ESTIMATING THE VALUE OF BRAND AND ATTRIBUTES FOR RETAIL FRESH BEEF PRODUCTS

By

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CHAPTER I

RETAIL BEEF MARKET

Changes in Consumer Demand and Preferences

In the 1980s and 1990s the beef industry steadily lost market share to the pork and poultry industries. Beef market share dropped from 44% in 1970 to almost 29% in 2003 (Lamb and Beshear, 1998; Schroeder and Mark, 2000). Although USDA's Foreign Agricultural Service forecasted a 17% increase in beef consumption worldwide since 1996, pork consumption is forecasted to increase by 48% and poultry consumption is expected to increase by 37% over the same time period (Schroeder, 2007). Worldwide, as a share of total meat consumption (beef, pork, poultry), beef consumption has declined from 28% in 1996 to slightly higher than 24% in 2006 (Schroeder, 2007). The poultry industry was the first of the meat industries to move to a consumer driven industry, followed by the pork industry. Both industries became highly vertically integrated which allowed them to drive down production costs and also relay consumers' wants and needs more efficiently between retailers, packers, feeders, and producers. Each party in the supply chain aimed their actions toward producing a product the final consumer desired. It is very important for the supply chain to produce a product efficiently enough to be competitively priced in the retail outlet. This is one area where the poultry and pork industries have overtaken the beef industry. It may be difficult for the beef industry to

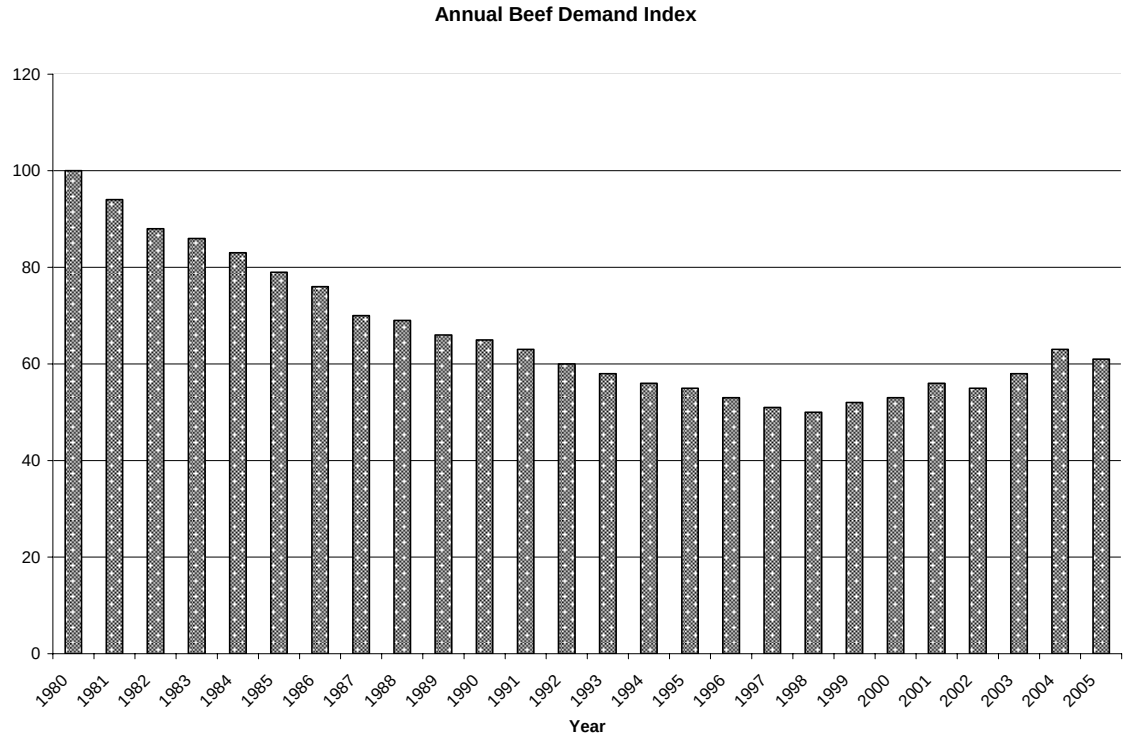
move toward a highly vertically integrated supply chain because it takes so much land and time to produce beef cattle. Cattle's comparative advantage rests with the ability to convert forage into meat, but requires more land. It is much too expensive and inefficient to raise cattle entirely in confinement type facilities similar to those for poultry and pork. Historically, the beef industry also has had many segments throughout the supply chain. There are many small producers who cannot enjoy the benefits of economies of scale. Both the cow-calf sector and the feedlot sector are very competitive and experience relatively little integration. On the other hand, the meatpacking sector has undergone the most consolidation in the beef industry with four major meatpackers; Tyson (IBP), Cargill (Excel), Swift & Company (ConAgra), and National Beef (U.S. Premium Beef) slaughtering approximately eighty percent of fed cattle (Khan, 2004). Unlike other meat industries, there was very little coordination between parties in the beef supply chain. Meatpackers have made the initial steps toward vertical coordination or integration by developing forward contracts, marketing agreements, and packer-owned feedlots (Lamb and Beshear, 1998).

Declining demand for beef has been attributed to competitive pricing, safety concerns, changing consumer lifestyles, quality issues, and convenience issues (Johnson and Ward, 2005). Ultimately, consumers expressed concern about the use of hormones, steroids, antibiotics, bacterial contamination, and health risks associated with red meat. Consumers demanded producers and food companies provide a consistent, tender, high quality product because they could not purchase such a product from a traditional grocery store meat case (Barkema, 2001; Fanatico, 2006).

In 1996, a national study was conducted by the National Cattlemen's Beef Association (NCBA) to assess the importance of consumer brands for fresh beef ("Today's Retail Meat Case: Evolving Trends Across the Country", 2004). When asked what would cause an increase in beef consumption, consumers answered that lower price or improved quality at the same price would be the most commanding forces driving increased consumption. Improvements in eating experience (tenderness, juiciness, consistent eating quality) came in a close second in motivating consumers to eat more beef. Percentages reported were the percentages of items scoring an 8, 9, or 10, with 10 being the best. Seventy-four percent of consumers answered that lower price was the biggest motivation to increase beef consumption. At the same time, 73% of consumers stated that if quality was improved with price remaining constant their beef consumption would increase. Improved quality was defined by consumers as leaner (70%), more tender (69%), more juicy (68%), and more consistent (64%).

One category that was analyzed in this study was branding. Sixty-five percent of consumers said their store's guarantee of quality would increase their level of beef consumption, while 61% answered a trusted brand would, and 48% of consumers reported that a well known brand name would influence their fresh beef buying decisions (Moeller, 1997). It is interesting to note that well known brand names did not score as high as a factor that would increase beef consumption.

As seen in Figure I-1, since 1998 the beef industry has been recovering, i.e. gaining almost 20 percent in lost demand (Cattlemen's Beef Board, 2007). What can the industry do to continue the growth seen recently?



Source: Cattlemen's Beef Board, 2007

Figure I-1. Beef Demand Index

Importance

This study is important because it identifies characteristics that are important to consumers when purchasing fresh beef products. If companies can identify specific characteristics that consumers perceive as important it will allow them to improve advertising and labeling schemes. By improving advertising and labeling, companies will be able to earn a higher return on their products and maintain a larger loyal customer base. This study is also a first attempt to identify the extent of product labeling and branding that currently exists in the retail meat case. Little research has been done in this area of the beef industry. Research that has been done is mostly survey and willingness-to-pay studies rather than observation of current market offerings in the retail meat case.

Little research has attempted to measure the value consumers place on specific product attributes from revealed preferences.

Objectives

The general objective of this study is to increase the probability of success for beef branding programs. More specifically, this study will determine the value consumers place on descriptive characteristics of fresh beef. It will also describe the extent of brands and labeling that already exists for fresh beef.

Beef Industry Marketing

Conventional Marketing

In the present production and marketing structure, the largest percentage of value is added after cattle leave the initial producer. Therefore, the producer receives a small share of the final price. Proof of the most value being added after cattle leave the producer is seen in beef price spreads from farm to retail. Farm to retail price spreads equaled $1.83/lb in 2001, peaked at $2.23/lb in 2004 and have fallen slightly in 2006 to $2.10/lb (USDA, 2006). Beef, along with most agricultural products, is considered a homogenous, commodity product making it difficult to receive a price premium in the retail outlet. Conventional marketing methods give little incentive to producers to produce higher quality beef. Conventional marketing, because the supply chain is segregated, makes it extremely difficult to transmit market signals back to producers efficiently. It is remarkably difficult to develop product differentiation, but a carefully planned and carried out marketing plan can make differentiation more likely to occur.

Studies have shown that consumers are willing to pay more for certain brands, which compounds the fact that product differentiation is possible and does occur (Makens, 1964).

Alliances

The creation of an alliance serves to unite producers in order to obtain a higher price for their cattle from buyers in the market. Alliance producers have similar goals and strive to produce similar products. The alliance may set specific standards that must be met in order for cattle to be sold under the alliance name. Alliances can integrate horizontally (producers) and they can integrate vertically (producers, feeders, packers and retailers). Alliances do not guarantee profits, but make it more probable to receive a profit if a producer's cattle fit the description of "alliance" cattle (Fanatico, 2006). Cattle sold through an alliance are usually sold on a grid pricing scheme. Grid pricing pays a base price for acceptable cattle and pays price premiums to cattle which perform better while paying price discounts for cattle whose performance is sub par. It is very important to avoid discounts. Most alliances will supply the producer with carcass and yield data for their cattle so it will be easier for producers to meet specifications set by the alliance. In addition, feedback on their cattle's slaughter performance makes it easier for producers to increase quality, reduce production costs, and in turn, increase profitability (Lamb and Beshear, 1998).

Marketing Cooperatives

Marketing cooperatives are a form of an alliance. They are producer-owned and usually have written bylaws members must follow. Marketing cooperatives generally take cattle from members and pool them by sorting them into separate lots by similar characteristics including weight and sex. Studies have shown that uniform lots bring higher prices from buyers than non-uniform lots. A study by Utah State University found that buyers paid almost $1.70/cwt. more for uniform lots of cattle as opposed to non-uniform lots of cattle. Therefore, a producer selling a 500 pound calf would take home $8.50/hd. more than if he had sold his calf in a non-uniform lot. Cooperatives are beneficial to smaller producers who do not have enough calves to make up the ideal size lot for most buyers. Ideal lot size is roughly 50-55 head for livestock markets and up to 240 head for satellite auctions (Bailey, 1996). Marketing cooperatives require commitment from producers. They must be willing to work hard, cooperate with other ranchers and follow the rules of the marketing cooperative (Fanatico, 2006).

Alternative/Niche Marketing

There are a sizeable number of consumers whose needs are not being met by conventional marketing channels. Therefore, smaller producers have found it profitable to differentiate their product and market to smaller niche markets. These producers receive premium prices for their products because they guarantee uniqueness of their products and their unique attributes meet consumers' needs. Considering the decline in beef market share, these smaller producers took the initiative to market their own products. Many of the producers who market their beef with alternative methods use descriptions

such as lean, organic, natural, pasture-finished, and grass-fed. They also make a distinction of no antibiotics, locally raised, family farm produced, and humanely produced. As differentiated marketing becomes more popular, regulations have been adapted to limit what types of products can carry specific labeling terms. Producers who wish to market their beef by an alternative method should consider the time commitment and skills required to be successful in an alternative market. Before labeling products with the terms mentioned above, the product label must be approved by the Labeling Review Branch of the United Stated Department of Agriculture (Fanatico, 2006). The approval procedure consists of a label application, a prepared label, and an Operation Protocol that describes, in detail, production practices, including ration formulations, sick animal protocol, herd health management, as well as other facts relating to the proposed claim. Additionally, labels are not allowed to use the term "chemical free" (Fanatico, 2006).

There are added costs from producing highly differentiated products like those discussed above (Lusk, 2001a). These costs come from:

- Production and segregation associated with the need for individual identity preservation
- Segregation throughout the entire supply chain; vertically integrated producers may be able to manage this more efficiently
- Loss of efficiencies in production which may occur if differentiation is based on the elimination or restriction of something (e.g. discontinue use of growth hormones)
- Inconsistent quality for an attribute important to consumers.

Labeling

Labeling is used to convey information about products to consumers. Labels can provide information about weight, ingredients, and production methods.

Lean

Lean beef targets the typical consumer because a growing percentage of consumers are focusing on low-fat and fat-free foods. For example, Laura's Lean beef combines an unconventional product with conventional marketing methods. Laura's Lean beef is based in Kentucky and serves markets in nine states. The company was started in 1985 as a "value adding experiment to a family stocker operation", and its products are endorsed by The American Heart Association. The company now contracts with family farms to raise lean breeds such as Limousin and Charolais. Laura's Lean beef products, both lean ground beef and steaks; differ from conventional beef because products are produced from cattle that are raised using natural feeds with no routine antibiotics or hormones and have less than 8% fat content. Rotation grazing is an important part of the program and low-stress handling is emphasized. Cattle are pasture finished with a very short period of grain finish before slaughter. Laura's Lean beef has developed into a large commercial business that mainly deals with large uniform lots of cattle, in both weight and breeding. This means they do not work well with small producers unless those producers are involved in a cooperative or cattle pool (Fanatico, 2006; Laura's Lean Beef, 2007).

Organic

Prior to 1999, the United States Department of Agriculture (USDA) did not allow companies to label livestock products as “organic”. Now companies can use “organic” labeling after filing an application and meeting all the general requirements. The requirements are shown in Table I-1. The requirements to carry an “organic” label are very strict compared to the requirements for using other labeling terms (Fanatico, 2006). The United States Department of Agriculture has developed regulations in regards to labeling terms. In October, 2002 organic labeling restrictions, in particular, were revised making organic labeling regulations much more rigid. Any firm whose total organic sales is $5,000 or more must be certified by USDA-accredited certifying agents. In order to be labeled organic, products must consist of at least 95% of organically produced ingredients. There is another organic labeling alternative, “made with organic ingredients” which requires at least 70% of ingredients used to be organic. If using this label, the label only contains up to three organic ingredients. Any products that contain less than 70% organic ingredients may not use an organic label or USDA organic seal anywhere on the package (“Labeling and Marketing Information”, 2007). In order to market products that are labeled organic, extreme amounts of work and commitment should be expected. For example, it takes 3 years for crops to be certified organic (Wulf, 2007). Animals produced organically must have access to pasture and confinement must be kept to a minimum.

Natural/Pasture Finished

USDA policy states that fresh beef products can carry the "natural" label if there are no artificial ingredients such as color, flavor, or preservatives, and if beef products are minimally processed. Nearly all fresh beef products qualify to be marketed under the "natural" label (Wulf, 2007). It is strongly recommended that the label define the use of

Table I-1. Alternative Marketing Terms

Term	Requirements
Lean	- 25% less fat than industry avg.
Natural	- no artificial ingredients (color, flavor, preservatives, etc.) - minimally processed - recommended to include and explanation of the use of "natural"
Pasture Finished	- high quality forages dominate feeding practices with small amount of grain supplements
No hormones	- provide sufficient documentation to prove no use of hormones during the production process
No antibiotics	- provide sufficient documentation to prove no use of antibiotics during the production process
Chemical free	- not allowed to be used on any label
Organic	- USDA permit - calf from certified cow - 100% organic feed from 30 days of age - humane treatment at all stages - antibiotics, wormers, growth promoters or insecticides must be on program list of approved natural products - contain at least 95 % organically produced ingredients
Made with organic products	- contain at least 70 % organic ingredients - label can contain up to 3 organic ingredients

Source: USDA FSIS, 2007 and Fanatico, 2006

the term “natural”. Beef carrying the “natural” label is usually pasture-finished. These types of products are targeted at consumers who are buying with environmental concerns in mind (Fanatico, 2006; “Today’s Beef Options”, 2006). USDA is currently developing more specific definitions for “natural” labeling to be used on meat products (Wulf, 2007). “If the regulations and requirements remain vague on all natural labeling, it could cause a loss in significance to the consumer”, stated Dana Stahl, manger of USDA’s Quality Systems Verification Programs (Wulf, 2007).

One example of a well known natural meat company is Coleman Natural Meats. Coleman Natural Meats is based in Colorado and is the largest producer of certified, all-natural beef in the United States. They were the pioneer to the “natural” label. Coleman contracts with over 600 ranchers to produce hormone and antibiotic free cattle. Coleman markets towards “green consumers” because they provide all natural products and educate ranchers about grazing practices that improve range conditions (Fanatico, 2006; “Today’s Beef Options”, 2006).

Even in light of the lenient regulations for the “natural” label, the 2004 National Meat Case Study, it was found that only 2% of beef cuts and 7% of ground beef carried a natural claim on its label (“Today’s Retail Meat Case: Evolving Trends Across the Country”, 2004).

United States Department of Agriculture Quality Grade

Another way to convey information about the quality of the product to consumers is through a USDA grade. Federal grading has three main functions. First is to provide information to producers to assist in receiving prices that correspond to

the quality of livestock they produce. Second is to provide consumers, retailers, and institutions with meat supply that is uniform in quality and possesses desirable characteristics. Third is to aid in promotion and marketing of quality products to consumers (Morris, 1999).

Federal government beef grading dates back to 1923, when the U.S. Shipping Board asked USDA to grade beef carcasses according to prospective standards to assure uniform quality in contract beef purchases. During the next two years, many government agencies, companies, and institutions began requesting the voluntary, fee-based service. As the grading service became better known, it was requested by steamship companies, railroads, large hotels, hospitals, and eventually chain stores and other retail meat dealers. By 1925 there was an organized effort within the livestock and retail meat industries to establish a federal beef grading and stamping program in all federally inspected plants. The objective of the efforts was to make benefits of a grading service available to all consumers. In 1926, the USDA Secretary published official United States Standards for Market Classes and Grades of Carcass Beef, and by 1927 a one year experimental federal beef grading program was in place. Initial packer response to the grading program was not desirable, but after public education, the program proved to be both practical and feasible. In addition, it proved to be able to prevent deception for both producers and consumers of beef products. The program emerged as a formal, voluntary, fee-for-service program in 1928 and remains this way today.

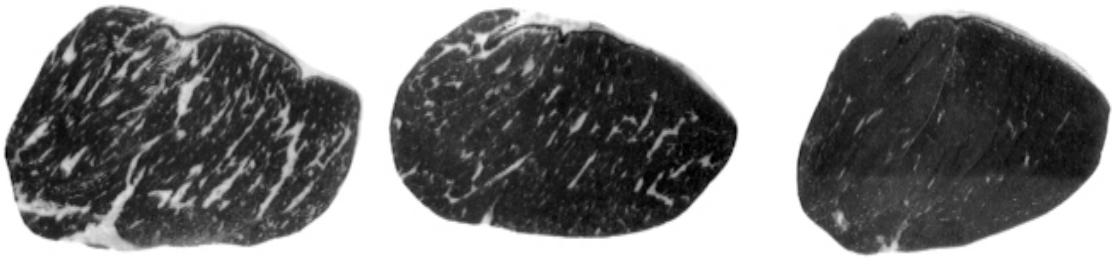
USDA grading remains voluntary, however; most retailers and restaurants require beef they purchase to be USDA graded. Therefore, it is in the best interest of

packing companies to request and pay for grading services in order to gain access to all markets. Packers also use the USDA grade in their marketing scheme. Graders' salaries, system supervision, and system management are paid for by a cost-recovery system. Average grading costs are approximately 1/20 of a cent per pound, equaling $0.38 per carcass graded (Morris, 1999).

Meat graded on the USDA scale can be graded Prime, Choice, Select, Standard, Commercial, Utility, Cutter or Canner. Prime is usually served at restaurants. A small amount of USDA Prime cuts are sold at retail outlets. Choice, Select, and Standard are the most common grades found in retail markets, with Standard being the most infrequent. The three lower grades, Utility, Cutter, and Canner are seldom, if ever, sold at retail. At times the three lower grades are used to make ground beef and other manufactured meat products. Prime, Choice, Select, and Standard are cut from young beef, while the three lower grades come from older, mature beef. Cuts of beef are graded according to cattle sex, maturity, the quality of the lean muscle, and extent of marbling of the animal. Marbling refers to the internal fat content of the meat and does not relate to trim fat. The more abundant marbling, the higher grade the cut will receive. Marbling is a strong indicator of the amount of tenderness, juiciness, and flavor (USDA AMS, 1995).

Prime graded beef is the most tender and juicy because it has the highest ratio of fat to red meat. Marbling is abundant in Prime graded beef. Choice beef is also high quality beef, but has less marbling than Prime beef. Select grade beef is leaner than both Prime and Choice because it has a lesser degree of marbling (USDA AMS, 1995; "The

Meat Buyer's Guide, 2007). A comparison of the amount of marbling can be seen in Figure I-2.



Prime Choice Select

Source: USDA AMS, 1995

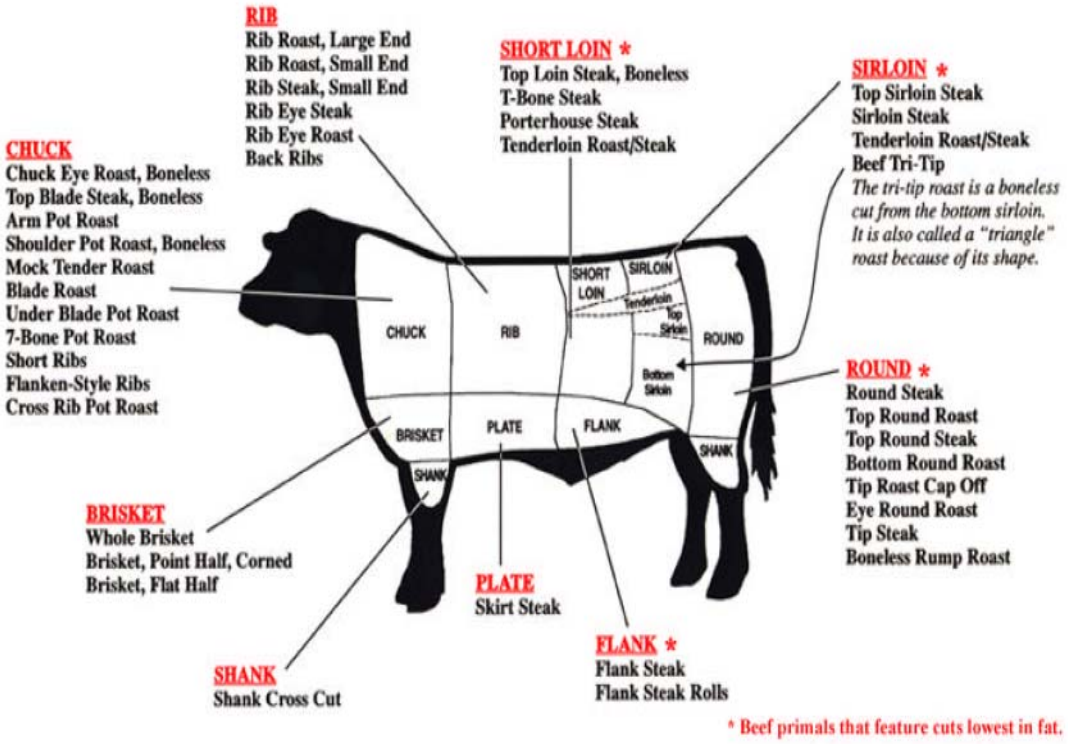
Figure I-2. Marbling

The USDA grading system should work to reduce search and transaction costs while providing more information to the consumer. The current USDA grading system has become less useful to consumers because it is somewhat confusing to the layman. Recently, more consumers have expressed a desire to be able to purchase leaner, healthier beef products. With the current system, those cuts receiving the highest grades are not cuts a health conscious consumer would want to buy. In 1975, new USDA rules were approved that relaxed beef grading standards, so that more beef could be graded Prime and Choice. Because more beef was able to be graded Prime and Choice it made the difference between Choice and Select less. With less actual difference between the two grades it does not allow the label to communicate as much information to the consumer (Cox, McMullen, and Garrod, 1990). Consumers' preferences vary greatly and, therefore; more education for consumers on how beef is graded and the specific characteristics of

each grade level could be beneficial to allow them to match their taste preferences with the correct grade.

Retail Meat Cuts

Primal cuts are the main beef cuts from a whole carcass and are made up of groups of muscles from the same region of the carcass. Primal cuts can be further divided into sub-primal cuts. Sub-primal cuts and smaller cuts that are taken from sub-primal cuts produce retail cuts seen in grocery stores (Hormel, 2007). A complete chart of retail beef cuts can be found in Appendix II.



Source: Beef It's What's For Dinner, 2007

Figure I-3. Beef Cuts

Chuck Primal- The chuck primal cut extends from the neck to the fifth rib, including the shoulder blade and upper arm (Figure I-3). Chuck primal is usually divided into two sections or sub-primal cuts, blade and arm. The chuck area has extensive connective tissue that melts when cooked, thus serving to add flavor and tenderness. From this primal cut, data were collected on chuck roast and ground chuck products. Both chuck arm roast and boneless chuck roll (Figure I-4) data were collected and together make up the observations for the variable, chuck roast.

Chuck Arm Roast

Boneless Chuck Roll

Source: The Meat Buyer's Guide, 2007

Figure I-4. Chuck Roasts from the Chuck Primal Cut

The chuck roast is a continuation of the ribeye meat. It is comparable to ribeye meat (ribs 6-12), but is located in the chuck primal region (ribs 1-5). Ground chuck is made from lean trim chuck from other chuck region cuts. Ground product coming from this area may be labeled as ground chuck or ground beef, but in order to be labeled as ground beef it must be at least 70% lean (Hormel, 2007).

Rib Primal - The second primal cut is the rib area (Figure I-3). The rib primal is the area contained between the 6^{th} and 12^{th} ribs. Cuts from this area are

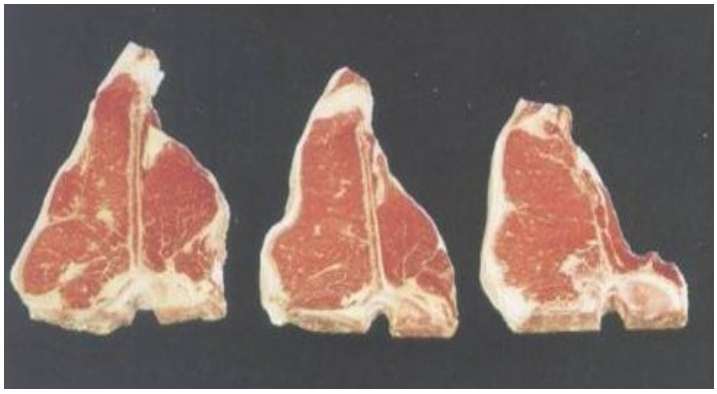
very tender and produce some of the best steaks and roasts. Ribeye steak (Figure I-5) was the only cut that was evaluated in this study from the rib primal cut. The ribeye is cut from the ribeye roast where the 6th through the 12th rib bones have been removed (Hormel, 2007).

Ribeye steak

Source: The Meat Buyer's Guide, 2007

Figure I-5. Ribeye Steak from the Rib Primal Cut

Loin Primal- The short loin sub-primal cut (Figure I-3) is from the wholesale cut loin and is the anterior (front) portion of the loin. The loin is divided into the short loin and sirloin and can be considered separate primal cuts or as one primal cut. The short loin contains the 13th rib and the small of the back. Cuts from this area are usually very tender because these muscles are used the least. Cuts from this region sometimes lack the flavor of other cuts that contain more fat and connective tissue. T-bone steaks (Figure I-6) are a crosscut from the short loin, consisting of tenderloin and top loin. The T-bone contains less of the tenderloin than the Porterhouse steak, another crosscut from the same primal area (Hormel, 2007). T-bone steaks were the only cut used from the short loin.



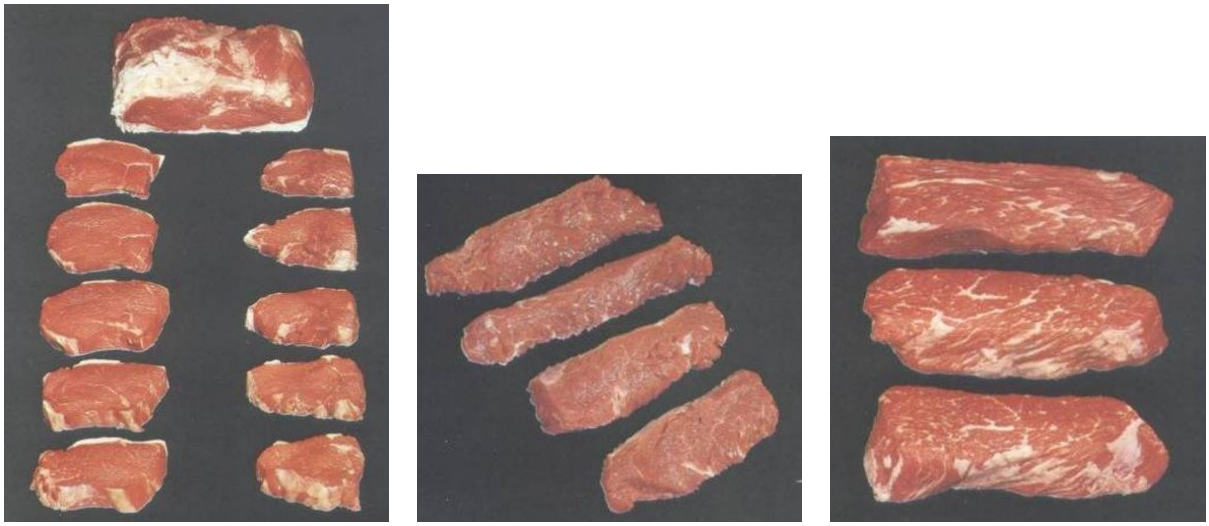
T-bone steaks

Source: The Meat Buyer's Guide, 2007

Figure I-6. T-bone Steaks from Loin Primal

Sirloin steaks come from the sub-primal cut sirloin (Figure I-3).which is situated within the loin. The sirloin is found between the short loin and the round, including the hip section ending at the socket of the pelvis (Hormel, 2007).

Three cuts of sirloin steaks were used for data collection for this study, top sirloin, bottom sirloin and tri-tip sirloin (Figure I-7). As a group, these three cuts made up the data for the sirloin dummy variable.



Boneless Top Sirloin steak Bottom Sirloin steak Tri-tip Sirloin steak

Source: The Meat Buyer's Guide, 2007

Figure I-7. Sirloin Steaks from Loin Primal

Round Primal- The round primal (Figure I-3) area contains the most cuts that were observed for this study. The round primal is the most anterior portion of the carcass. It includes the hind shank and the rump. There is a higher fat content in these cuts, helping to increase tenderness and flavor in the meat. Bottom round roast (Figure I-8) is cut from the outside muscle from the upper leg (Hormel, 2007).

Bottom Round roast

Source: The Meat Buyer's Guide, 2007

Figure I-8. Bottom Round Roast from Round Primal

From the sub-primal eye round, eye round roast (Figure I-9) is the boneless eye muscle of the bottom round. In addition, the eye round steak (Figure I-10) is cut from the eye round roast.

Eye of Round Roast

Source: Aggie Meat, 2007

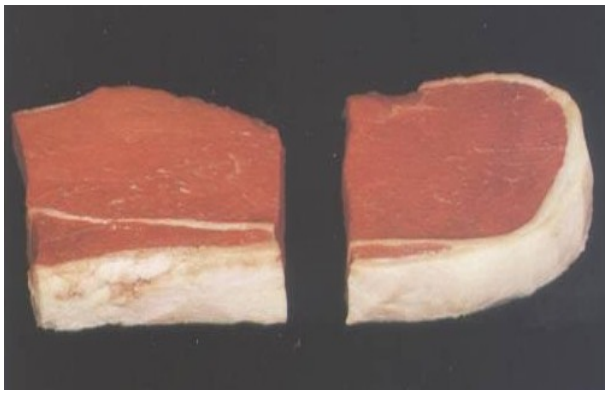
Figure I-9. Eye of Round Roast from the Round Primal

Eye of Round steak

Figure I-10. Eye of Round Steak from Round Primal

Top round roast, top round steak (Figure I-11) and round steak (Figure I-12) are cut from the sub-primal top round. Top round roast (Figure I-11) is from the inside muscle of the upper leg. The top round steak (Figure I-11) is a thick steak that is cut from the top round roast, whereas, the round steak (Figure I-12) is merely a thinner cut from the top round roast.

Top Round roast



Top Round steak

Source: The Meat Buyer's Guide, 2007

Figure I-11. Top Round Roast and Top Round Steak from Sub-primal Top Round

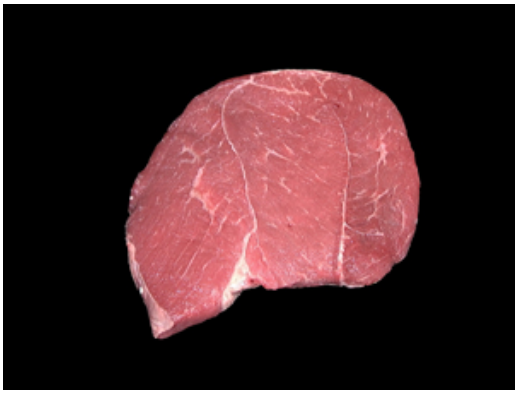
Round Steak

Source: Aggie Meat, 2007

Figure I-12. Round Steak from Sub-primal Top Round

Cuts from the sub-primal round tip, are the round tip roast and the round tip steak (Figure I-13). Round tip roast is from the front of the leg from the hip to the knee. The round tip steak is cut from the untrimmed round tip roast (Hormel, 2007). It should be noted that all round steak, regardless of type, collectively make up the category “round” for the purpose of this research.

Round Tip Roast



Round tip Steak

Source: Aggie Meat, 2007

Figure I-13. Sub-primal Round Tip Cuts Round Tip Roast and Round Tip Steak

Bottom Round steak

Source: The Meat Buyer's Guide, 2007

Figure I-14. Round Tip Sub-primal - Bottom Round steak

Plate/Flank Primal- Ground beef comes mainly from the plate primal and flank primal (Figure I-3). Ground products may also come from lean trimmings from the rib, loin, chuck and round primal areas. The plate primal, also known as the short plate, is positioned on the underside of the animal below the rib primal. Similarly, the flank is situated on the underside of the animal below the loin primal. Ground beef (Figure I-15) can be made from trimmings from both of these primal cuts (Hormel, 2007). Fat content of ground beef should not exceed 22% unless specified by the purchaser. In no case may the fat content be higher than 30% ("The Meat Buyer's Guide", 2007).

Ground beef

Source: The Meat Buyer's Guide

Figure I-15. Ground Beef

Branding Categories

The promise to consumers coming from branded beef is consistency in taste, tenderness, juiciness, and flavor. Each program has its own requirements that must be met in order to carry a particular brand name. Currently, there are three general brand categories. First, is breed specific brands. This type of brand will choose cattle only from a certain breed to carry its label in supermarkets. An example of this branding is Certified Angus Beef, which only uses cattle that are 51% or more black hide. Additionally, CAB is only made from upper 2/3 Choice and Prime graded beef. Second, is company specific branding. These branding programs take cattle from any breed as long as they meet specifications for grade, marbling, size, types of feed used, and use of pesticides, antibiotics, and growth hormones set by the branding company. An example of company specific branding is Cargill's Sterling Silver Premium Beef. The final category of branding is store brands. Meat is branded with a retail store's brand after being cut and packaged in the store. An example is City Market and King Sooper's Cattlemen's

Collection Beef which is produced specifically for Kroger by Excel Corporation ("Today's Beef Options", 2006).

Table I-2. Brand by Category

Brand Category	Brand Name
Special	
	Coleman Natural Meats
	Davis Mountains
	Laura's Lean Beef
	Maverick Ranch
	Natural Well
	Naturewell
	Wild Harvest
Program/Breed	
	Angus Pride
	Certified Angus Beef (CAB)
	Butcher's Premium Angus
Store	
	Homeland
	Moran's
	Rancher's Reserve
	Kirkland Signature
	Blue Ribbon
Other	
	B-Bar
	Grill Classics
	Grill Ready Classics
	Steakhouse Choice
	Century Farm

However, for the purpose of this research branded products were divided into five categories (Table I-2). The first category, Special, contains brands that carry labels claiming all natural, organic, no antibiotics, or no hormones used. Brands placed in the Program category are brands that are program or breed specific such as Certified Angus

Beef. The Store brand category includes brands cut and packaged for specific grocery store chains such as Homeland or Rancher's Reserve which is Safeway's fresh beef line. Generic products are products which do not carry a specific brand. The Other category contains those products which could not be identified in one of the other brand categories. Brands were included in the "Other" category if enough information could not be collected about the brand to place in another category.

Market Trends

Branded beef products are likely to continue to gain popularity, especially natural and organic products. In 2005, natural beef accounted for 1% of beef sales and has an annual growth rate of 20% (Bowser, 2007; Wulf, 2007). In 2005, approximately 375,000-425,000 of 100 million head of U.S. cattle qualified for an all natural beef program (Bowser, 2007). Many consumers are focused on a healthier lifestyle and express concern over the use of antibiotics and hormones as well as the humane treatment of animals. "Supermarket Guru," Philip Lempert states, "I hear from consumers that they love beef, but they're concerned (Gordon, 2006)," indicating that grass-fed and organic beef will continue to gain popularity. The Food Marketing Institute confirms the growth of natural and organic products in their 2005 study, showing that 50% of stores reported their natural and organic offering was their second most popular segment. In early 2006, Tyson alone introduced two new natural beef product lines, Star Ranch Natural Angus and Certified Angus Beef Natural (Gordon, 2006).

Colorado State University animal science professor, Tom Field, anticipates branding will have to continually evolve to hold consumer interest. The interest will

come from the “story” behind the brand rather than the actual product (Gordon, 2006; Wulf, 2007). He believes that products will be less important to consumers because they can easily be duplicated. People want to buy an experience. For example, Oregon Country Beef claims: “Our product is more than beef; it’s the smell of sage after a summer thunderstorm, the cool shade of a Ponderosa Pine forest. It is 80-year-old weathered hands saddling a horse in the Blue Mountains, the future of a 6-year-old in a one-room school on the High Desert. It’s a trout in a beaver-built pond, haystacks on an Aspen-framed meadow. It’s the hardy quail running to join the cattle for a meal, the welcomed ring of a dinner bell at dusk (Gordon, 2006).” Along the same lines is consumer concern about food safety and quality. Consumers are demanding to know the “story” of how food is produced and the traceability of products from farm to fork (Gordon, 2006).

CHAPTER II

CONCEPTUAL FRAMEWORK AND PREVIOUS RESEARCH

Consumer Theory

A demand curve shows the quantity of product that will be purchased at a given price. Consumer demand is a function of income, prices for substitute products, price of the product itself, consumer expectations, number of buyers in the market, and tastes/preference. Tastes and preferences represent the intrinsic assets that goods can provide. This is especially true with fresh beef because some attributes such as tenderness and flavor are intrinsic and can not be visually evaluated. Market researchers, advertisers, and manufacturers also act as though these intrinsic qualities exist. Traditional consumer theory does not account for intrinsic value that good possess, but states that consumers derive utility directly from the good. Lancaster developed a new approach to consumer theory, which takes into account utility could be derived by the consumer from characteristics of the goods (Lancaster, 1966).

People's tastes and preferences can change at any time without an observable explanation as to why they have changed. With this in mind, hedonic pricing theory is used to estimate value placed on particular characteristics of fresh beef products (Mankiw, 2007).

By using hedonic models, implicit prices for different product attributes will help explain the role consumer tastes and preferences play in consumer demand for retail beef. Hedonic pricing theory is an easy way to capture the idea that consumers demand a product with multiple attributes and more than one factor affect their purchase decision. The consumer goods characteristics models look at product heterogeneity coming from products having different kinds of characteristics, amounts, or both (Ladd and Suvannunt, 1976). With this in mind, a consumer derives their total utility from the total bundle of characteristics that are purchased for a good.

Hedonic Model

Hedonic pricing uses market transactions for differentiated goods to determine the value of key product attributes revealed to purchasers. Beef is a product composed of both observable and unobservable characteristics, and differences in quality can be real or perceived by the consumer. Therefore, in order to describe pricing behavior, a hedonic, or attribute based, methodology has been chosen. Since consumers have differing tastes and preferences, retailers must use pricing, presentation (package material and label), and branding to influence purchasing decisions. thus, all mentioned attributes have been surveyed.

Differences in quality can be real or perceived by consumers. Branding becomes important to consumers when there are quality differences in products that are offered in the marketplace. Therefore, it is assumed brands indicate superior quality of products whose quality cannot be measured by a consumer's visual inspection. Brands are simply an assurance of quality (Png and Reitman, 1995). Fresh beef consumers are demanding

assurance of quality and consistency, so branding beef products could be very beneficial for producers, suppliers, and retailers. Since branded products indicate a product of superior quality, the product will have a higher retail price.

Hedonic prices are defined as the implied prices of characteristics and are revealed from observed prices of differentiated products and the specific amounts of characteristics associated with them (Rosen, 1974). The hedonic method is an indirect valuation method where we cannot directly observe the value that consumers have for a specific characteristic, but infer value from market transactions (Taylor, 2003). For this research, it is assumed that consumers are willing to pay prices that were observed in the fresh meat cases. A heterogeneous product refers to products whose characteristics vary, creating different varieties of a commodity even though they are sold in a single market (grocery stores). The variation in product attributes gives rise to variation in price within the fresh beef market in grocery stores. The hedonic method relies on market transactions, or in this case, available market transactions, to determine the value of key underlying characteristics (Taylor, 2003).

Hedonic analysis contains two parts. The first part is the most commonly used, where hedonic price function is estimated with the differing price and characteristic information for the commodity. The result is implicit prices of varying characteristics that reveal details on the underlying preferences for the characteristics. The second step is dependent on the first, where the implicit prices for varying characteristics are used to derive demand functions for each characteristic (Taylor, 2003). This research uses the first stage of hedonic analysis.

Hedonic analysis has dated back to 1928 by Fred Waugh's analysis of quality factors influencing asparagus pricing. Hedonic method is very well developed and documented. Refer to Rosen and Taylor for a complete theoretical discussion.

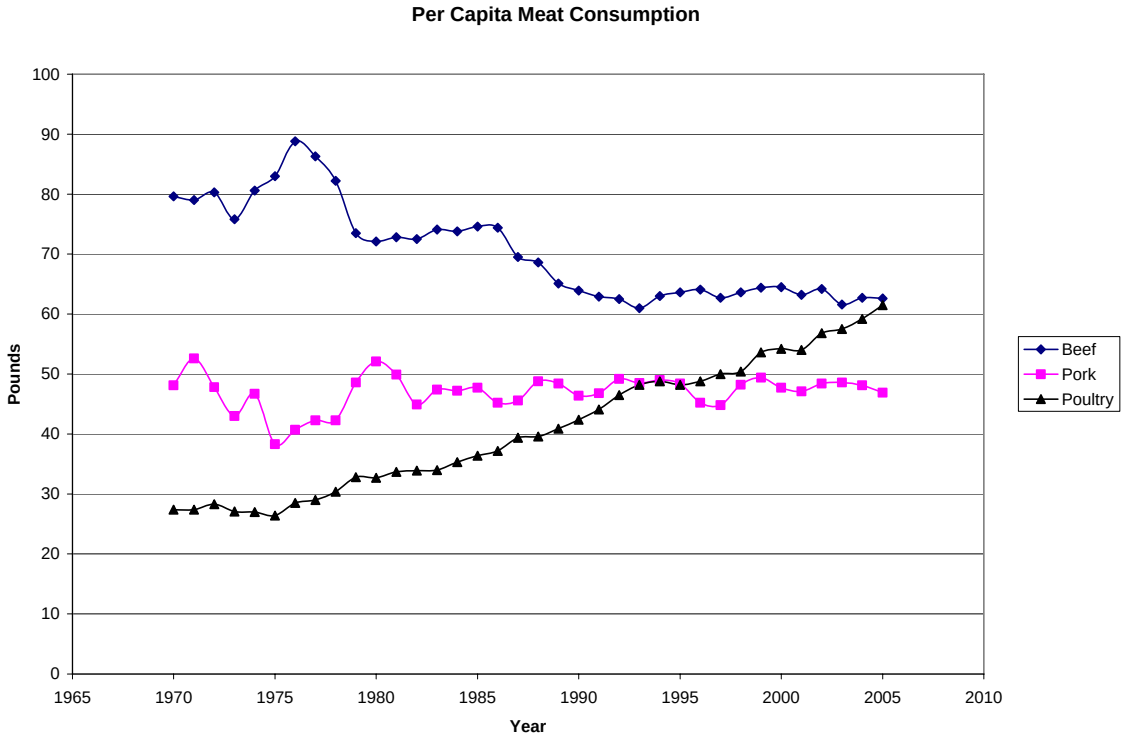
Literature Review

Little previous literature focuses on what is available in the retail meat case, but rather has focused on preferences of consumers, both by survey and their actual purchase decisions in controlled experimental auctions. This section will summarize several studies of revealed preference.

Revealed Preference

There have been several studies done where consumers are asked to state their preferences or participate in a survey where their revealed preferences, or what they actually do in a buying situation, can be recorded. Another important segment of research that has been done is consumers' willingness-to-pay for varying attributes of fresh beef cuts. In this section several different studies looking at factors that affect a purchase decisions will be reviewed.

Factors Affecting Beef Consumption- Based on the 1994-96 and 1998 Continuing Survey of Food Intake by Individuals (CSFII), most beef is eaten at home. Of all meat consumed in the United States, beef accounted for fifty-six percent, or approximately 60 lb/year (Figure II-1) of all red meat consumption (Davis and Lin, 2005).



Source: United States Department of Agriculture, 2007

Figure II-1. Per Capita Meat Consumption

The findings from the CSFII study found that health factors are a major concern for American consumers. More specifically, consumers expressed concern about calorie content, fat content, and cholesterol level of fresh beef cuts (Davis and Lin, 2005).

There were many demographic trends found with this study. Lower income households report eating more beef than both middle and high income consumers reported. On average, low income consumers ate four more pounds of beef than their higher income counterparts. Most beef is also eaten at home, as indicated by nearly 65% of beef being purchased at retail outlets (Davis and Lin, 2005).

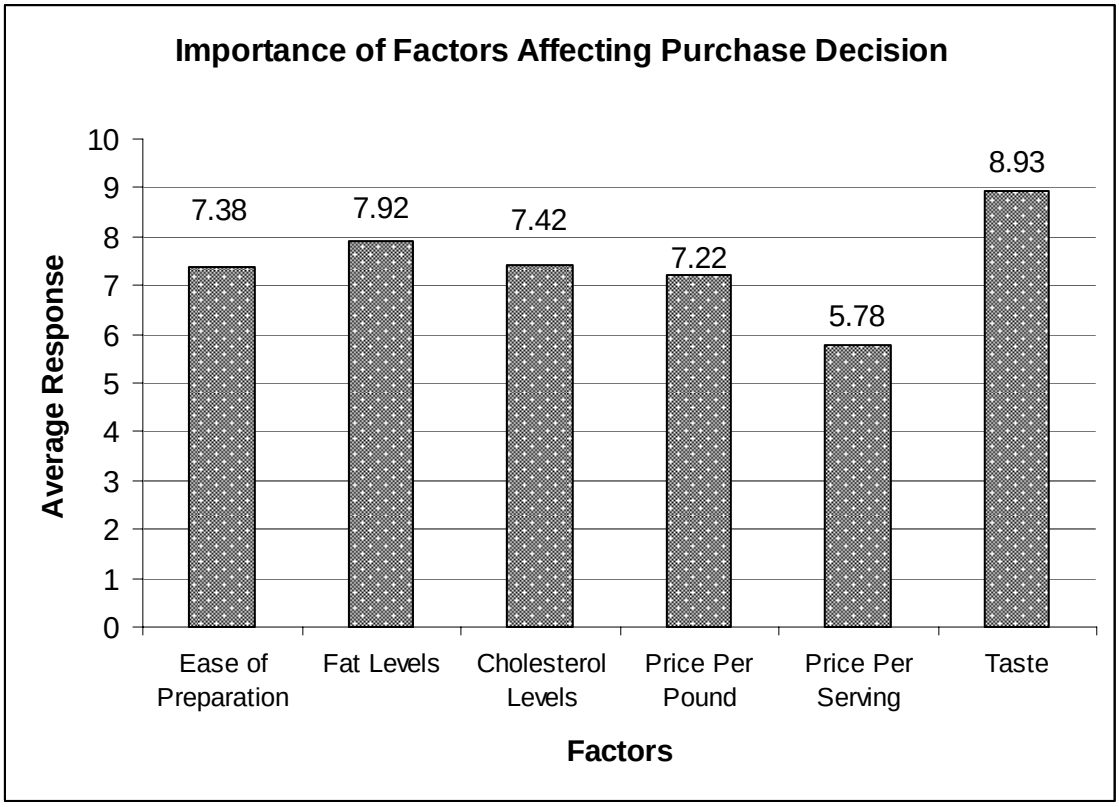
Factors Affecting Purchase Decisions- In order to understand a market, product characteristics which are important and valued by consumers must first be identified.

This can be a difficult task because changes in consumer lifestyles, tastes, and preferences are constantly changing causing the level of importance for different product characteristics to vary (Erikson et. al, 1998).

One study conducted by Dale Menkhaus et. al (1993) first defined broad categories of characteristics that carry high importance to consumers. They were health, convenience, appeal, and merchandising. Each broad category was divided into more specific traits that consumers are concerned with and which affect their purchase decision. Regarding health concerns the top characteristics that concern consumers are calorie content, use of artificial ingredients, and untrimmed product. Consumers demand more convenience from the beef products they purchase. Menkhaus et. al. found that consumers express concern over not being able to prepare the product in a microwave oven. Consumers also communicated, through this study, that their biggest concern is tough beef products. They also indicated beef cuts are too expensive and the product cannot be entirely viewed in the package (Menkhaus et. al, 1993). Results found through this study are confirmed by later studies. Many studies have found that health issues are very important to consumers and attributes that promote a healthier product will be rated very high by consumers, providing an opportunity for price premiums (Erickson, 1998; Capps and Schmitz, 1991).

A 1991 study by Wayne Purcell found that cholesterol, fat level, quality and convenience of preparation are non-price factors that influence consumers' buying behavior. Continuation of this research done in 1993 by Purcell confirmed earlier findings. His results are shown in Figure II-2. In his survey, respondents were asked to rate, on a scale of 10 = very important and 1 = not important, the importance of factors

affecting their purchase decisions (Purcell, 1993). It is interesting to note that there are several factors consumers rate as more important than price.

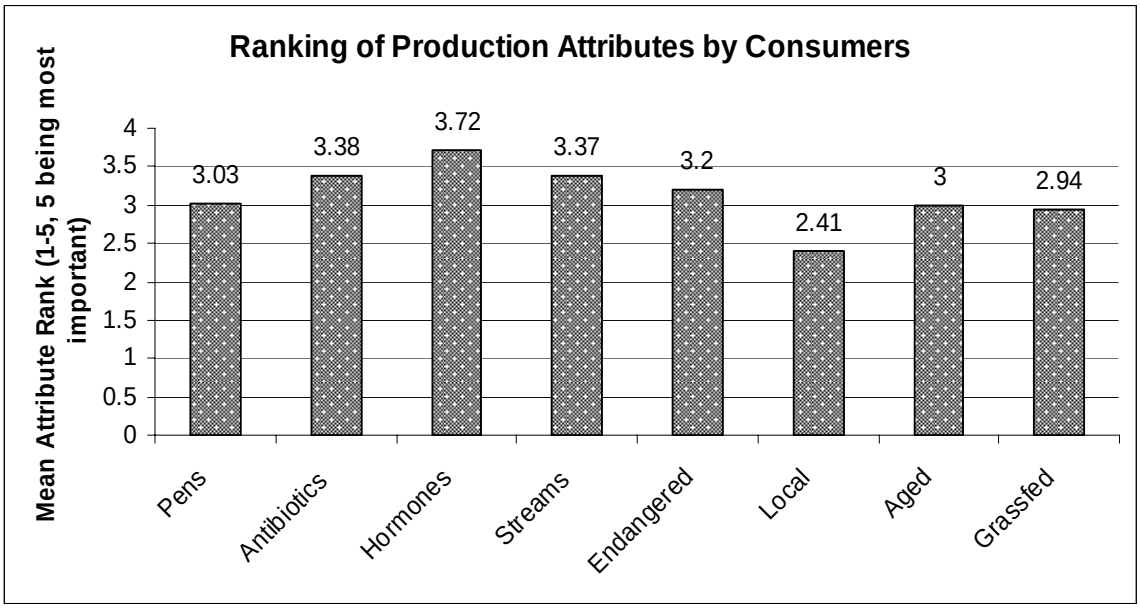


Source: Purcell, 1993

Figure II-2. Purchase Decision Factors

It is also important to note that shopping choices may also change based on the availability of preferred product attribute. The *Progressive Grocer* reports that 99% of people shop at supermarkets, 76% shop at discount stores, 29% at warehouse club stores, and 11% shop at specialty stores (Janoff, 2000). Consumers are willing to shop around to look for the best fit for their preferences. Therefore, it will be beneficial for stores and branding programs to consider the type of consumer they are hoping to attract to their store and to their product (Grannis, Thilmany, Sparling, 2002).

One study conducted in the intermountain region of Colorado, Utah, and New Mexico determined the importance of production practices on their purchase decisions, in essence the story behind the product. The attributes that consumers were asked to rank on a scale from one to five, with five being the most important, were no small or crowded pens, no antibiotics, no growth hormones, grazing managed to protect streams, grazing managed to protect endangered species, animal born and raised within 250 miles, meat aged at 14 days, and grass fed (Figure II-3). Notably, the use of chemical additives is an important factor in consumers' purchase decisions, while beef that is raised using grass-fed production methods was the second least important attribute (Grannis and Thilmany, 2000).

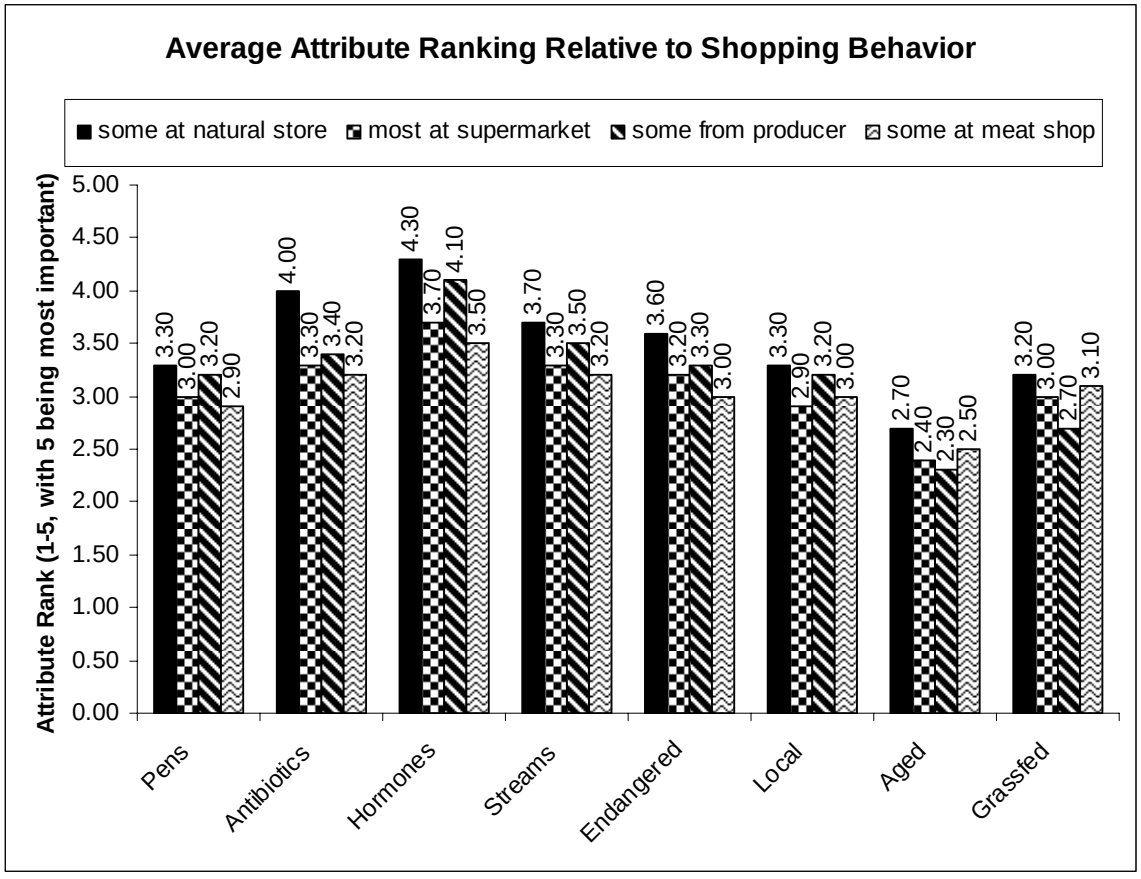


Source: "Marketing Opportunities for Natural Beef Products in the Intermountain West" Grannis and Thilmany, 2000

Figure II-3. Production Attributes

Grannis and Thilmany (2000) also assessed how consumers' ranked production attributes according to their shopping habits. According to the findings

most shoppers were sensitive about chemical additives being used as well as environmental preservation issues regardless of where they made a majority of their fresh beef purchases (Figure II-4).



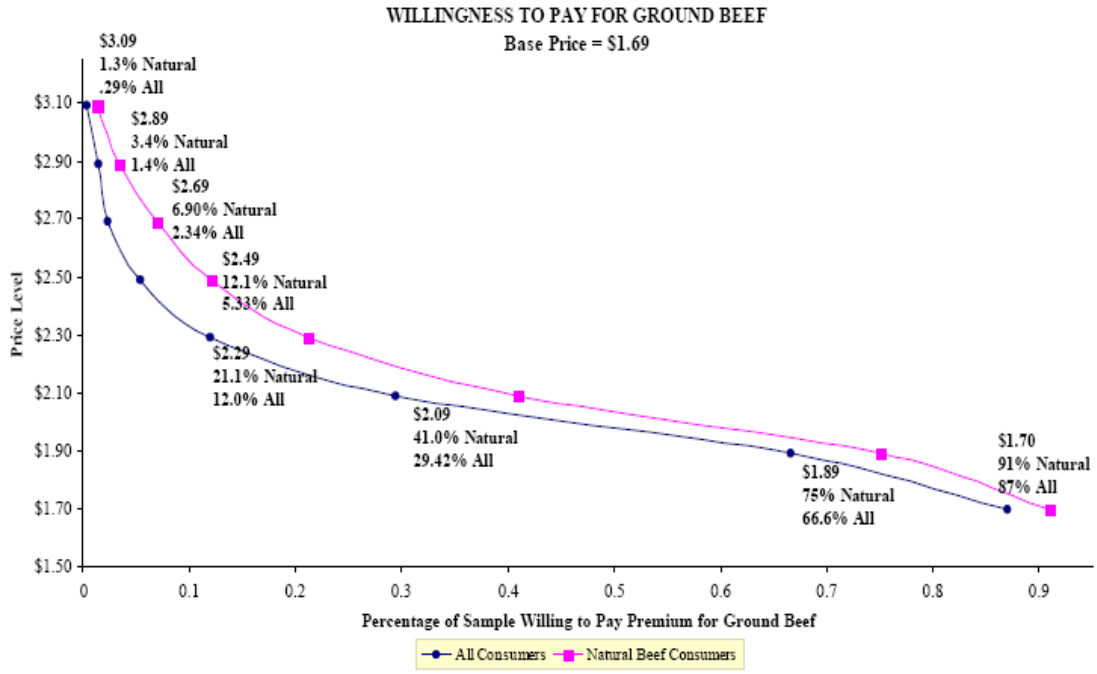
Source: "Marketing Opportunities for Natural Beef Products in the Intermountain West" Grannis and Thilmany, 2000

Figure II-4. Average Attribute Rank

Willingness-to-Pay

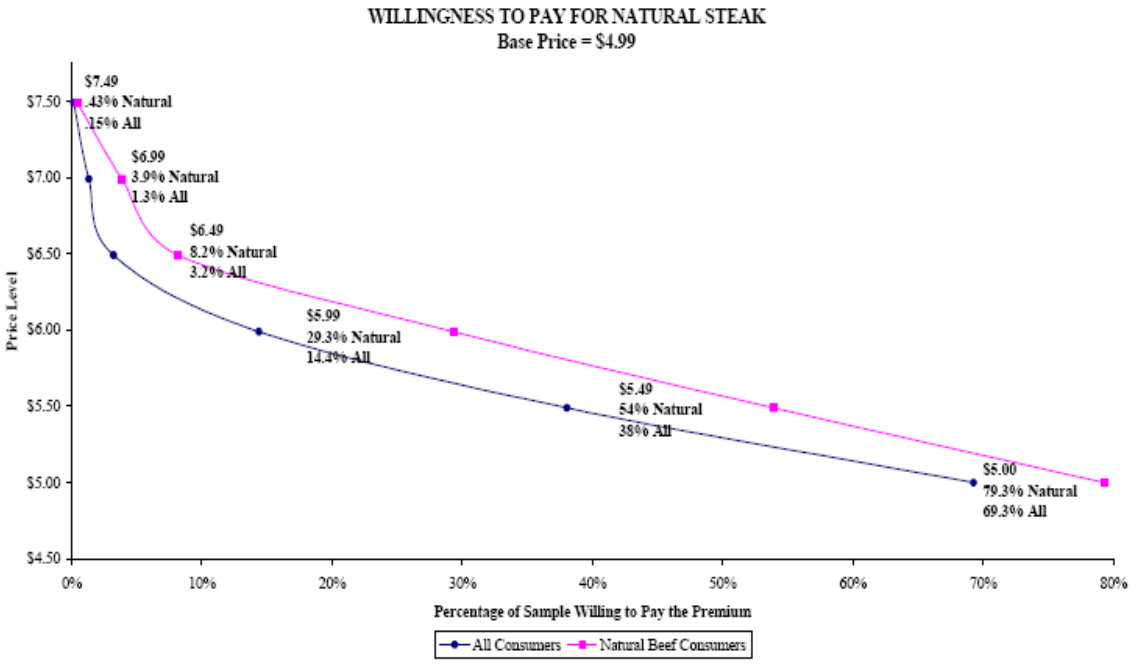
In conjunction with the study of the importance of production attributes (Grannis and Thilmany, 2000), consumers were asked how much they would be willing to pay for local, natural beef if it were available. The base prices for ground round and steak were

$1.69/lb and $4.99/lb, respectively. The top curve in Figure II-5 illustrates past purchasers of natural beef. A higher percentage of previous customers were likely to pay a premium for natural beef. This finding shows that consumers' stated preferences coincide with their revealed preferences. In both Figure II-5 and Figure II-6 past natural beef consumers were willing to pay higher premiums for natural beef. The amount of premium that consumers were willing to pay decreased as the base price increased (Grannis and Thilmany, 2000).



Source: "Marketing Opportunities for Natural Beef Products in the Intermountain West" Grannis and Thilmany, 2000

Figure II-5. Willingness-to-Pay for Natural Ground Beef



Source: "Marketing Opportunities for Natural Beef Products in the Intermountain West" Grannis and Thilmany, 2000

Figure II-6. Willingness-to-Pay for Natural Steak

A study conducted by Lusk and Schroeder (2004) estimated willingness-to-pay for differing scenarios for generic, guaranteed tender, natural, Choice, and Certified Angus Beef (CAB) steaks in both a hypothetical and non-hypothetical setting. The number of participants for the study totaled 67 in the non-hypothetical treatment and 37 in the hypothetical treatment. Results from the random parameters logit model showed willingness-to-pay premiums for guaranteed tender, natural, Choice, and CAB steaks when compared to generic steaks. Guaranteed tender steaks commanded a $3.85/lb price premium when compared to generic steaks. Natural steaks displayed the smallest marginal willingness-to-pay premium of $1.81/lb. Choice steaks and CAB steaks offered price premiums of $4.85/lb and $4.24/lb, respectively (Lusk and Schroeder, 2004). It should be noted that the premium values reported by Lusk and Schroeder (2004) are for

12 ounce steaks. For the purpose of this research premium values, stated above, were converted to prices for 16 ounce steaks.

Marbling

A study that examined consumer sensory acceptance and value for beef steaks of similar tenderness, but that differed in marbling level showed that consumers were willing to pay a premium for a steak that was consistent with the marbling level of their choice (Killinger et. al, 2004b). So, in other words, consumers who preferred high marbled steaks were willing to pay a premium for steaks containing more marbling. Taken as a whole, consumers in Chicago and San Francisco found high marbled steaks to be more adequate than low marbled steaks. This study found Chicago participants to be willing to pay between $0.24/lb and $1.13/lb premium for high marbled steaks, while those preferring a low marbled steak were willing to pay a premium between a $0.05/lb and $1.40/lb. Their San Francisco counterparts were willing to pay $1.47/lb premium for high marbled steaks and $1.94/lb premium for low marbled steaks (Killinger al et., 2004b).

In a controlled laboratory experiment researchers found similar results with a sub-sample group. However, their willingness-to-pay was much lower in a laboratory setting, where consumers were willing-to-pay $0.15/lb and $0.13/lb for high marbled steaks and low marbled steaks, respectively (Killinger al et., 2004b). Often times, results such as these are found where stated willingness to pay and actual willingness to pay premium amounts differ. Stated willingness to pay premiums is generally higher than demonstrated premiums in a controlled experiment.

Color

Color has traditionally been used as an indicator of freshness and potential eating quality after being cooked. From Killinger al et. (2004a) it appears that consumers who are looking for steaks with reduced fat (low marbling) are more willing to pay a premium for a reduced fat attribute. Consumers in both groups (Chicago and San Francisco) preferred bright, cherry-red color in their steaks. Consumers that did prefer a dark red color usually associated color with aging and tenderness of the steak. Consumers who preferred the dark red color showed a willingness-to-pay premium of $0.64/lb whereas; consumers preferring the bright, cherry-red color were willing to pay an extra $0.74/lb for steaks with bright, cherry-red color (Killinger al et., 2004a).

Growth Hormones

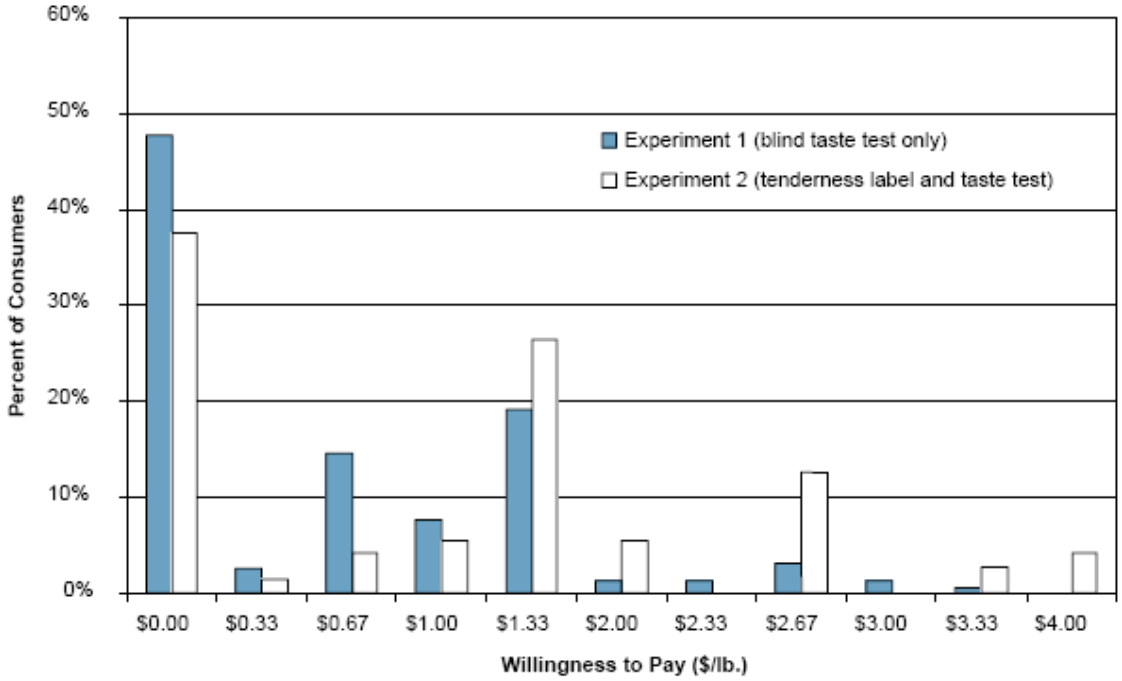
The European Union banned the use of growth hormones in 1985. If the U.S. were to completely abolish the use of growth hormones, it is estimated that the ban would cost producers approximately $314 million (Kenney and Fallart, 1989). As stated by Kenney and Fallart (1989), growth hormones are reported to increase weight gain by 5-20% , feed efficiency by 5-12%, and lean meat growth by 15-25% (Kenney and Fallart, 1989). Nixon reports similar losses in weight gain and feed efficiency with bodyweight decreased by 70-100 lbs and feed efficiency being 10-15% less than animals which are administered growth hormones (Nixon, 2007). Results from a study by Lusk, Roosen, and Fox (2003) show that preference for steaks cut from cattle which were administered growth hormones over steak produced without the use of growth hormones is similar across all countries, France, Germany, United Kingdom, and U.S. The study also

attempted to put a value that consumers attributed to steak produced without the use of growth hormones over steak produced with growth hormones. In order for consumers to trade their steak produced without the use of growth hormones for the steak produced with growth hormones the price would have to be $0.922, $0.823, $1.221, and $2.629/lb less for consumers in France, Germany, U.K. and U.S., respectively. Therefore, results indicated that U.S. consumers are willing-to-pay more for beef that is produced without the use of growth hormones than counterparts from European countries (Lusk, Roosen, and Fox, 2003).

Tenderness

In general, guaranteed tender steaks are preferred by consumers. A study conducted at three urban retail grocery stores in the Midwest in 1998 confirmed the fact that consumers prefer guaranteed tender beef cuts (Lusk al et., 2001b). The study consisted of two separate experiments. In the first experiment, consumers were not provided any information on steak tenderness. They had to rely on their own tastes and experiences. The second study provided consumers with label information indicating the level of tenderness as either “guaranteed tender” or “probably tough”. Sixty-nine percent of the participants in the first study preferred a guaranteed tender steak whereas 84% preferred the guaranteed tender steak when tenderness information was provided. While it is apparent that most shoppers prefer a guaranteed tender steak the percentage of shoppers that were willing to pay a premium for this guarantee was a substantially lower percentage, 36% and 51%, respectively. Of those consumers who were willing to pay a premium for guaranteed tender steaks the average premium was $1.23/lb without

tenderness information provided while consumers that were presented with tenderness information on the label were willing to pay an extra $1.84/lb on average. Consumers willing to pay a premium for tender steak are shown in Figure II-7 , with premiums ranging from $0.33/lb to $4.00/lb. It is interesting to note that 20% of those consumers participating in experiment two who were willing to pay tenderness premiums were willing to pay at least $2.67/lb for a tender steak compared to a tough steak (Lusk al et., 2001b).



Source: Mintert, 2000; Lusk et. al, 2001b.

Figure II-7. Willingness-to-Pay Premiums for Tender Steak

Commodity Branding

When standing before a fresh beef meat case, one may ask themselves why are some products branded and others not? What is the difference between the two

products? Branding is way for retailers to communicate product characteristics that are difficult for consumers to evaluate on their own by visual inspection. However, when paying a price premium for branded products, a guarantee of something extra, consumers expect to receive a product of superior quality (Png and Reitman, 1995; "Today's Beef Options", 2006). Consumer information theory explains the problem by presenting consumers with two alternatives. First, consumers can recognize that unbranded products are less expensive and assumed to be lower in quality than a reliable branded product. Second, consumers can pay a price premium for a branded product, in a sense buying a guarantee of quality. Therefore, products are more likely to be branded when personal experimentation is not appealing to the consumer for various reasons. The appeal of personal experimentation can be based on a consumer's background. For example, a person with high disposable income may not find it appealing to spend time trying different unbranded products because the opportunity cost of time versus paying the price premium is too high. If the consumer intends to be a repeat customer they might spend more time on personal experimentation to find an acceptable product for a lower price compared to buying a branded product (Png and Reitman, 1995).

Branding is beneficial to consumers because it offers them a sense of security, representing a guarantee of consistency and quality to the consumer. There have been some studies done related to the effects of branding beef products. In a study conducted by the National Cattlemen's Beef Association, evidence showed that consumers are looking for improved consistency, improved eating enjoyment and low prices (Moeller, 2003). It has been argued that the lack of support for branded

beef products stems from the lack of branded products already on the market (Lusk, 2001a). Generic advertising such as the "Beef, It's What's For Dinner," campaign could also be hurting efforts to brand beef products. Generic advertising causes an overall demand increase for the industry, but can have a negative impact for individual producers because the generic advertising insinuates that all beef products are homogenous (Crespi and Marette, 2002).

During the 1980's branded poultry advertising took over the meat market with approximately $32 million dollars (1993 dollars) spent in 1980 and continually increasing to approximately $78 million dollars (1993 dollars) by 1985. Consequently, beef and pork consumption declined. As beef and pork started their own generic advertising campaigns, the overall demand for red meats started to increase. Branded pork advertising was the other main advertising force in the meat industry, growing from approximately $35 million dollars (1993 dollars) in 1980 to approximately $78 million dollars (1993 dollars) in 1985. In contrast, beef advertising, both generic and branded, was under $10 million dollars (1993 dollars) annually (Brester and Schroeder, 1995). In 1986, the Beef Council began its own generic advertising campaign, dedicating a little more than $35 million dollars (1993 dollars) to generic beef advertising per year in 1989 (Brester and Schroeder, 1995). There could have been some substitution effects as a result of generic beef and pork advertising campaigns (Brester and Schroeder, 1995).

Beef Branding

Consumers do not see branding as an important influencing factor on their buying decisions because they feel their grocer stands behind the products sold (Moeller, 1997). Consumers are most dissatisfied with the lack of consistency in flavor, quality and tenderness. If marketers used branding to aggressively market new and improved beef products, then it could increase fresh beef demand, but the brand must provide consumers with a product that is higher in quality. Relatively little branding exists in the beef industry, but branding is growing and is most predominant in smaller niche markets such as natural and organic markets (Moeller, 1997). Certified Angus Beef seems to be the most predominant brand available today from data collected by NCBA. Many retailers are offering a premium line of beef products in addition to the store line that is carried. Store lines are generally USDA Select grade, and in an attempt to diversify their selection, the premium line is usually USDA Choice grade with a few selections that are graded USDA Prime.

From the 1996 study by NCBA it seems that branding does not have a large impact on consumers' decision to purchase beef products (Moeller, 1997). Forty-eight percent pointed out they would buy more of a well known brand, while 61% indicated that they would purchase more of a trusted brand. A trusted brand is one that delivers consistent quality. A credible store brand could fall into the trusted brand category. Therefore, if a brand builds credibility with consumers it will build a reputation as a trusted brand and eventually become a well known brand (Moeller, 1997).

USDA certified beef programs (www.ams.usda.gov/lsg/certprog/certbeef.htm) are sorted by the specifications that each brand has set for their products. There are forty-six brands that are USDA certified. In this research only two of these brands, Certified Angus Beef (CAB) and Angus Pride (Cargill Meat Solutions), were observed in the retail outlet. Consequently, it seems that there is room for marketing of brands that currently exist that are USDA certified. Additionally, it can be noted brands that exist in the retail outlet are, for the most part, not USDA certified brands.

One study, by Parcell and Schroeder (2007), looked at hedonic prices of retail beef which is similar to research that was done for this project. However, they utilized data from the Meat Panel Diary (MPD) database, obtained through the Retail Meat Purchase Diary research that was conducted by the MPD group on behalf of the Beef Board. Specific product information such as type of meat purchased, package weight, price, whether or not the product was discounted, grade, fat content, and demographic information of the purchasing household. For beef transactions, only those that reported a brand were used, limiting the dataset to approximately 2,300 observations. Steaks were divided into three groups of varying degrees of quality, low, medium, and high (Parcell and Schroeder, 2007).

Ground beef received a price discount of $0.23/lb for each additional package pound and a premium of $0.04/lb for each lower percentage point of fat content. Roasts received a discount of $0.28/lb for each additional package pound. With MPD data, it was found that, on average, steaks received a price discount of $0.74/lb for each additional pound in the package. Steaks of medium quality received a $0.27/lb premium for USDA grade Prime and a $0.04/lb discount for USDA grade

Select when compared to steaks that did not disclose USDA grade (Parcell and Schroeder, 2007).

Results show that brand was statistically different from zero for roasts and steaks; however, brand was not statistically significant for ground beef. Roasts received a $0.34/lb premium for branded roasts when compared to store branded roasts. Similarly, steaks received $0.76/lb to $1.26/lb premiums for branded steaks when compared to store branded steaks. Higher premiums were associated with steaks that were of medium and high quality (Parcell and Schroeder, 2007).

CHAPTER III

PRIMARY DATA PROCEDURES

Primary data are data collected by the researcher or author for the purpose of the present research. Collecting primary data is beneficial to the researcher because the researcher can collect data that is needed for the research project. There will not be extra data and missing data, provided that the data is available for collection. Secondary data are data originally collected for another purpose. There are many types of primary data collection that can be used. Some common forms of primary data collection are surveys, “homegrown value” experiments, and “induced value” experiments.

This research used primary data collected by Jennifer Dutton (Tulsa, Oklahoma City, Denver), Andrea Troyer (Tulsa), Mallory Vestal (Oklahoma City), and Kelsey Dutton (Denver). Data were collected in all metropolitan areas using two survey forms. One form was developed for collecting store level characteristics such as store type, store name, location, city name, in-store butcher, chicken price per pound (boneless skinless breasts), pork price per pound (boneless loin) and collection date. The second form collected beef product information. Information collected included cut type, fat content or grade, brand type, brand name, package material, package size, price per pound, total price, sale price, label, and expiration date. The survey can be found in Appendix I.

Hedonic Model Form

Hedonic pricing theory is used to estimate price per pound as a function of store and product characteristics. Models were estimated, using the general model form, for each data category, ground, roast, and steak products. The general model forms for each category are:

Ground:

$$\begin{aligned} LBPRICE_{it} = {} & \alpha + \sum_{j=1}^{4} \beta_{1j} STORETYPE_{ij} + \sum_{j=1}^{3} \beta_{2j} METRO_{ij} + \sum_{j=1}^{2} \beta_{3j} BUC_{ij} \\ & + \sum_{j=1}^{2} \beta_{4j} CUT_{ij} + \sum_{j=1}^{5} \beta_{5j} BRAND_{ij} + \sum_{j=1}^{6} \beta_{6j} FC_{ij} + \sum_{j=1}^{5} \beta_{8j} PKG_{ij} \\ & + \beta_{9} PKGSZ_{i} + \beta_{10} DSCTP_{i} + \sum_{j=1}^{5} \beta_{11j} LABEL_{ij} + \sum_{j=1}^{4} \beta_{12j} EXP_{ij} + \nu_{t} + \varepsilon_{it} \end{aligned} \tag{1}$$

where $E[\nu_t] = E[\varepsilon_{it}] = 0$, $VAR[\nu_t] = \sigma_t^2$, and

$$VAR[\varepsilon_{iT}] = \sigma_{it}^2 \exp \left[\begin{aligned} & \sum_{j-1}^{4} \delta_{1j} STORETYPE_{ij} + \sum_{j-1}^{3} \delta_{2j} METRO_{ij} + \sum_{j-1}^{2} \delta_{3j} BUC_{ij} \\ & + \sum_{j-1}^{2} \delta_{4j} CUT_{ij} + \sum_{j-1}^{5} \delta_{5j} BRAND_{ij} + \sum_{j-1}^{6} \delta_{6j} FC_{ij} + \sum_{j-1}^{5} \delta_{7j} PKG_{ij} \\ & + \delta_{8j} PKGSZ_{i} + \delta_{9j} DSCTP_{i} + \sum_{j-1}^{5} \delta_{10j} LABEL_{ij} + \sum_{j-1}^{4} \delta_{12j} EXP_{ij} \end{aligned} \right]$$

Roast:

$$
\begin{aligned}
LBPRICE_{it} &= \alpha + \sum_{j=1}^{4}\beta_{1j}STORETYPE_{ij} + \sum_{j=1}^{3}\beta_{2j}METRO_{ij} + \sum_{j=1}^{2}\beta_{3j}BUC_{ij} \\
&+ \sum_{j=1}^{2}\beta_{4j}CUT_{ij} + \sum_{j=1}^{2}\beta_{5j}BRAND_{ij} + \sum_{j=1}^{3}\beta_{6j}GRADE_{ij} + \sum_{j=1}^{2}\beta_{8j}PKG_{ij} \\
&+ \beta_{9}PKGSZ_{i} + \beta_{10}DSCTP_{i} + \sum_{j=1}^{2}\beta_{11j}LABEL_{ij} + \sum_{j=1}^{2}\beta_{12j}EXP_{ij} + \nu_{t} + \varepsilon_{it}
\end{aligned} \tag{2}
$$

where $E[\nu_t] = E[\varepsilon_{it}] = 0$, $VAR[\nu_t] = \sigma_t^2$, and

$$
VAR[\varepsilon_{it}] = \sigma_{it}^2 \exp\left[
\begin{aligned}
&\sum_{j-1}^{4}\delta_{1j}STORETYPE_{ij} + \sum_{j-1}^{3}\delta_{2j}METRO_{ij} + \sum_{j-1}^{2}\delta_{3j}BUC_{ij} \\
&+ \sum_{j-1}^{2}\delta_{4j}CUT_{ij} + \sum_{j-1}^{2}\delta_{5j}BRAND_{ij} + \sum_{j-1}^{3}\delta_{6j}GRADE_{ij} + \sum_{j-1}^{2}\delta_{7j}PKG_{ij} \\
&+ \delta_{8j}PKGSZ_{i} + \delta_{9j}DSCTP_{i} + \sum_{j-1}^{2}\delta_{10j}LABEL_{ij} + \sum_{j-1}^{2}\delta_{12j}EXP_{ij}
\end{aligned}
\right]
$$

Steak:

$$
\begin{aligned}
LBPRICE_{it} &= \alpha + \sum_{j=1}^{4}\beta_{1j}STORETYPE_{ij} + \sum_{j=1}^{3}\beta_{2j}METRO_{ij} + \sum_{j=1}^{2}\beta_{3j}BUC_{ij} \\
&+ \sum_{j=1}^{4}\beta_{4j}CUT_{ij} + \sum_{j=1}^{5}\beta_{5j}BRAND_{ij} + \sum_{j=1}^{5}\beta_{6j}GRADE_{ij} + \sum_{j=1}^{4}\beta_{8j}PKG_{ij} \\
&+ \beta_{9}PKGSZ_{i} + \beta_{10}DSCTP_{i} + \sum_{j=1}^{5}\beta_{11j}LABEL_{ij} + \sum_{j=1}^{4}\beta_{12j}EXP_{ij} + \nu_{t} + \varepsilon_{it}
\end{aligned} \tag{3}
$$

where $E[\nu_t] = E[\varepsilon_{it}] = 0$, $VAR[\nu_t] = \sigma_t^2$, and

$$
VAR[\varepsilon_{iT}] = \sigma_{it}^2 \exp\left[
\begin{aligned}
&\sum_{j-1}^{4}\delta_{1j}STORETYPE_{ij} + \sum_{j-1}^{3}\delta_{2j}METRO_{ij} + \sum_{j-1}^{2}\delta_{3j}BUC_{ij} \\
&+ \sum_{j-1}^{4}\delta_{4j}CUT_{ij} + \sum_{j-1}^{5}\delta_{5j}BRAND_{ij} + \sum_{j-1}^{5}\delta_{6j}GRADE_{ij} + \sum_{j-1}^{4}\delta_{7j}PKG_{ij} \\
&+ \delta_{8j}PKGSZ_{i} + \delta_{9j}DSCTP_{i} + \sum_{j-1}^{5}\delta_{10j}LABEL_{ij} + \sum_{j-1}^{4}\delta_{11j}EXP_{ij}
\end{aligned}
\right]
$$

where ν_t represents the variance of the individual stores.

LBPRICE is the price per pound of the i^{th} beef product in the t^{th} store available to consumers, STORETYPE is a dummy variable for the nature of the i^{th} retail outlet, METRO is a dummy variable indicating the location of the i^{th} observation, BUC is a dummy variable indicating the presence of an in-store butcher, CUT is a dummy variable indicating the cut type, BRAND is a dummy variable designating the brand type, FC is a dummy variable designating the fat content for each ground beef observation, GRADE is a dummy variable that indicates the USDA quality grade for each roast or steak observation, PKG is a dummy variable designating the package type, PKGSZ is a continuous variable indicating the size (in pounds) of the each observation, DSCTP is a continuous variable indicating the discount, if found, for the i^{th} observation, LABEL is a dummy variable designating the presence of a special label for the observation, and EXP is a dummy variable indicating the freshness of the i^{th} observation. Complete variable descriptions can be found in Table III-1

Table III-1. Variable Definitions-Ground and Steak Model Sets

Variable Name	Variable Description
LbPrice	Price per pound
StoreID	Unique ID number for each store observed
Store Name	Name of store
Package size	Weight of package in pounds
Unit price	Total price of each observation
Discount price	Discount per pound for each observation
Store Type	
Specialty	Specialty (e.g. Wild Oats)
Supermarket	Supermarket (e.g. Albertson's, Safeway)
Discount	Discount (e.g. Wal-Mart)
Warehouse club	Wholesale (e.g. Sam's Club)
Location	
Tulsa	Tulsa, Sand Springs, Broken Arrow, Owasso, Sapulpa
Oklahoma City	Oklahoma City, Edmond, Midwest City, Yukon, Moore
Denver	Denver, Arvada, Aurora, Lakewood, Littleton, Westminster
Butcher	
Butcher	In-store butcher is present
Cut Type	
Ground beef	Ground beef
Ground chuck	Ground chuck
Ribeye	Ribeye steak
Sirloin	Sirloin steak
Round	Round steak
T-bone	T-bone steak
Brand	
Special	Brands that contain special labeling (e.g. all natural, organic, no antibiotics etc.)
Program/Breed	Program and breed branding (e.g. CAB)
Store	Store branding (e.g. Homeland, Blue Ribbon)
Other	Not clearly categorized in any other category
Generic	No brand name or "Beef It's What's for Dinner"
Fat Content (for ground products)	
FCL5	< 5%
FC5-10	5-10%
FC11-15	11-15%
FC16-20	16-20%
FCG20	> 20%
FCnone	No fat content indicated on package

Table III-1. Variable Definitions-Ground and Steak Model Sets

Variable Name	Variable Description
Quality Grade (for steak products)	
Standard	USDA Standard
Select	USDA Select
Choice	USDA Choice
Prime	USDA Prime
Grdnone	No USDA grade indicated
Package Material	
Chub	Chub packaging-ground products
Foam tray	Foam tray packaging-all cuts
Case ready	Case ready packaging-all cuts (i.e. hard plastic tray, clear top covering)
Custom cut	Custom cut by butcher-all cuts
Vacuum sealed	Vacuum sealed packaging-all cuts
Label	
Antibiotics	"No antibiotics used" labeling
Hormones	"No hormones used" labeling
All natural	"All natural" labeling
Source verified	"Source verified" labeling
Quality guaranteed	"Guaranteed quality" labeling
Days until Expiration	
ExpL1	<1 day until expiration
Exp1-7	> 1, < 8 days until expiration
ExpG7	> 7 days until expiration
Expnone	No expiration date indicated

Misspecification tests were conducted to determine if multicollinearity and heteroskedasticity problems existed. Using SAS to obtain correlation coefficients, it can be concluded that there was multicollinearity existing in the dataset (SAS Institute, 2002-2003). The most extreme cases were between the label dummy variables and brand type dummy variables. This was expected and contributed to the development of models where dummy variable sets were not present. However,

models that were deficient of varying dummy variable sets produced similar results in parameter estimates as well as R-square statistics.

The roast data set contains a few more multicollinearity problems due to having fewer observations (seasonality of data) than for the other two data sets. With fewer total observations, there were many observations that overlapped for same variables. For example, all observations that were labeled “source verified” were also labeled “hormone free” and “all natural”. Additionally, all roasts labeled “source verified”, “hormone free” and “all natural” were also custom cut, Coleman roasts except one observation. While the highest correlation coefficients were those label and brand dummy variable sets, there were also some correlation coefficients that caused concern between package type and store type. Overall, some variables had to be combined into grouped variables to correctly estimate the roast hedonic models. Grade was divided into three dummy variables to increase the number of observations for each category. Grade was divided into Prime/Choice, Select/Standard, and no grade indicated. Similarly, package material was separated into two categories, custom cut/foam tray and case ready/vacuum sealed. Branded products were divided into two categories, branded versus generic products. Likewise, expiration date was divided into two groups, products that had a specified expiration date versus those whose label did not display an expiration date (Table III-2)

Table III-2. Combined Variable Definitions-Roast Model Set

Variable Name	Variable Description
Cut Type	
ChuckR	Chuck roast
RoundR	Round roast
Brand	
Brand	Any type of brand (not generic)
Quality Grade	
Select/Standard	USDA Select or Standard
Choice/Prime	USDA Choice or Prime
Grdnone	No USDA grade indicated
Package Material	
Foam/Custom cut	Foam tray packaging or custom cut by butcher
Case ready/Vacuum sealed	Case ready or vacuum sealed packaging
Label	
Combo	"No antibiotics used" "Hormone free", "All natural", "Source verified", or "Guaranteed quality" labeling
Nolabel	No special label present
Days until Expiration	
Exp	Expiration date printed on package
Expnone	No expiration date indicated

Steak correlation coefficients closely resembled those of the ground data set, with the greatest amount of multicollinearity taking place between the label and brand dummy variables. Again, a set of models was estimated in order to remove variables that were collinear with other variables in the data set.

The data used for this study was cross-sectional data, for that reason; heteroskedasticity was highly likely to occur. As anticipated, heteroskedasticity existed. To test for heteroskedasticity the Liklihood Ratio test was used where $-2\left(\ln L^R - \ln L^U\right) \approx \chi^2$ is used to calculate the chi square critical value.The null hypothesis is $\chi_c^2 \leq 0.05$ and if found, then heteroskedasticity does not exist. Unrestricted

models are reflected in equations (1), (2), and (3) for ground, roast, and steak, respectively. The restricted models are the same as the unrestricted models denoted in equations (1), (2), and (3) with the $\eta_{1i} - \eta_{12i} = \sigma \nu_i$ restriction imposed to test for heteroskedasticity.

For the ground data model, the chi square critical value, using 378 degrees of freedom, was 0.9987. The null hypothesis is rejected and it was concluded that heteroskedasticity does exist. The calculated chi square critical value, using 667 degrees of freedom, was 0.9999 which concludes that heteroskedasticity exists because the null hypothesis is rejected, for the steak model.

The SAS MIXED procedure was used to estimate all three model sets that are reported in this study (SAS Institute). The MIXED procedure was used to account for random store effects in the models and account for non-constant error variance. Ground and steak models sets each contained models estimating a base model (all variables included), log transformation of the dependent price variable model, and models across metro area, across store type, across brand type, across labels, and with a combined label variable group. The model estimating a combined label group (no antibiotics, no hormones, all natural,) was included because many products carrying one of these labels frequently carried at least one of the other labels in the group. The roast model set contains collapsed categories, as noted earlier, because of statistical errors due to the small number of observations for this set. The small number of observations is probably due to the summer time frame in which the data were collected and reduced demand (thus offerings) of roasts in the summer months.

Survey Development

The survey developed for this research is unconventional compared to what most people think of when asked about a survey. The survey was a data collection instrument designed for use by a two person team to collect data from each store sampled. Most surveys consist of questions that a person must read, understand, and respond to without help from the administrator.

This survey was developed in fulfillment of a semester project for AGEC 5990: Primary Data Analysis: Methods and Applications in Economic Research taught by Dr. Jayson Lusk. Since this part of the research took place in a classroom setting, Andrea Troyer and I developed this survey together. Since this survey was designed specifically for this research use, it had to be decided which characteristics could affect price and which characteristics that would be estimated to measure the effect on price. After developing a list of variables for which data needed to be collected, a rough draft of the survey was developed. After the rough draft was completed, Albertson's in Stillwater, Oklahoma was chosen as a pilot test store. After the test data collection, several small modifications were made to the survey instrument to increase its ease of use. The order of the questions was changed and the surveys were bound into four separate books for each metropolitan area to make the amount of materials that had to be carried to each store minimal.

Data Collection and Sample Size

For this research primary data was collected from grocery stores in three metropolitan areas, Oklahoma City, Oklahoma; Tulsa, Oklahoma; and Denver, Colorado.

The Oklahoma City area consisted of Oklahoma City, Edmond, Midwest City, Yukon and Moore. The Tulsa area consisted of Tulsa, Sand Springs, Broken Arrow, Owasso, and Sapulpa. The Denver area consisted of Denver, Arvada, Aurora, Lakewood, Littleton, and Westminster. These three areas were chosen because of the grants that funded this project. The first was, "Improving Alignment within the Beef Supply Chain: Pricing to Value and Brand Marketing" by the National Beef Industry Development Fund through the Canadian Cattlemen's Association. This was a two-part project in conjunction with the University of Manitoba. The second grant was "Branded Marketing of Beef: Extent, Opportunities, and Impediments" from the Livestock Marketing Information Center and the third was "Consumers' Revealed Preferences for Branded Fresh Beef Products" from the Oklahoma Beef Council. Tulsa and Oklahoma City areas were chosen to provide the necessary information for the grant from the Oklahoma Beef Council. Denver is a "western melting pot" where east meets west and was chosen because it is representative of many different demographic characteristics.

The first step in choosing a sample population was to estimate the total number of observations in each proposed population. Sample data from Albertson's in Stillwater, Oklahoma was collected to test the survey instrument. From this, it was estimated that fifteen ground beef, ten roast, and fifteen steak observations could be collected from each store. In the Oklahoma City metropolitan area a list of 125 stores was compiled; the Tulsa metropolitan area, 65 stores; and the Denver metropolitan area, 150 stores.

Using the estimates from the test store in Stillwater, the estimated population size of retail meat packages for the Oklahoma City area was 1,875, 1,250, and 1,875 possible observations for ground beef, roasts, and steaks, respectively. The approximated

population size for the Tulsa area was 975, 650, and 975 possible observations for ground beef, roasts, and steaks, respectively. Population size estimates for the Denver area was 2,250, 1,500, and 2,250 possible observations for ground beef, roasts and steaks, respectively.

By using the population size calculations to determine the number of stores that needed to be surveyed in each metropolitan area, an online sample size calculator from the Aborigine Mundi website (http://www.aboriginemundi.com/ssc/) was used. In calculating the number of stores needed, a 95% confidence level was used for all cuts in each metropolitan area. Tolerance levels of $0.03, $0.02, and $0.05/lb was used for roast, ground beef, and steak, respectively. The standard deviation of price per pound varied for each cut and was $0.186, $0.147, and $0.351/lb respectively. Meaning, we are 95% confident that the estimated mean will be plus or minus $0.186, $0.147, and $0.351/lb from the actual mean for roast, ground beef, and steak, respectively. Tolerance levels set the minimum actual difference that is significantly different. From the sample size calculator, it was estimated that data needed to be collected from at least 14.8 stores in each metropolitan area; Oklahoma City, Tulsa, and Denver to achieve a representative sample. It was estimated that there would be 570 ground observations, 435 roast observations, and 440 steak observations would be collected across all metropolitan areas. The actual number of observations collected is shown in Table III-3 by cut type and metropolitan area.

Online yellow pages were used to compile store lists for each suburban area. Each suburban area store was chosen independently of other areas. Each store was assigned a unique identification number. Using Microsoft Excel, the stores were listed in

alphabetical order and then assigned a random number. Then the stores were sorted in ascending order by their corresponding randomly generated number. The first 19 stores were chosen to be sampled. Stores were checked to see that each area and store type was represented in the sample population. If they were not all represented, the selection process was repeated. The final store population list contained 22 stores in the Oklahoma City area, 20 in the Tulsa area, and 24 in the Denver area. A slightly larger sample population was used to account for stores that may be smaller and not have the estimated selection size, or if a store was no longer in business.

Table III-3. Observations by Cut and Metropolitan Area

Ground	*Ground beef*	*Ground chuck*	*Total*
Tulsa	99	71	170
Oklahoma City	110	46	156
Denver	115	21	136
Total	324	138	462

Roasts	*Round*	*Chuck*	*Total*
Tulsa	37	46	83
Oklahoma City	9	13	22
Denver	44	26	70
Total	90	85	175

Steaks	*Sirloin*	*T-bone*	*Rib-eye*	*Round*	*Total*
Tulsa	65	41	53	85	244
Oklahoma City	71	47	60	97	275
Denver	43	33	78	76	230
Total	179	121	191	258	749

A trial version of RouteSmith routing program was used to minimize the time and money used to collect data from each area. The RouteSmith program allows the user to

enter each store's physical address and then compares the address with a GPS system and figures the most economical route considering all stops that must be made. The program allows the user to print step-by-step driving directions as well as maps of the route. It also calculates the distance and approximate driving time between each store.

Sample Population

All observations were taken from food stores in Oklahoma City, Tulsa, and Denver metro areas. A food store is defined as a retail outlet containing at least 50% food products that are intended for preparation and consumption outside the store. Grocery stores are a type of food store that carry a general line of food products including canned and frozen foods; fresh fruits and vegetables; fresh and prepared meats, fish and poultry; as well as nonfood grocery products. For the purpose of this research the stores were further divided into four categories, specialty, conventional supermarket, discount (including limited-assortment stores, and supercenters), and warehouse club stores (Kaufman, 2002).

Specialty stores are food stores that are specialized to one type of product such as a meat market, bakery, or organic food store. Supermarkets are grocery stores that are primarily self-service, providing all major food departments. The most common supermarket format that was encountered within this research project was the conventional supermarket. Conventional supermarkets offer major food departments, nonfood grocery, and limited amount of general merchandise. Many conventional supermarkets also offer a bakery, service deli, or fresh meat butchers. Discount stores include limited-assortment stores that offer few products at economy prices. These stores

often have a limited number of perishable products. Another type of discount store is a supercenter. Supercenters have a combination of general merchandise and grocery items, where grocery items account for up to 40% of floor space. The final category observed for this research was warehouse club stores. Warehouse club stores usually require a fee-based membership. Both grocery and general merchandise items are offered in large and multi-pack sizes (Kaufman, 2002). Table III-4 shows all types of stores from which data on fresh beef products was collected.

Table III-4. Brands Carried by Store Type and Name

Store Type and Name	Number of Brands Carried		
	Ground	***Roast***	***Steak***
Specialty			
Whole Foods Market	1	1	1
Wild Oats Market	1	1	1
Discount			
Aldi	0	1	1
Buy 4 Less	0	0	0
Grider's Foods	0	n/a	0
Wal-Mart	4	0	2
Warehouse Market	0	0	0
Whittaker's	0		0
Conventional supermarket			
Albertson's	4	3	2
Crest Foods	1	0	1
GFF Foods	0	0	0
Grocery Warehouse	2	1	1
Homeland	2	2	2
King Soopers	2	0	2
Reasors	1	1	0
Safeway	2	4	
Save-A-Lot	0	0	1
Warehouse club			
Costco	2	1	1
Sam's Club	0	0	0

NOTE: Number of brands carried does *not* include generic products.

Summary Statistics

Since brands were of primary interest in this research, several tables were developed to show the distributions of brands observed. Data collected for this research supports the conclusion from the data collected by National Cattlemen's Beef Association (Moeller, 1997) that Certified Angus Beef (CAB) was the largest reoccurring brand in the fresh meat case.

Table III-5. Number of Observations per Store

Store Name	Observations per Store		
	Ground	***Roast***	***Steak***
Specialty			
Whole Foods Market	3	1	5
Wild Oats Market	7	5	11
Discount			
Aldi	8	2	11
Buy 4 Less	13	4	34
Grider's Foods	6	0	10
Wal-Mart	161	37	196
Warehouse Market	25	11	31
Whittaker's	4	0	3
Conventional Supermarket			
Albertson's	70	23	133
Crest Foods	7	5	15
GFF Foods	5	3	8
Grocery Warehouse	7	5	12
Homeland	31	3	38
King Soopers	30	11	40
Reasors	36	21	93
Safeway	25	20	73
Save-A-Lot	9	4	4
Warehouse Club			
Costco	3	8	9
Sam's Club	12	12	24

Table III-5 shows the number of observations per store name. It should be noted that these numbers represent all stores of that name in all three metropolitan areas. Wal-Mart is by far the most sampled store, simply because of the extent of its product offering. Albertson's provides consumers with the largest product offering of conventional supermarket type stores, followed closely by Reasor's, King Soopers, and Safeway. It should be noted that some stores were only found in one metropolitan area. Therefore, may appear to have a smaller product offering than is actually present. For example, Safeway stores were only found in the Denver metropolitan area.

Table III-6 shows the number of each product type by brand category. Store brands represent the greatest number of cuts of roast and steak, second only to generic or non-branded products. Fresh beef is mostly unbranded products. It appears there is ample room for brands to enter the market provided they differentiate their product and provide consistent quality that consumers demand. There is a higher percentage of branded steak products. This would be expected because steaks are higher value cuts than either roast or ground products, so there is a higher expected premium associated with branding high value cuts. Generic products account for 75.4% and 78.4% of ground chuck and ground beef products, respectively. However, generic steak products account for a much smaller proportion of steak products. Generic ribeye accounts for 36.7% of ribeye observations, while generic sirloin accounts for the highest percentage of generic products at 50.0% of sirloin observations. Generic round and T-bone steaks account for about 43% of total round and T-bone steak observations.

Table III-7 shows the distribution of brands for ground beef by fat content and for roasts and steaks by grade. It is interesting to note that 73.0% of ground beef packages

that are 90% to 95% lean are a generic product, followed by 61.9% of 95% or more lean packages. With an increasingly health conscious society, it seems that more lean products would carry a brand name trying to win customers and earn repeat business. Leanness could be a strong selling point for ground beef and where products are differentiated from

Table III-6. Distribution of Observations by Product Category and Brand

	Special	Program	Store	Other	Generic	Total
Ground						
Chuck	6	16	8	4	104	138
	(4.35)	(11.59)	(5.80)	(2.90)	(75.36)	(29.87)
Beef	24	11	26	9	254	324
	(7.41)	(3.40)	(8.02)	(2.78)	(78.40)	(70.13)
Total	**30**	**27**	**34**	**13**	**358**	**462**
Roast						
Round	5	10	22	5	48	90
	(5.56)	(11.11)	(24.44)	(5.56)	(53.33)	(51.43)
Chuck	3	22	19	4	37	85
	(3.53)	(25.88)	(22.35)	(4.71)	(43.53)	(48.57)
Total	**8**	**32**	**41**	**9**	**85**	**175**
Steak						
Ribeye	12	28	63	18	70	191
	(6.28)	(14.66)	(32.98)	(9.42)	(36.65)	(25.47)
Sirloin	9	29	43	9	90	180
	(5.00)	(16.11)	(23.89)	(5.00)	(50.00)	(24.00)
Round	1	64	78	3	112	258
	(0.39)	(24.81)	(30.23)	(1.16)	(43.41)	(34.40)
T-bone	3	22	32	12	52	123
	(2.48)	(18.18)	(26.45)	(9.92)	(42.98)	(16.13)
Total	**25**	**143**	**216**	**42**	**324**	**752**

NOTE: Numbers in parentheses for columns special through generic are percent of cut totals. Numbers in parentheses for totals are percent of general product categories.

Table III-7. Distribution of Observations by Fat Content or Grade and Brand

	Special	Program	Store	Other	Generic	Total
Ground						
<5 %	3	9	4	0	26	42
	(7.14)	(21.43)	(9.52)	(0.00)	(61.90)	(9.09)
5-10 %	13	0	11	3	73	100
	(13.00)	(0.00)	(11.00)	(3.00)	(73.00)	(21.65)
11-15 %	7	2	4	5	9	27
	(25.93)	(7.41)	(14.81)	(18.52)	(33.33)	(5.84)
16-20 %	5	1	10	4	114	134
	(3.73)	(0.75)	(7.46)	(2.99)	(85.07)	(29.00)
>20 %	1	0	5	0	97	103
	(0.97)	(0.00)	(4.85)	(0.00)	(94.17)	(22.29)
None indicated	1	15	0	1	39	56
	(1.79)	(26.79)	(0.00)	(1.79)	(69.64)	(12.12)
Total	**30**	**27**	**34**	**13**	**358**	**462**
Roast						
Standard	0	0	0	0	0	0
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Select	0	0	0	1	1	2
	(0.00)	(0.00)	(0.00)	(50.00)	(50.00)	(1.14)
Choice	0	14	8	7	25	54
	(0.00)	(25.93)	(14.81)	(12.96)	(46.30)	(30.86)
Prime	0	7	0	0	0	7
	(0.00)	(100.00)	(0.00)	(0.00)	(0.00)	(4.00)
None indicated	8	11	33	1	59	112
	(7.14)	(9.82)	(29.46)	(0.89)	(52.68)	(64.00)
Total	**8**	**32**	**41**	**9**	**85**	**175**
Steak						
Standard	0	0	1	0	1	2
	(0.00)	(0.00)	(50.00)	(0.00)	(50.00)	(0.27)
Select	0	0	0	3	11	14
	(0.00)	(0.00)	(0.00)	(21.43)	(78.57)	(1.87)
Choice	1	82	9	36	64	192
	(0.52)	(42.71)	(4.69)	(18.75)	(33.33)	(25.60)
Prime	0	12	0	0	0	12
	(0.00)	(100.00)	(0.00)	(0.00)	(0.00)	(1.60)
None indicated	24	49	206	3	248	530
	(4.53)	(9.25)	(38.87)	(0.57)	(46.79)	(70.67)
Total	**25**	**143**	**216**	**42**	**324**	**750**

NOTE: Numbers in parentheses for columns special through generic are percent of cut totals. Numbers in parentheses for totals are percent of general product categories.

others. Similarly, the greatest percentage of roasts and steaks were non graded cuts, with 64.0% and 70.7%, respectively. Partnered with education on the USDA grading system, grade could be a good way to differentiate product. The grading system is a standardized way to provide consumers with information about the products they are purchasing.

With respect to the packages that were being marketed as USDA graded products, program/breed branding has the highest percentages of Choice products within the steak category. Program branding dominates the number of products graded USDA Prime cuts, representing 100% of Prime products observed for this study.

The most frequently discounted items are unbranded cuts, as can been seen in Table III-8. Store brands follow a close second in the roast and steak category. Ground products display variation in the percentage of products discounted in different brand categories. There are large differences in the proportion of discounted items to non-discounted items. Discounted items for ground and roast categories are 16.9% and 16.0%, respectively. Steak is more frequently discounted as 27.2% of steak products were discounted. In theory, this could be because the meat is closer to expiration and discounted for quick sale, but as seen in Table III-8 steak has a very low percentage of products that were past their expiration date on the shelf. The lower number of products that were past expiration date could be due to stronger demand for steak products or steak products have a longer shelf life than ground products.

Table III-8. Distribution of Observations by Discounts and Brand

	Special	Program	Store	Other	Generic	Total
Ground						
Discounted	3	1	5	2	67	78
	(3.85)	(1.28)	(6.41)	(2.56)	(85.90)	(16.92)
Non-discounted	27	26	29	11	290	383
	(7.05)	(6.79)	(7.57)	(2.87)	(75.72)	(83.08)
Total	**30**	**27**	**34**	**13**	**357**	**461**
Roast						
Discounted	3	2	11	1	11	28
	(10.71)	(7.14)	(39.29)	(3.57)	(39.29)	(16.00)
Non-discounted	5	30	30	8	74	147
	(3.40)	(20.41)	(20.41)	(5.44)	(50.34)	(84.00)
Total	**8**	**32**	**41**	**9**	**85**	**175**
Steak						
Discounted	1	16	65	5	117	204
	(0.49)	(7.84)	(31.86)	(2.45)	(57.35)	(27.20)
Non-discounted	24	127	151	37	207	546
	(4.40)	(23.26)	(27.66)	(6.78)	(37.91)	(72.80)
Total	**25**	**143**	**216**	**42**	**324**	**750**

NOTE: Numbers in parentheses for columns special through generic are percent of cut totals. Numbers in parentheses for totals are percent of general product categories.

The highest percentage of packages expire within a week of the date that product information was collected, indicating that most beef on store shelves was fairly fresh (Table III-9). It is interesting that special brands and program/breed brands carry a large percentage of the products that do not display an expiration date. Once again, this is an easy channel to communicate information to consumers. The information on expiration date that was collected is in Table III-9.

Table III-9. Distribution of Observations by Expiration Date and Brand

	Special	Program	Store	Other	Generic	Total
Ground						
< 1 day	2 (6.25)	0 (0.00)	0 (0.00)	1 (3.13)	29 (90.63)	32 (6.93)
1 week	10 (3.13)	19 (5.96)	30 (9.40)	4 (1.25)	256 (80.25)	319 (69.05)
1 + week	3 (4.17)	1 (1.39)	3 (4.17)	3 (4.17)	62 (86.11)	72 (15.58)
None indicated	15 (38.46)	7 (17.95)	1 (2.56)	5 (12.82)	11 (28.21)	39 (8.44)
Total	**30**	**27**	**34**	**13**	**358**	**462**
Roast						
< 1 day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (100.00)	1 (0.57)
1 week	2 (1.54)	23 (17.69)	38 (29.23)	9 (6.92)	58 (44.62)	130 (74.29)
1 + week	0 (0.00)	1 (4.00)	0 (0.00)	0 (0.00)	24 (96.00)	25 (14.29)
None indicated	6 (31.58)	8 (42.11)	3 (15.79)	0 (0.00)	2 (10.53)	19 (10.86)
Total	**8**	**32**	**41**	**9**	**85**	**175**
Steak						
< 1 day	0 (0.00)	0 (0.00)	10 (66.67)	0 (0.00)	5 (33.33)	15 (2.00)
1 week	9 (1.44)	126 (20.16)	195 (31.20)	34 (5.44)	261 (41.76)	625 (83.33)
1 + week	0 (0.00)	1 (2.00)	0 (0.00)	8 (16.00)	41 (82.00)	50 (6.67)
None indicated	16 (26.67)	16 (26.67)	11 (18.33)	0 (0.00)	17 (28.33)	60 (8.00)
Total	**25**	**143**	**216**	**42**	**324**	**750**

NOTE: Numbers in parentheses for columns special through generic are percent of cut totals. Numbers in parentheses for totals are percent of general product categories.

Although there were very few products that carried a “source verified” label, all came from specially branded products, which are most likely to be found in specialty stores that cater to a specific niche market such as organic or health conscious consumers. Generic products displayed a higher than expected percentage of labeling. This is seen mostly in the ground and steak categories (Table III-10). In particular, roasts did not have many observations that carried a special label, with only 17 observations or 9.7% of all roasts observations. Steaks also had a low percentage that was labeled, at 10.3% of all steaks having a label. Ground beef showed the greatest percentage of labeled products, having 38.3% of observations carrying a special label.

The most common type of package material was foam tray packaging with 35.7% of ground packages, 64.6 % of roast packages, and 64.1 % of steak packages. Case ready packaging was the second most common type of packaging with 30.5% of ground packages, 17.1% of roast packages, and 27.2% of steak packages. Vacuum sealed packaging was the least common package material type except for roasts which were least common at the butcher’s counter (Table III-11). It should be noted that chub packaging is unique to ground products and was used to package 25.1% of ground products.

Table III-10. Distribution of Observations by Label Type and Brand

	Special	Program	Store	Other	Generic	Total
Ground						
Antibiotics	1	0	0	0	0	1
	(100.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.56)
Hormones	1	0	0	1	0	2
	(50.00)	(0.00)	(0.00)	(50.00)	(0.00)	(1.13)
All natural	13	0	11	4	102	130
	(10.00)	(0.00)	(8.46)	(3.08)	(78.46)	(73.45)
Source	8	0	2	0	2	12
verified	(66.67)	(0.00)	(16.67)	(0.00)	(16.67)	(6.78)
Guaranteed	2	0	3	2	25	32
quality	(6.25)	(0.00)	(9.38)	(6.25)	(78.13)	(18.08)
Total	**25**	**0**	**16**	**7**	**129**	**177**
Roast						
Antibiotics	0	0	0	0	0	0
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hormones	0	0	0	0	0	0
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
All natural	1	1	0	0	1	3
	(33.33)	(33.33)	(0.00)	(0.00)	(33.33)	(17.65)
Source	2	0	0	0	0	2
verified	(100.00)	(0.00)	(0.00)	(0.00)	(0.00)	(11.76)
Guaranteed	3	0	6	2	1	12
quality	(25.00)	(0.00)	(50.00)	(16.67)	(8.33)	(70.59)
Total	**6**	**1**	**6**	**2**	**2**	**17**
Steak						
Antibiotics	0	0	0	0	1	1
	(0.00)	(0.00)	(0.00)	(0.00)	(100.00)	(1.30)
Hormones	4	4	1	0	0	9
	(44.44)	(44.44)	(11.11)	(0.00)	(0.00)	(11.69)
All natural	4	1	1	0	1	7
	(57.14)	(14.29)	(14.29)	(0.00)	(14.29)	(9.09)
Source	7	0	0	0	0	7
verified	(100.00)	(0.00)	(0.00)	(0.00)	(0.00)	(9.09)
Guaranteed	4	5	30	5	9	53
quality	(7.55)	(9.43)	(56.60)	(9.43)	(16.98)	(68.83)
Total	**19**	**10**	**32**	**5**	**11**	**77**

NOTE: Numbers in parentheses for columns special through generic are percent of cut totals. Numbers in parentheses for totals are percent of general product categories.

Table III-11. Distributions of Observations by Package Material and Brand

	Special	Program	Store	Other	Generic	Total
Ground						
Chub	1	0	11	0	104	116
	(0.86)	(0.00)	(9.48)	(0.00)	(89.66)	(25.12)
Foam tray	4	20	16	1	124	165
	(2.42)	(12.12)	(9.70)	(0.61)	(75.15)	(35.71)
Case ready	10	0	6	5	120	141
	(7.09)	(0.00)	(4.26)	(3.55)	(85.11)	(30.52)
Custom cut	12	7	1	3	10	33
	(36.36)	(21.21)	(3.03)	(9.09)	(30.30)	(7.14)
Vacuum	3	0	0	4	0	7
sealed	(42.86)	(0.00)	(0.00)	(57.14)	(0.00)	(1.52)
Roast						
Foam tray	2	24	35	8	44	113
	(1.77)	(21.24)	(30.97)	(7.08)	(38.94)	(64.57)
Case ready	0	0	2	1	27	30
	(0.00)	(0.00)	(6.67)	(3.33)	(90.00)	(17.14)
Custom cut	0	7	1	0	0	8
	(0.00)	(87.50)	(12.50)	(0.00)	(0.00)	(4.57)
Vacuum sealed	6	1	3	0	14	24
	(25.00)	(4.17)	(12.50)	(0.00)	(58.33)	(13.71)
Steak						
Foam tray	3	127	196	30	125	481
	(0.62)	(26.40)	(40.75)	(6.24)	(25.99)	(64.13)
Case ready	7	3	11	4	179	204
	(3.43)	(1.47)	(5.39)	(1.96)	(87.75)	(27.20)
Custom cut	15	13	8	0	20	56
	(26.79)	(23.21)	(14.29)	(0.00)	(35.71)	(7.47)
Vacuum sealed	0	0	1	8	0	9
	(0.00)	(0.00)	(11.11)	(88.89)	(0.00)	(1.20)

NOTE: Numbers in parentheses for columns special through generic are percent of cut totals. Numbers in parentheses for totals are percent of general product categories.

Our primary concern in this study was price paid by consumers for various brands. Table III-11 shows that prices (per pound) are consistently higher for products that are branded versus generic. The fact branded products have higher prices is expected because of the additional costs associated with marketing branded products. It is expected

that consumers will be willing to pay a higher price for branded items because the brand offers a guarantee of quality and consistency for their products. It should be noted that prices shown in Table III-12 do not account for price differences due to other product attributes.

Table III-12. Mean Price ($/Lb) by Store Type and Brand

	Special	Program	Store	Other	Generic
Ground Store Type					
Specialty	4.71	0.00	0.00	0.00	5.99
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)
Supermarket	4.90	3.03	3.08	4.37	2.88
	(0.81)	(0.70)	(0.92)	(0.35)	(1.09)
Discount	5.66	0.00	0.00	3.95	2.17
	(0.56)	(0.00)	(0.00)	(0.26)	(0.63)
Warehouse club	2.49	0.00	2.13	0.00	2.02
	(0.00)	(0.00)	(0.21)	(0.00)	(0.21)
Roast Store Type					
Specialty	6.26	0.00	0.00	0.00	0.00
	(0.37)	(0.00)	(0.00)	(0.00)	(0.00)
Supermarket	4.39	3.38	3.84	4.47	3.97
	(1.13)	(0.63)	(1.08)	(0.72)	(0.84)
Discount	0.00	2.52	0.00	2.79	3.02
	(0.00)	(0.54)	(0.00)	(0.00)	(0.52)
Warehouse club	0.00	0.00	2.90	0.00	2.57
	(0.00)	(0.00)	(0.39)	(0.00)	(0.50)
Steak Store Type					
Specialty	13.97	0.00	0.00	0.00	0.00
	(3.01)	(0.00)	(0.00)	(0.00)	(0.00)
Supermarket	10.99	6.32	6.62	10.13	7.26
	(1.42)	(3.01)	(2.95)	(2.60)	(2.96)
Discount	12.05	4.37	0.00	8.45	5.08
	(2.00)	(1.76)	(0.00)	(1.91)	(1.84)
Warehouse club	0.00	0.00	5.30	0.00	5.85
	(0.00)	(0.00)	(2.76)	(0.00)	(2.57)

NOTE: Numbers in parentheses are the standard deviation of each mean price.

Table III-13. shows the mean price by cut type and brand. It is can be seen that Special and Other brands provided the greatest price per pound for ground, roast, and steak categories. The table also shows which cuts are higher in value compared to other cuts within the same category.

Table III-13. Mean Price ($/Lb) by Cut Type and Brand

	Special	Program	Store	Other	Generic
Ground					
Ground beef	4.90	3.57	3.14	4.02	2.50
	(1.08)	(0.31)	(1.00)	(0.26)	(1.04)
Ground chuck	4.74	2.67	2.65	4.62	2.31
	(0.27)	(0.65)	(0.41)	(0.25)	(0.47)
Roast					
Chuck	5.12	3.03	3.43	3.69	2.91
	(1.33)	(0.61)	(1.09)	(1.01)	(0.72)
Round	6.19	3.80	3.85	4.75	3.46
	(0.62)	(0.53)	(1.01)	(0.37)	(0.76)
Steak					
Ribeye	15.02	9.28	9.56	10.42	8.38
	(2.36)	(2.09)	(1.72)	(1.67)	(1.82)
Round	10.44	3.60	4.09	5.32	3.84
	(0.00)	(0.52)	(1.20)	(0.29)	(0.87)
Sirloin	10.70	5.06	4.71	7.24	4.54
	(1.63)	(1.26)	(1.69)	(2.09)	(1.31)
T-bone	14.32	9.12	9.20	10.12	7.84
	(0.58)	(2.06)	(1.12)	(1.81)	(1.48)

NOTE: Numbers in parentheses are the standard deviation for each mean price.

As expected, a majority of fresh beef products were generic products. It is surprising however, the amount of generic products that carry labels and expiration dates. These are two things that would be expected of branded products. If generic products are offering these channels of communication to consumers, brands will have to be more creative and work harder to provide consumers with attributes and consistency that make paying a price premium worthwhile to the consumer.

CHAPTER IV

PRIMARY DATA RESULTS

Results

The following sections describe, in detail, parameter estimates from hedonic models estimated, which are of most interest from this study. Parameter estimates from all models in each model set are included in table format. Most models from this study provided explanations of a high degree of the variability in the observed data.

Ground Beef Results

The MIXED regression procedure explained the variability of the models very well for this model set. It was able to explain 84.0%, 84.9%, 84.7%, 85.0 %, 80.6%, 83.4%, and 86 % of variability for base, log price, metropolitan area, store type, brand type, label, and combined label models, respectively (Table IV-1). Paired with the high explanation of variability came a large number of significant variables. In detail, some of the most interesting variables from the base models will be discussed, however; all parameter estimates from the entire model set can be found in Table IV-1.

Store level characteristics were all significant and had expected signs, with the exception of the presence of an in-store butcher which was not statistically significant in any of the models in the ground set.

Store type- Store type variables, supermarket, discount, and warehouse club, all received price discounts when compared to specialty type stores. This is expected because of the nature of specialty stores. Specialty stores most often satisfy the needs of smaller, niche markets; thus, drawing premiums for satisfying a specific consumer need. Discounts ranged from $0.35/lb to $2.91/lb, for all models and store types

Metropolitan area- The metropolitan variables for Tulsa and Oklahoma City were also negative when compared to the Denver area. This was expected because of differences in cost of living between Oklahoma and Colorado. Tulsa experienced a $0.46/lb discount while, Oklahoma City showed a $0.45/lb discount when weighed against Denver.

Butcher- The presence of an in-store butcher was not statistically significant in any of the models. Added cost may be reflected in the point of packaging of that particular store (in-store vs. case ready).

Cut type- Ground beef was discounted $0.09/lb to $0.21/lb, with the average discount being $0.16/lb, compared with ground chuck products. This is expected because of the cuts of meat that are used to produce these products.

Fat content- Fat content was significant when used to predict price per pound for fresh beef product. Less than 5% fat content enjoyed a $1.13/lb price premium when compared to packages that did not specify a fat content level. The average

premium for ground products with less than 5% fat content was $1.05/lb. In contrast, FC5, greater than 20%, received $0.23/lb price discount over those packages that had no specified fat content level. The average discount received by packages of ground products with greater than 20% fat content was $0.19/lb.

By looking at the fat content either as a continuous or discrete variable, different premiums can be associated with the level of fat for ground products. Parcell and Schroeder (2007) found for each less a $0.04/lb price premium associated with each percentage point decrease in fat content.

Package material- Case ready, custom cut and vacuum sealed packages all received price premiums, $0.27, $0.53, $0.57/lb, respectively when compared to foam tray packaging. Ground beef packaged in chubs did not produce statistically significant results. Case ready packaging was the only package type that was statically significant in all models, with premiums ranging from $0.08/lb to $0.38/lb.

Package size- Package size was statistically significant in all models for ground products. As package size increased by one pound, price per pound decreased by $0.02 to $0.07/lb. In contrast, Parcell and Schroder (2007) found as package size increase by one pound, price per pound decreased by $0.23/lb for ground beef.

Discount- Discount was measured by the amount per pound that a specific package was discounted. For example, packages that were reduced for quick sale, special sale, or manager's sale were accounted for by this continuous variable. Discount did not prove to be statistically significant in predicting price per pound

for fresh ground products except for the model measuring effect across all label types. Across all label types, higher priced products were discounted most frequently. A $1.00 increase in price was associated with $0.09/lb price discount.

Expiration date- Expiration date proved to be statistically significant, bringing price premiums ranging from $0.27 to $1.00/lb when compared to packages that did not denote an expiration date.

Brand and Label- The focus of this research is on branding and labeling; therefore, each will be discussed in more detail. Brand type consisted of dummy variables for Special, Program/Breed, Store, Other and generic. All branded products received a price premium when compared to unbranded, or generic, ground products. Of course, that was expected. Premiums received ranged from $0.18 to $1.64/lb across all different types of branding programs.

Labeling variables offered interesting results suggesting that “No antibiotics” labeling brings a price premium ranging from $0.27 to $1.75/lb over products that were not labeled. “No hormones” was statistically insignificant in all models. This could be due to many observations containing both “No antibiotics” and “No hormones.” For this reason a model was estimated combining “No antibiotics”, “No hormones”, “All natural”, and “Guaranteed quality” labels into one category. However; the combination label variable indicated a price discount of $0.15/lb for combination labeling, which is opposite of what one would expect from providing more information to the consumer. “All natural” labeling also received a price discount when compared to products marketed without a special label throughout the model set, which could be possible from the overuse and lax regulations that

must be met in order to be labeled “All natural”. These results do not support evidence found by Grannis and Thilmany (2000), which found consumers were willing to pay a premium for local, natural beef; however, they found the amount of the premiums paid decreased as base price increased.

Table IV-1. Regression Results for Ground Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Store Type	Brand Type	Label	Combined Label^
Intercept	2.900*** (5.57)	1.224*** (8.01)	3.289*** (5.99)	1.980*** (7.70)	3.991*** (6.97)	4.613*** (8.97)	4.795*** (9.75)
Store Type							
Specialty	Base	Base	Base	Base	Base	Base	Base
Supermarket	-0.734 (1.54)	-0.349*** (2.91)	-1.317*** (2.67)	n/a	-1.362*** (2.63)	-1.767*** (3.74)	-2.200*** (5.13)
Discount	-1.324*** (2.69)	-0.613*** (4.78)	-2.029*** (4.02)	n/a	-2.069*** (3.91)	-2.330*** (4.77)	-2.806*** (6.27)
Warehouse Club	-1.427*** (2.80)	-0.630*** (4.60)	-2.182*** (4.14)	n/a	-2.023*** (3.71)	-2.395*** (4.71)	-2.910*** (6.20)
Metropolitan Area							
Tulsa	-0.457*** (3.38)	-0.158*** (3.16)	n/a	-0.683*** (4.13)	-0.484*** (3.99)	-0.417*** (2.80)	-0.436*** (2.95)
Oklahoma City	-0.449*** (3.33)	-0.136*** (2.76)	n/a	-0.684*** (4.16)	-0.498*** (4.11)	-0.379** (2.55)	-0.401*** (2.73)
Denver	Base	Base	Base	Base	Base	Base	Base
Butcher							
Butcher	-0.077 (0.61)	-0.053 (1.14)	0.015 (0.11)	0.181 (1.44)	-0.099 (0.85)	-0.122 (1.06)	-0.085 (0.68)
Cut Type							
Ground chuck	Base	Base	Base	Base	Base	Base	Base
Ground beef	-0.151*** (4.15)	-0.089*** (5.06)	-0.147*** (3.87)	-0.187*** (5.88)	-0.177*** (4.81)	-0.212*** (5.29)	-0.163*** (4.54)

Table IV-1. Regression Results for Ground Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Store Type	Brand Type	Label	Combined Label^
Brand							
Generic	Base	Base	Base	Base	Base	Base	Base
Special	1.447***	0.223***	1.014***	1.145***	n/a	1.433***	1.426***
	(6.96)	(3.96)	(4.85)	(6.07)		(8.69)	(9.14)
Program	0.596***	0.181***	0.468***	0.674***	n/a	0.574***	0.516***
	(5.53)	(4.23)	(3.67)	(8.04)		(5.70)	(4.19)
Store	0.301***	0.025	0.230***	0.304***	n/a	0.173*	0.273***
	(3.10)	(0.72)	(3.44)	(3.43)		(1.69)	(3.17)
Other	1.170***	0.388***	1.078***	1.118***	n/a	1.438***	1.639***
	(9.43)	(9.77)	(8.51)	(11.01)		(14.79)	(13.62)
Fat Content							
FC not indicated	Base	Base	Base	Base	Base	Base	Base
FCL5	1.127***	0.465***	1.247***	1.240***	1.155***	1.183***	1.139***
	(11.31)	(12.46)	(12.04)	(12.07)	(11.41)	(10.82)	(11.21)
FC5-10	0.974***	0.410***	1.064***	1.091***	0.959***	0.986***	0.967***
	(10.18)	(11.13)	(11.19)	(11.27)	(10.47)	(9.72)	(10.01)
FC11-15	0.318***	0.186***	0.533***	0.564***	0.435***	0.492***	0.460***
	(2.60)	(3.94)	(4.84)	(5.31)	(3.21)	(4.58)	(4.35)
FC16-20	0.127	0.065*	0.211**	0.205**	0.076	0.088	0.120
	(1.33)	(1.84)	(2.21)	(2.13)	(0.84)	(0.89)	(1.14)
FCG20	-0.232**	-0.102***	-0.149	-0.120	-0.256***	-0.221**	-0.241**
	(2.43)	(2.73)	(1.57)	(1.25)	(2.82)	(2.20)	(2.51)

Table IV-1. Regression Results for Ground Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Store Type	Brand Type	Label	Combined Label^
Package Material							
Foam Tray	Base	Base	Base	Base	Base	Base	Base
Chub	0.006 (0.09)	0.034* (1.81)	-0.074 (1.11)	0.012 (0.19)	0.000 (0.01)	-0.109 (1.64)	-0.041 (0.63)
Case ready	0.271*** (3.07)	0.050* (4.94)	0.188** (2.18)	0.244*** (2.65)	0.382*** (4.40)	-0.022 (0.33)	0.192** (2.35)
Custom cut	0.531*** (2.43)	0.020 (0.24)	0.334 (1.51)	0.449** (2.07)	0.800*** (2.83)	-0.198 (1.13)	0.013 (0.07)
Vacuum sealed	0.569*** (2.79)	-0.020 (0.38)	0.543*** (2.93)	0.586*** (3.53)	1.302*** (6.48)	0.215 (1.45)	0.039 (0.25)
Package Size							
Package size	-0.057*** (15.13)	-0.024*** (12.67)	-0.054*** (13.55)	-0.059*** (14.98)	-0.063*** (14.40)	-0.070*** (15.82)	-0.061*** (15.19)
Discount							
Discount	-0.039 (0.97)	-0.003 (0.23)	0.009 (0.23)	-0.040 (1.00)	-0.073 (1.60)	-0.089** (2.47)	-0.063 (1.58)
Label							
No special label	Base	Base	Base	Base	Base	Base	Base
Combo^	n/a	n/a	n/a	n/a	n/a	n/a	-0.153*** (3.40)
Antibiotics	0.909*** (5.12)	0.268*** (4.06)	0.794*** (4.26)	0.663*** (3.65)	1.747*** (11.34)	n/a	n/a
Hormones	0.001 (0.01)	-0.015 (0.36)	0.002 (0.02)	0.090 (0.90)	-0.021 (0.37)	n/a	n/a

Table IV-1. Regression Results for Ground Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Store Type	Brand Type	Label	Combined Label^
All natural	-0.186*** (3.87)	-0.050*** (3.47)	-0.177*** (3.77)	-0.179*** (-3.64)	-0.275*** (5.16)	n/a	n/a
Source verified	-0.064 (0.95)	-0.034*** (2.71)	-0.069 (0.95)	-0.053 (0.81)	-0.081 (1.21)	n/a	-0.014 (0.18)
Quality guaranteed	0.034 (0.65)	0.018 (1.12)	0.051 (0.94)	0.033 (0.66)	0.077 (1.19)	n/a	n/a
Expiration Date							
No expiration date indicated	Base	Base	Base	Base	Base	Base	Base
ExpL1	0.995*** (5.78)	0.275*** (4.65)	0.882*** (5.23)	0.776*** (4.95)	0.937*** (5.26)	0.375*** (3.01)	0.614*** (4.17)
Exp1-7	0.901*** (6.17)	0.296*** (5.17)	0.732*** (5.43)	0.744*** (5.45)	0.621*** (4.29)	0.338*** (3.46)	0.515*** (4.29)
ExpG7	0.838*** (5.61)	0.272*** (4.66)	0.680*** (4.99)	0.681*** (4.90)	0.576*** (4.00)	0.274** (2.54)	0.448*** (3.66)
-2 LLF	329.4	-566.1	352.2	367.8	387.5	367.7	345.5
R^2	0.840	0.849	0.847	0.850	0.806	0.834	0.826
Number of observations	461	460	461	461	461	461	461

NOTE: T-values (absolute value) are reported in parenthesis under parameter estimates.

*** Statistically significant at the 1% level.

** Statistically significant at the 5% level.

* Statistically significant at the 10% level.

^ All labels except “Source verified” are combined into one dummy variable.

Summary

The base model explains a high percentage of variability in price per pound for ground beef and chuck items. In particular, store variables are influential on price per pound, excluding the presence of an in-store butcher. When compared to generic products, all types of branded products received price premiums indicating that branding programs may be beneficial at the retail level. Of course, this would depend on the costs associated with developing a branded product as well as maintenance and advertising costs. Labeling proved to be either insignificant or offered price discounts over packages that did not contain a special label. This could be due to lack of public education on the requirements that must be met to label with certain words.

Roast Results

The roast data set was considerably smaller than those of the other models, for this reason it was necessary to collapse some dummy variable groups in order to maintain enough degrees of freedom for statistical analysis. All parameter estimates can be seen in Table IV-2. The model, analyzing data across all store types, has an R^2 of 0.744, or the model will explain 74.4% of the variance in the price data. All significant variables were significant at the 1% level, excluding USDA quality grade Prime/Choice, which was significant at the 10% level.

Metropolitan area- Tulsa and Oklahoma City were discounted when compared to the Denver metropolitan area. The model across all store types realized \$0.86/lb and \$0.76/lb discounts for Tulsa and Oklahoma City, respectively.

Butcher- The presence of an in-store butcher was not significant in any of the three models estimated for roast products.

Cut type- The price of chuck roasts were decreased by $0.57/lb when compared to round roasts.

Discount- The sale discount per pound, proved to be not significant in estimating price per pound for roasts.

USDA quality grade- Prime and Choice graded roasts increased price by $0.23/lb compared to roasts that were not graded. Consequently, Select and Standard grade roasts did not prove to be statistically significant.

Package size- As package size increase by one pound, there was a price discount of $0.28/lb for roasts. Package size was statistically significant at the 1% level

Unlike the ground product data, package material, expiration date, brand, and label did not prove to be statistically significant in any model.

Table IV-2. Regression Results for Roast Products ($/Lb)

Variable	**Store Type**
Intercept	5.234*** (21.40)
Store Type	
Specialty	Base
Supermarket	n/a
Discount	n/a
Warehouse club	n/a
Metropolitan Area	
Denver	Base
Tulsa	-0.858*** (6.06)
Oklahoma City	-0.758*** (3.72)
Butcher	

Table IV-2. Regression Results for Roast Products ($/Lb)

Variable	Store Type
Butcher	0.050 (0.29)
Cut type	
Round	Base
Chuck	-0.565*** (9.75)
Discount	
Discount	-0.064 (1.05)
USDA Quality Grade	
USDA grade not indicated	Base
Prime/Choice	0.233* (1.69)
Select/Standard	-0.074 (0.25)
Brand	
Generic	Base
Brand	0.214 (1.60)
Expiration Date	
Expiration date not indicated	Base
Expiration Date	-0.262 (1.65)
Label	
No special label	Base
Label	0.036 (0.22)
Package Material	
Case ready/Vacuum sealed	Base
Custom cut/Foam tray	-0.104 (0.74)
Package size	-0.279*** (11.48)
-2LLF	281.8
R^2	0.744
Number of observations	175

NOTE: T-values (absolute value) are reported in parenthesis under parameter estimates.
*** Statistically significant at the 1% level.
** Statistically significant at the5% level.
* Statistically significant at the 10% level.

Summary

Data for roasts offer little insight as to whether or not branding and labeling of roasts is beneficial for consumers, retailers, and packers alike. Due to the small number of degrees of freedom encountered by a smaller data set and large number of variables, statistical analysis was difficult. The smaller data set stems from the lack of product offering in retail outlets. The small extent of offering could be because roasts are a less value cut than ground products or steaks. It could also be due to the time frame in which the data were collected. Data were collected during the summer season when roasts are a less popular cut due to the grilling season beginning. From the analysis that was possible, both brands and labels were found to be not significant variables. However, all store level variables were significant with the exception of the presence of an in-store butcher.

Steak Results

Steak models explained variability very well, as evidenced by R^2 statistics of, 90.4%, 89.0%, 90.3 %, 90.4%, and 90.4% to base model, across metropolitan area, across all labels, and combined label category, respectively (Table IV-3). Even with a high degree of variability explained by the models, there were not as many significant variables with the steak data set as there were in the ground beef data set. Parameter estimates can be found in Table IV-3.

Store type- Store type is not significant in most models. The only exception is supermarkets offering $1.09/lb, $0.21/lb, and $1.21/lb price premiums over

specialty stores for the base model, log (price) model and the model with combined label categories. These estimates do not have the expected sign.

Metropolitan area- Metropolitan area was the only store level variable that was significant in a majority of the models contained by the set. As expected, both Tulsa and Oklahoma City received average price discounts of, $1.33 and $1.18/lb, respectively when compared to Denver. The variation of price discount was small across all models in the set.

Butcher- Like models for ground and roast products, the presence of an in-store butcher was not statistically significant in any model within the set.

Cut type- Two of three dummy variables for steak cut were statistically significant, exhibiting price discounts of $3.59 and $4.14/lb, for sirloin and round steaks, respectively when compared to ribeye steaks in the base model. The average price discount for sirloin steaks when compared to ribeye steaks was $3.60/lb, while round steaks were discounted, on average, $4.13/lb when compared to ribeye steaks. The average discounts are calculated using models without the dependent variable transformation because of differences in interpretation of the coefficients.

USDA quality grade- Choice and Prime grade were both significant throughout the model set. This is expected because most steaks sold at the retail level are graded USDA Choice or Prime. A much smaller number were graded as USDA Select or Standard. Steaks graded USDA Choice commanded an average premium of $0.69/lb over steaks that did not make a distinction of grade. USDA Prime was found to receive a $2.91/lb average premium over steaks that were un-graded. It should be noted that the log transformation model yielded much lower

premiums of $0.48/lb for Prime steaks when compared to un-graded steaks. Parcell and Schroeder (2007) found price premiums ranging from $0.27/lb to $2.46/lb for prime steaks when compared to non-graded steaks. Studies by Killinger al et. (2004b) found price premiums for high marbled steaks (Prime) ranging from $0.24/lb to $1.13/lb for Chicago participants while San Fransico participants revealed willingness to pay premiums of $1.47/lb for high marbled steaks.

Package material- Vacuum sealed and custom cut packaging proved to be significant most frequently. Cuts packaged in vacuum sealed packages received price discounts ranging from $1.14/lb and $1.25/lb, while custom cut steaks received price premiums ranging from $0.33/lb to $0.37/lb. Case ready packaging was not significant in any model estimated for this research.

Package size- Package size was significant in all models that were estimated. Increasing package size by one pound indicated a cost savings of $0.27/lb, on average.

Discount- Sale prices were not significant in any model that was estimated for the steak data set.

Expiration date- Expiration date was statistically different from packages that did not disclose an expiration date to the consumer at the 10% level for packages that had one week until expiration. For packages with one week to expiration an average price discount of $0.24/lb when compared to steaks that did not have an expiration date. In contrast, Killinger al et. (2004a) found consumers were willing to pay premiums of $0.74/lb for bright, cherry-red colored steaks.

Cherry-red color has traditionally been used as an indicator of freshness for fresh beef.

Brands and Labels- Branding in the steak data set is not as noteworthy as in the ground beef data set with two of the four dummy variables not being significant. Steak packages carrying a brand classified as “special” or “other” are significant and both provided price premiums of $5.87/lb and $1.99/lb, respectively over generic products in the base model. Many special brands were present in specialty stores and were confirmed by the high price premium for those brands compared to generic products. Products carrying a special brand received an average premium of $6.01/lb over generic products. Products with an “other” brand, on average, received $1.92/lb price premium when compared to generic products. Parcell and Schroeder (2007) found an average price premium of $1.08/lb associated with an Angus branded product when compared to a store brand product.

Labels that were statistically significant were “No hormones”, “All natural”, and “Source verified” labels. The “No hormones” label had a negative effect on price averaging $0.23/lb. This is opposite of what was expected and of what previous research has indicated. Lusk, Roosen, and Fox (2003) found that consumers in France, Germany, U.K. and U.S. were willing to pay premiums of $0.92/lb, $0.82/lb, $1.22/lb, and $2.63/lb, respectively for steaks produced without growth hormones. The “All natural” label increases price by approximately $0.25/lb in the base model. This agrees with evidence found by Grannis and Thilmany (2000) showing that consumers are willing to pay a premium for local, natural beef. Again, the amount of the premium consumers were willing to pay decreased as base price

increased for steak. Steaks labeled “Source verified” was significant at varying levels, but commanded an average price premium of $0.52/lb when compared to products that did not have a special label.

Summary

The steak models explained a high percentage of variability in the data set. Store level characteristics were not as useful in predicting price per pound for steak cuts as with ground beef and chuck cuts. Metropolitan area was the only significant store level variable that proved to be statistically significant. Steak cut type proved to be significant with sirloin, round and t-bone being price discounted when compared to ribeye cuts. Packages carrying a brand classified as special or other received price premiums when compared to generic products. Grade also had a significant effect on price per pound that was received at the retail level.

Table IV-3. Regression Results for Steak Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Label	Combined Label
Intercept	8.398***	2.102***	8.456***	8.637***	8.296***
	(13.35)	(18.06)	(12.49)	(11.93)	(11.64
Store Type					
Specialty	Base	Base	Base	Base	Base
Supermarket	1.090*	0.211*	0.378	0.896	1.213*
	(1.87)	(1.95)	(0.62)	(1.31)	(1.81)
Discount	0.826	0.076	-0.347	0.599	0.957
	(1.31)	(0.67)	(0.55)	(0.83)	(1.34)
Warehouse club	1.065	0.177	-0.047	0.805	1.149
	(1.41)	(1.38)	(0.06)	(0.96)	(1.39)
Metropolitan Area					
Denver	Base	Base	Base	Base	Base
Tulsa	-1.331***	-0.171***	n/a	-1.328***	-1.329***
	(4.51)	(4.02)		(4.52)	(4.52)
Oklahoma City	-1.171***	-0.175***	n/a	-1.178***	-1.177***
	(3.98)	(4.02)		(4.03)	(4.01)
Butcher					
Butcher	-0.072	-0.005	-0.105	-0.073	-0.087
	(0.24)	(0.11)	(0.32)	(0.24)	(0.28)
Cut Type					
Rib-eye	Base	Base	Base	Base	Base
Sirloin	-3.587***	-0.589***	-3.585***	-3.606***	-3.588***
	(46.22)	(44.96)	(44.37)	(46.03)	(45.88)
Round	-4.135***	-0.735***	-4.124***	-4.122***	-4.126***
	(59.90)	(72.82)	(57.81)	(58.94)	(59.19)
T-bone	-0.086	0.003	-0.106	-0.083	-0.090
	(1.06)	(0.35)	(1.25)	(1.01)	(1.09)

Table IV-3. Regression Results for Steak Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Label	Combined Label
Brand					
Generic	Base	Base	Base	Base	Base
Special	5.872***	0.668***	5.868***	6.235***	6.047***
	(25.15)	(7.27)	(24.71)	(39.29)	(31.06)
Program	0.713**	-0.021	-0.127	0.572	0.637*
	(2.04)	(0.57)	(0.32)	(1.59)	(1.80)
Store	0.162	0.017	0.218	0.153	0.175
	(0.82)	(0.60)	(1.04)	(0.77)	(0.88)
Other	1.988***	0.153***	1.830***	1.933***	1.939***
	(5.38)	(2.97)	(4.67)	(5.07)	(5.11)
USDA Quality Grade					
No grade indicated	Base	Base	Base	Base	Base
Standard	-0.273	-0.001	-0.284	-0.292	-0.279
	(1.02)	(0.01)	(1.08)	(1.06)	(1.00)
Select	-0.694	-0.076	-0.789	-0.662	-0.664
	(1.26)	(1.03)	(1.38)	(1.21)	(1.21)
Choice	0.557	0.120**	0.808**	0.635*	0.617*
	(1.59)	(2.40)	(2.16)	(1.77)	(1.72)
Prime	2.793***	0.482***	3.034***	2.944***	2.867***
	(4.04)	(7.46)	(4.23)	(4.22)	(4.11)
Package Material					
Foam tray	Base	Base	Base	Base	Base
Case ready	0.133	0.016	0.112	0.113	0.118
	(1.17)	(0.84)	(1.02)	(0.96)	(1.02)
Custom cut	0.373**	0.009	0.365**	0.331**	0.350**
	(2.49)	(0.26)	(2.21)	(2.15)	(2.32)
Vacuum sealed	-1.146***	-0.094***	-1.259***	-1.153***	-1.138***
	(4.41)	(2.90)	(4.69)	(4.37)	(4.37)

Table IV-3. Regression Results for Steak Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Label	Combined Label
Package Size					
Package Size	-0.266*** (9.41)	-0.039*** (7.81)	-0.263*** (9.07)	-0.265*** (9.17)	-0.269*** (9.33)
Discount					
Discount	-0.021 (0.53)	-9.98E-6 (0.00)	-0.023 (0.54)	-0.042 (1.04)	-0.047 (1.15)
Label					
No special label	Base	Base	Base	Base	Base
Combo^	n/a	n/a	n/a	n/a	-0.090 (0.87)
Antibiotics	0.154 (1.23)	0.030 (0.45)	0.157 (1.25)	n/a	n/a
Hormones	-0.218* (1.83)	-0.036** (2.31)	-0.225* (1.91)	n/a	n/a
All natural	0.253** (2.35)	0.033 (1.00)	0.252** (2.38)	n/a	n/a
Source verified	0.497** (2.12)	-0.068 (1.25)	0.490* (1.90)	n/a	0.559*** (2.68)
Quality guaranteed	-0.064 (0.57)	0.019 (1.17)	-0.076 (0.66)	n/a	n/a

Table IV-3. Regression Results for Steak Products ($/Lb)

Variable	Base	Log (LbPrice)	Metro Area	Label	Combined Label
Expiration Date					
No expiration date indicated	Base	Base	Base	Base	Base
ExpL1	-0.066	-0.077	-0.047	-0.131	-0.116
	(0.30)	(0.87)	(0.20)	(0.54)	(0.50)
Exp1-7	-0.223*	-0.009	-0.206	-0.245*	-0.242*
	(1.66)	(0.33)	(1.34)	(1.67)	(1.70)
ExpG7	-0.109	0.012	-0.081	-0.143	-0.151
	(0.74)	(0.40)	(0.49)	(0.90)	(0.98)
-2 LLR	1834.2	-681.7	1860.0	1848.4	1845.2
R^2	0.904	0.890	0.903	0.904	0.904
Number of observations	749	749	749	749	749

NOTE: T-values (absolute value) are reported in parenthesis under parameter estimates.

*** Statistically significant at the 1% level.

** Statistically significant at the5% level.

* Statistically significant at the 10% level.

^ All labels except “Source verified” are combined into one dummy variable.

CHAPTER V

SUMMARY AND CONCLUSIONS

Primary data were collected from 65 grocery stores located in three metropolitan areas, Oklahoma City, Oklahoma, Tulsa, Oklahoma, and Denver, Colorado. The sample population was randomly generated and attempted to represent all suburban areas in each metropolitan area, as well as, store type (specialty, supermarket, discount and warehouse club). Data were collected on 462 ground products, 175 roast products, and 756 steak products. Hedonic pricing methods were used to estimate the value consumers place on observable characteristics of fresh beef products.

Branding offers price premiums, however; the costs of branding programs would need to be addressed to calculate net returns for branding programs. Branding programs that are classified as "special" (i.e. no antibiotics, no hormones, all natural) offer the largest price premiums, but "other" types of branding programs offer price premiums as well. Special brands offer price premiums of $1.12/lb for ground products and $6.01/lb for steak products. All other brand types averaged premiums of $0.65/lb for ground products (excluding coefficients that were not statistically significant). Other brand, in the steak data, was the only other brand type that was statistically significant. It produced an average price premium $1.92/lb.

When comparing this research data to data obtained for the 2004 National Meat Case Study, it suggests that the usage of natural labeling has increased, especially on

ground beef products. Thirty-three percent of ground beef and chuck packages carried an all natural claim on its label compared to 7% that carried all natural labels in the 2004 study. In contrast, this research showed only 3% of roast and steak packages to carry an all natural label, while the National Meat Case study observed 2% of beef cuts carrying an all natural label. The percent change in roast and steak cuts is much smaller than the percent change seen in "all natural" labeling in ground products. Labeling variables were not consistently significant throughout the data, indicating that labels associated with a brand name might offer consumers the most reassurance for their purchasing decision. It is interesting to note that ground products labeled "No antibiotics" were statistically significant for ground products and offered price premiums ranging from $0.26/lb to $1.75/lb. In contrast, "No hormones" was statistically significant for steak products and showed an average price premium of $0.22/lb. It was assumed that "All natural" labeling would also produce price premiums for ground products. This was not so as "All natural" labeling received an average price discount of $0.18/lb for ground products and is statistically significant could be due to the loose regulations that must currently be met in order to label a product "All natural". Consumer education has allowed consumers to understand labeling regulations and could be to blame for price discounts for ground products that are labeled "all natural".

From this research, it seems that the most useful attributes when estimating price per pound of ground beef products are store level characteristics. This could be due to amount of processing required to produce ground products. Also the store's reputation can influence consumers' perception of food safety and quality of fresh beef products. Fat content is also a predictor of price received for ground products. Data results indicate that

price premiums are available for case ready packaging. This could be due to the cleaner nature of the packaging compared to foam tray packaging. As mentioned above, both labeling and branding is influential on price of fresh ground products.

There clearly needs to more research regarding fresh roast products that are available in retail outlets. Research was limited due to the season of data collection. However, store level characteristics affect price as well as USDA quality grade on roast products.

Store characteristics have less effect on price per pound for steak items than ground items. Steak pricing is influenced by cut type, USDA quality grade, and package size. Brand paired with special labeling can offer an average price premium of $6.01/lb for steaks; however, premiums for other brand types (program, store, and other) are much smaller.

The inconsistency between branding and labeling across different cut groups indicates there is an opportunity and need for more research in the effect of brands and labeling on the price of fresh beef.

Future Research

There are extensive opportunities to expand on research that was completed for this thesis project. Branding continues to be an area of great interest and opportunity for the beef industry. Results show consumers pay more for retail beef cuts that are marketed under brand names regardless of the type of branding program; with the largest premiums being derived from brands that incorporate special labeling.

The ongoing nature of this research provides the Oklahoma Beef Council with plenty of opportunity to research and inform consumers and retailers alike. Consumer preferences are continually changing, therefore, requiring future research pertaining to characteristics that consumers perceive as important in retail meat purchasing decisions. Producers, packers, and retailers need to be able to market their products in response to consumer demands. Without additional research, consumer demands will not be communicated throughout the supply chain. As research becomes more abundant in the area of retail meat attributes and price differentials, consumer demand will be better satisfied.

Statistical analysis can be completed in a variety of ways on the present data. Price differentials could be looked at from a metropolitan area perspective by pooling data from all three sets together by location. This, of course, would require a new set of dummy variables to be assigned, but provide a larger data set from each area for analysis. Additionally, data could be examined by store name, capturing the effect of the store. Store type could be influential on ground product prices because many stores use ground products to get people into their store. Ground products are also susceptible to more processing, thus, increasing the likelihood of food safety concern. A store's reputation might influence the premiums or discounts paid for ground products because of the level of safety the consumer associates with each store name. Another analysis option that was not explored for this research was interaction effects of brand and grade. This could be an alternative analysis because many branding programs only allow certain grades to be labeled with the brand name. Alternatively, research could be conducted by collecting

new data and determining the effects of store and product attributes have over time in the same metropolitan areas.

This research, by design, did not contain demographic information about consumers who are purchasing fresh beef products. In additional research it might be helpful to combine research similar to that conducted for this thesis with demographic data of current purchasers of fresh beef products to see how the combination of consumer demographic characteristics as well as, store and product characteristics affect price paid for fresh beef products.

Pork and poultry industries have greatly extended their offering of branded products. For beef to realize the same type of opportunities, as an industry, it needs to move towards more product branding. Continued research is needed to identify changing consumer preferences as the industry continues to develop and evolve.

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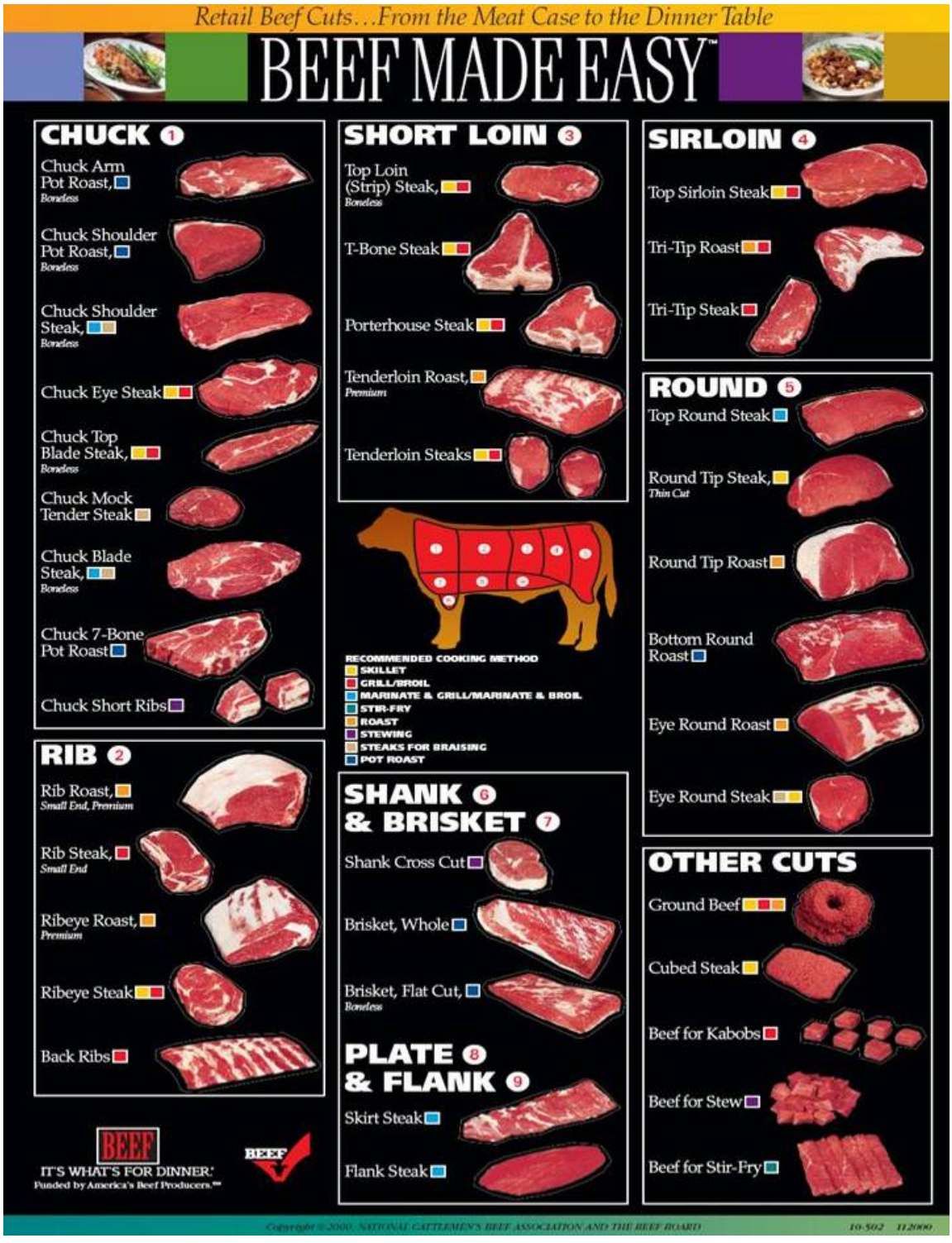
APPENDICES

Appendix I

Beef Made Easy



Appendix II

Survey Form - Store Information

STORE INFORMATION

1. Store Type
① speciality
② supermarket
③ discount
④ wholesale warehouse

2. Store Name
_____

3. Location
① metropolitian
② suburban

4. City Name
_____

5. In-store Butcher
① yes
② no

6. Chicken Price
_____

7. Pork Price
_____

Survey Form – Beef Ground

PRODUCT INFORMATION

ID#_____

1. Type-Ground
① ground beef
② ground chuck

2. Fat Content
① < 5%
② 5-10%
③ 11-15%
④ 16-20%
⑤ >20

3. Brand
① generic
② store
③ program
④ other

4. Brand Name
_____

5. Package Material
① chub
② foam tray
③ case ready
④ custom cut

6. Package Size in lbs
_____

7. Price/lb _____

8. Price_____

9. Sale Price
_____

10. Label
① no antibiotics
② hormone free
③ all natural
④ source verified
⑤ guaranteed quality

11. Expiration Date
_____

12. Other Comments
_____
_____
_____

1. Type-Ground
① ground beef
② ground chuck

2. Fat Content
① < 5%
② 5-10%
③ 11-15%
④ 16-20%
⑤ >20

3. Brand
① generic
② store
③ program
④ other

4. Brand Name
_____

5. Package Material
① chub
② foam tray
③ case ready
④ custom cut

6. Package Size in lbs
_____

7. Price/lb _____

8. Price_____

9. Sale Price
_____

10. Label
① no antibiotics
② hormone free
③ all natural
④ source verified
⑥ guaranteed quality

11. Expiration Date
_____

12. Other Comments
_____
_____
_____

Survey Form – Beef Roast

PRODUCT INFORMATION ID#_____

1.Type-Roast
① round
② chuck

2. Grade
① none indicated
② standard
③ select
④ choice
⑤ prime

3. Brand
① generic
② store
③ program
④ other

4. Brand Name
_____

5. Package Material
① vacuum sealed
② foam tray
③ case ready
④ custom cut

6. Package Size in lbs
_____

7. Price/lb _____

8. Price_____

9. Sale Price _____

10. Label
① no antibiotics
② hormone free
③ all natural
④ source verified
⑤ guaranteed quality

11. Expiration Date
_____

12. Other Comments
_____
_____
_____

1.Type-Roast
① round
② chuck

2. Grade
① none indicated
② standard
③ select
④ choice
⑤ prime

3. Brand
① generic
② store
③ program
④ other

4. Brand Name
_____

5. Package Material
① vacuum sealed
② foam tray
③ case ready
④ custom cut

6. Package Size in lbs
_____

7. Price/lb _____

8. Price_____

9. Sale Price _____

10. Label
① no antibiotics
② hormone free
③ all natural
④ source verified
⑤ guaranteed quality

11. Expiration Date
_____

12. Other Comments
_____
_____
_____

Survey Form – Beef Steak

PRODUCT INFORMATION ID#_____

1. Type-Steaks
① ribeye
② sirloin
③ t bone
④ round

1. Grade
① none indicated
② standard
③ select
④ choice
⑤ prime

3. Brand
① generic
② store
③ program
④ other

4. Brand Name
_____

5. Package Material
① vacuum sealed
② foam tray
③ case ready
④ custom cut

6. Package Size in lbs
_____

7. Price/lb _____

8. Price_____

9. Sale Price _____

10. Label
① no antibiotics
② hormone free
③ all natural
④ source verified
⑤ guaranteed quality

11. Expiration Date
_____

12. Other Comments
_____
_____
_____

1. Type-Steaks
① ribeye
② sirloin
③ t bone
④ round

2. Grade
① none indicated
② standard
③ select
④ choice
⑤ prime

3. Brand
① generic
② store
③ program
④ other

4. Brand Name
_____

5. Package Material
① vacuum sealed
② foam tray
③ case ready
④ custom cut

6. Package Size in lbs
_____

7. Price/lb _____

8. Price_____

9. Sale Price _____

10. Label
① no antibiotics
② hormone free
③ all natural
④ source verified
⑤ guaranteed quality

11. Expiration Date
_____

12. Other Comments
_____
_____
_____

VITA

Jennifer Michelle Dutton

Candidate for the Degree of

Masters of Science

Thesis: ESTIMATING THE VALUE OF BRAND AND ATTRIBUTES FOR RETAIL FRESH BEEF PRODUCTS

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Name: Jennifer Michelle Dutton Date of Degree: July, 2007

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: ESTIMATING THE VALUE OF BRAND AND ATTRIBUTES FOR RETAIL FRESH BEEF PRODUCTS

Pages in Study: 112 Candidate for the Degree of Master of Science

Major Field: Agricultural Economics

Scope and Method of Study: The purpose was to increase the probability of success for beef branding programs, more specifically to determine the value consumers place on specific characteristics of fresh beef and to identify the extent of brands and labeling that already exist at the retail level for fresh beef products.

Findings and Conclusions: Premiums available for branded and specially labeled fresh beef products vary greatly. Brands that are paired with special labeling terms offer the largest premiums of $1.12/lb for ground products and $6.01/lb for steak products. Compared to the 2004 National Meat Case Study usage of natural labeling has increased. The percentage of ground products labeled “all natural” grew from 7% to 33% of packages observed, while steaks labeled “all natural” grew from 2% to 3% of observed packages, a much slower rate. Evidence from data obtained for this study show 21.43% of ground, 46.29% of roast, and 49.73% of steak products are branded.

Advisor’s Approval Dr. Clement Ward