# Defining and quantifying *Certified Angus Beef* ® brand consumer demand

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# Defining and Quantifying *Certified Angus Beef*®
# Brand Consumer Demand

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Angus producers looked beyond the pasture gate to build the nation's first branded beef company in 1978. The company was built on the premise of pull-through demand, starting with consumers and ultimately reaching the producers of Angus seedstock.

The concept is more than 30 years old and remains largely unchanged. The *Certified Angus Beef* ® (CAB) brand is a time-tested lesson in the practical application of derived demand. The company's mission statement provides the guide to "Increase demand for registered Angus cattle through a specification-based, branded-beef program to identify consistent, high quality beef with superior taste" (CAB 2011).

Successfully accomplishing this mission requires improving the collective demand for products used to create CAB. Essentially, each beef industry sector benefits from the brand's success by improving the demand for Angus-influenced carcasses, live cattle, feeder cattle and calves – ultimately increasing demand for registered Angus genetics.

The brand grew rapidly in the 1980s and 1990s as retailers, restaurants, distributors and meat packing companies recognized the benefits of supplying consumers with a consistent, high-quality beef product. Supply limited brand growth during its early development.

The company built relationships with major U.S. packers and was produced through more than 80 percent of the nation's packing capacity by the late 1990s. The company's supply concerns during the last 15 years have been focused on identifying and sharing the best practices for developing Angus-influenced calves from the cow-calf to feedlot sector (CAB 2011).

*Certified Angus Beef* ® brand certification rates have gradually improved from a program low of 14 percent in 2006 to a high of 23 percent in 2010 (CAB 2011). Successful company supply efforts, evolving industry management practices, and support from Angus breeders have shifted attention back to demand generation.

Demand for the CAB appears to be strong with boxed beef prices consistently greater than USDA Choice and Select grade cutout values. Despite recognized brand growth, the industry has not developed a way to quantify annual changes in consumer demand for CAB.

This report summarizes the concept of demand in the beef industry. The report also provides a CAB demand index and discusses benefits and challenges with using such an index for measuring demand.

## Introducing Beef Demand
Beef demand in its simplest form is the price-quantity relationship of beef, which is influenced by prices of competing proteins and evolving consumer preferences.

Consumer preferences for convenience, health benefits and taste influence the demand for specific products. Economic factors such as consumer income and beef price relative to other competing proteins also influence demand.

Aggregate U.S. beef demand declined consistently throughout the 1980s and early 1990s, then rebounded with the introduction of low-carbohydrate and high-protein diets in the late 1990s and early 2000s. Demand for beef has remained relatively flat to slightly declining since then (Tonsor et al. 2009).

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Recognizing when a change in demand occurs is easier than pinpointing the exact reasons for the change. The dynamic and complex nature of consumer beef demand can be affected by a number of influences that are difficult, if not impossible, to measure.

Eales and Unnevehr (1988) showed that meat demand is often not as simple as examining differences between aggregate protein groups, such as beef and chicken. Consumers generally do not associate purchase preferences based simply on protein type. Instead, consumers make purchase decisions on a more detailed product level, comparing for example chicken breasts with items such as processed chicken patties, steaks, roasts and hamburger.

Wholesale and retail beef demand is also influenced by quality grade and seasonality (Lusk et al. 2001 and Capps 1989). In general, Select beef demand is more elastic, or sensitive to price change, at the wholesale level compared to Choice (Lusk et al. 2001). This is because Select grade beef has more substitutes available than Choice grade. For example, Choice grade beef can substitute for Select more readily than the reverse.

Choice and Select boxed beef demand are derived directly from consumer demand for retail beef. Stronger consumer demand for Choice and Select beef translates into greater demand for these products at the wholesale level (Lusk et al. 2001).

The demand for Choice and Select beef can best be illustrated seasonally. Demand for both Choice and Select product increases during the summer grilling season. The demand curves for these products become more inelastic, or quantity purchased is less sensitive to price change, during these months. However, Choice and Select beef products are not strong substitutes in the summer (Lusk et al. 2001). Consumers likely differentiate these products for their distinct grilling and eating characteristics during this season.

As demand for beef declines in the winter, these two quality grades become closer substitutes (Lusk et al. 2001). Winter weather dictates more meals being prepared as roasts and ground beef, and grade is not as important in determining overall eating quality using these preparation methods.

Consumer willingness to pay for specific meat characteristics can have powerful implications for product demand. Gao and Schroeder (2009) developed a conjoint-analysis experiment to determine consumer willingness to pay for beef labeled with characteristics such as certified from the United States, guaranteed tender, guaranteed lean or enhanced with Omega-3 fatty acids.

The study found beef consumers' willingness to pay for specific product attributes varied considerably by characteristic. Willingness to pay for individual product attributes was influenced by the number and combination of attributes provided on the label for specific beef products. Studies such as these provide powerful implications for the effect of product characteristics and product labeling for branded beef products.

The influence of meat brands and advertising effects cannot be ignored when considering beef demand. The presence of branded protein programs, such as CAB, increased substantially throughout the 1980s and 1990s.

Brester and Schroeder (1995) looked at the effects of generic advertising for beef, poultry and pork, as well as branded beef and pork advertising at the retail level. The research showed branded poultry, branded pork and generic beef advertising had marginal influence on retail demand for meat products. They argued that branded product promotion is likely to provide greater returns than generic product advertising because consumers associate the brand with the product.
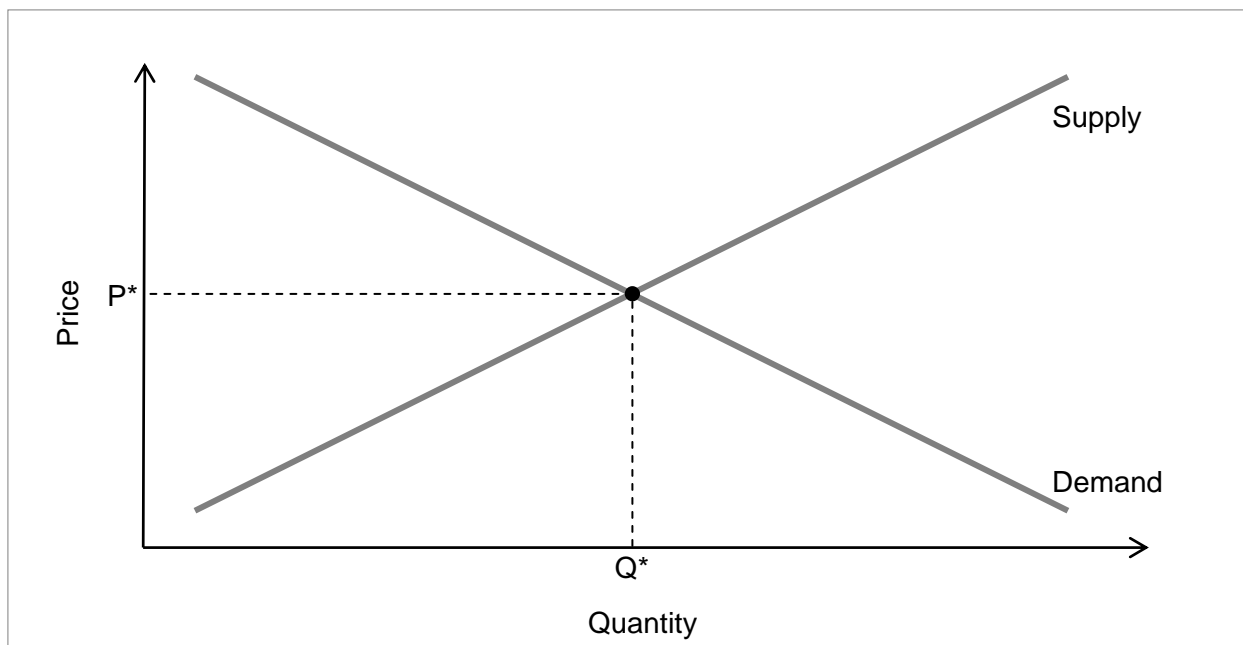
### Understanding Demand
The complexities involved in quantifying demand can lead to misunderstandings when trying to create simplified demand estimates.

Domestic prices, sales and per capita consumption alone are not measures of product demand. However, the measurements are frequently used individually to illustrate patterns over time in what is inaccurately represented as illustrating demand.

Demand represents the quantity consumers are willing to purchase at a specific market price. A demand curve represents this quantity-and-price relationship (Figure 1). Consumers are willing to purchase less of a good as the price increases and more as price decreases.

The supply curve represents a quantity-and-price relationship where producers are willing to supply more of a good as price increases and less as price decreases. The market price of a good (P*) and the quantity exchanged in the marketplace (Q*) are determined by the interaction of supply and demand. The interactions between supply and demand make it challenging to develop a simple demand metric for specific products.
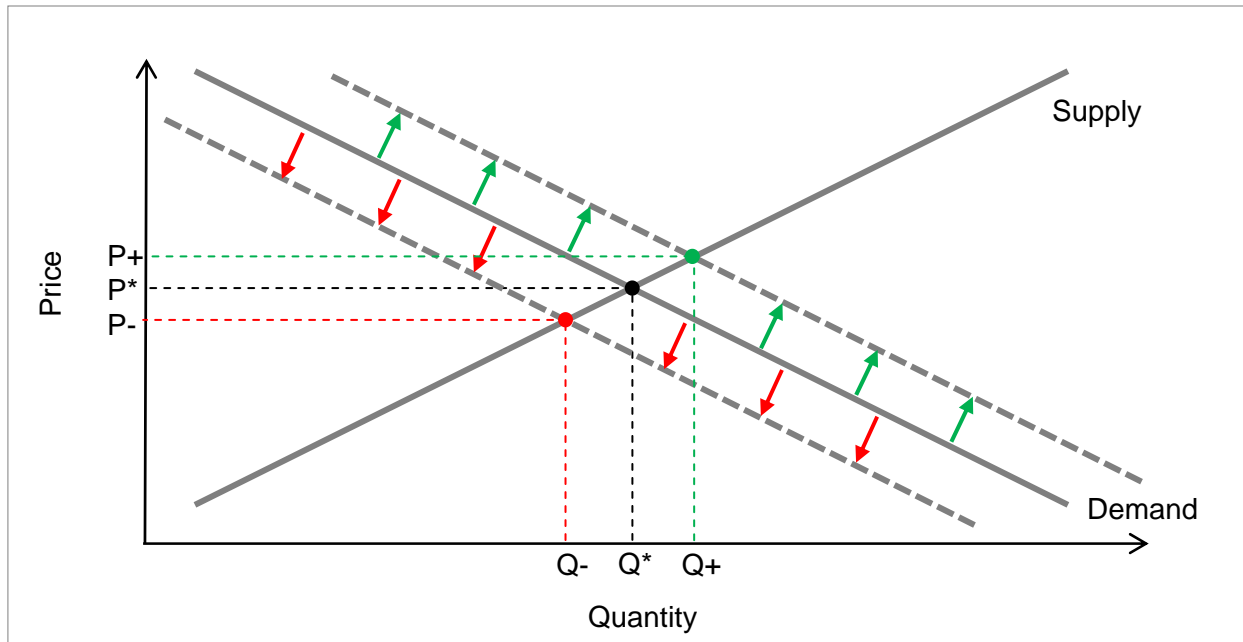
**Figure 1 - Market Supply and Market Demand Curves**



When economists discuss demand changes, they are focused on a shift in the demand curve, not a change in P* or Q*. A movement in the demand curve away from the axis indicates increasing demand, while a shift toward the axis represents decreasing demand (Figure 2).

Notice when all else remains equal, an increase in demand increases price and quantity, likewise a decrease in demand reduces price and quantity. However, supply and demand are constantly shifting to create a completely fluid equilibrium between price and quantity.

**Figure 2 – Market Supply and Changing Demand Curve**



In addition to shifts in the demand curve, the shape of the demand curve can also vary. The illustrations in Figure 1 and Figure 2 represent linear supply and demand curves. However, the shape of the demand curve can also change based on consumer preferences and the relative price effects of competing goods. These can affect the demand curve slope and even whether it is linear or non-linear.

Elasticity is often a term used to describe the slope of a demand curve. Elasticity is the percentage change in quantity resulting from a one percent change in price. A relatively steep demand curve is considered inelastic – a 1 percent change in price results in quantity changing by less than 1 percent. A relatively flat demand curve is elastic – a 1 percent change in price results in quantity changing by more than 1 percent.

## Application of Demand
The graphs below represent annual sales and price data for CAB (Figure 3 and Figure 4). Neither of these figures represent annual demand for the branded beef product.

Figure 3 provides insight on sales changes on an annual basis. The graph reveals a 150 million pound increase in CAB sales from 2006 to 2010. Can this major upward trend be credited to increased demand for the beef brand? Possibly. However, if prices declined substantially during that five-year period, the increased pounds of sales could simply be reflecting increased production of CAB over time with no change in consumer demand.

If demand for the brand did not change during that five-year period, declining prices would lead to increased annual sales. Without more information, it is impossible to know whether demand improved during this time period or supply simply increased.

Figure 4 provides the price information missing from Figure 3. It shows a relatively stable boxed beef cutout from 2006 to 2010. With annual price and sales information, the demand picture is clearer. Perhaps demand did increase over this time period, but the information in the two graphs needs to be combined to make that determination.

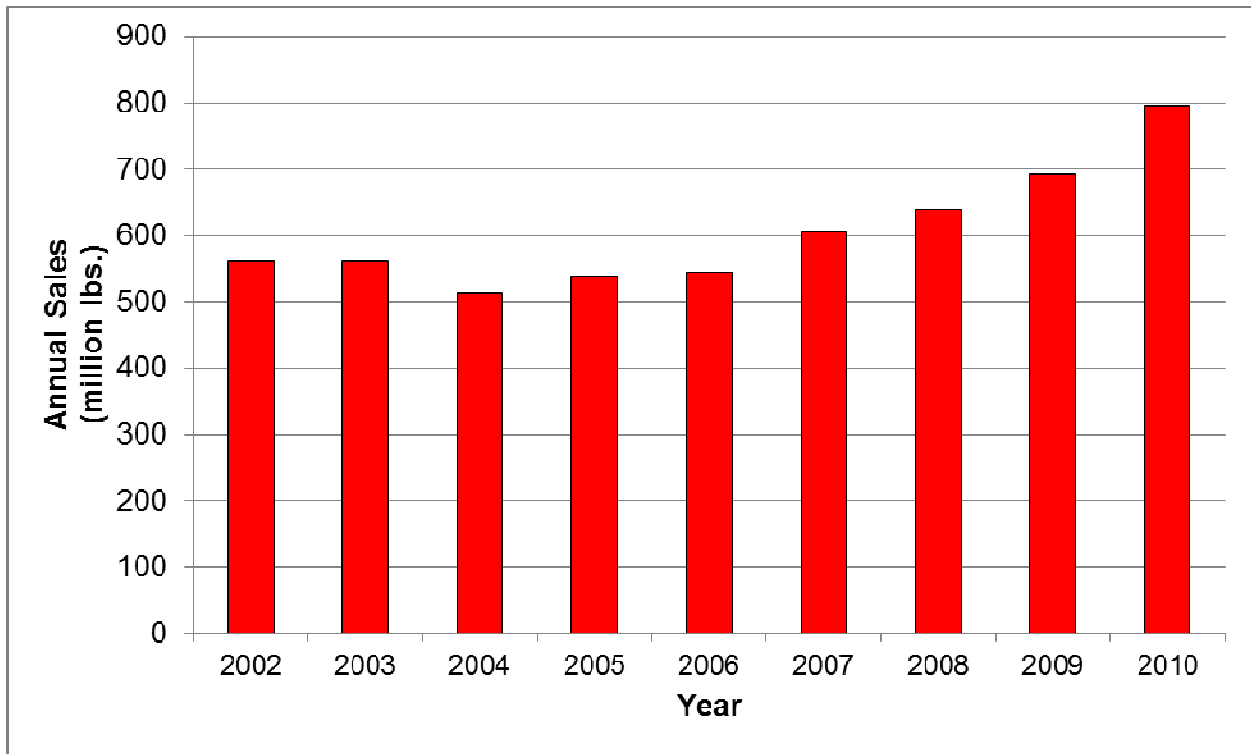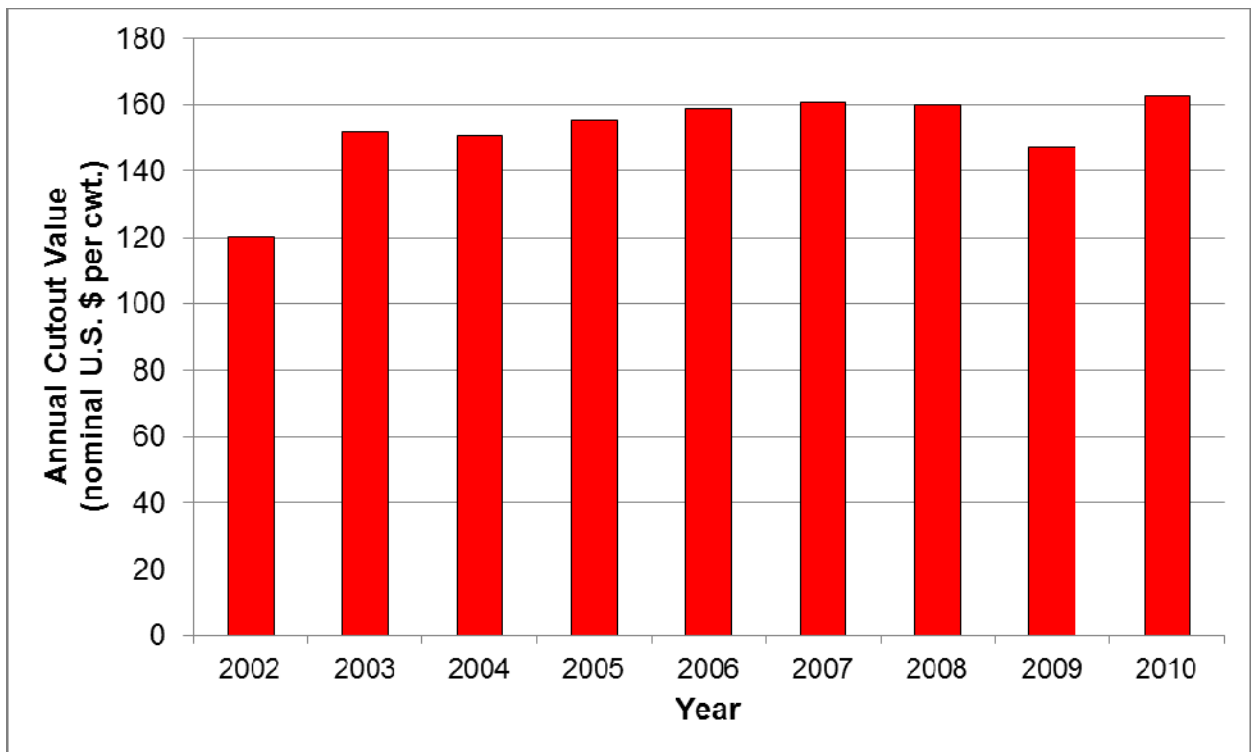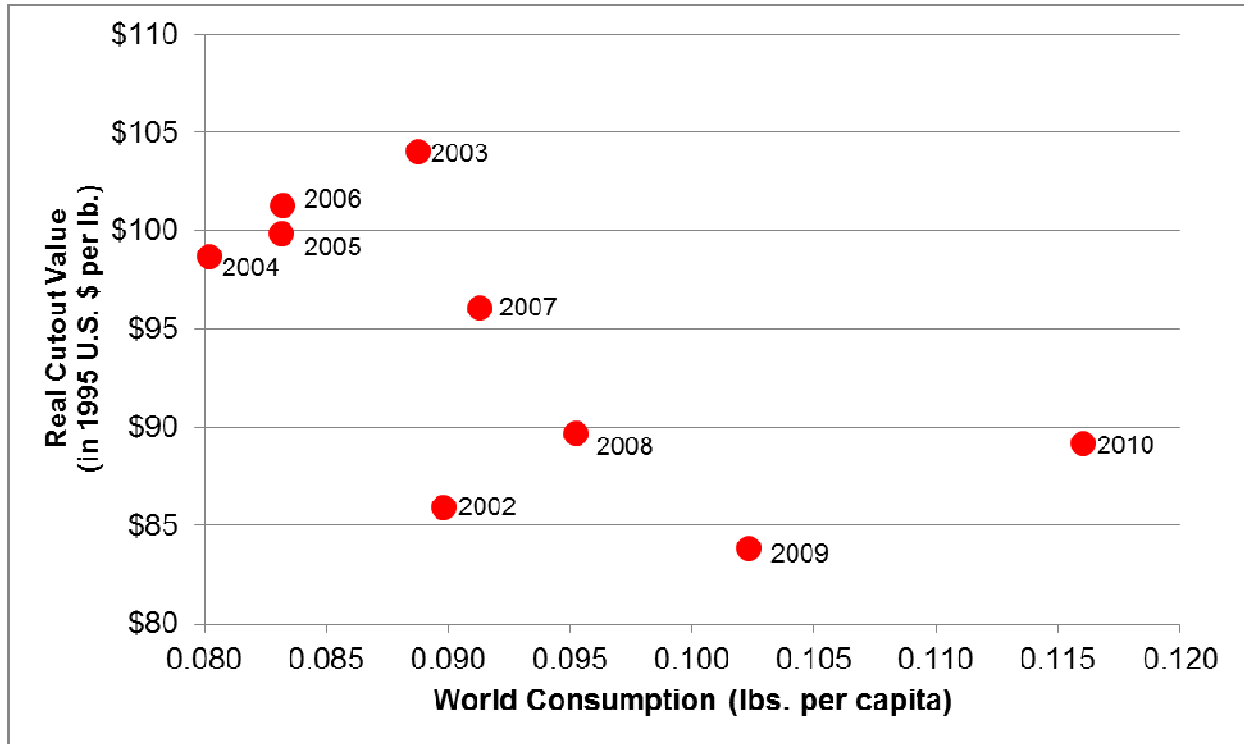**Figure 3 - Annual Consumption of Certified Angus Beef ®**



**Figure 4 - Annual *Certified Angus Beef ®* Boxed Beef Cutout Value**

Population and inflation effects also need to be included in demand-related estimates. Figure 5 combines the information in the preceding two charts and adjusts the sales information based on per capita world consumption and deflates the sales figures to real prices.

**Figure 5 – Annual *Certified Angus Beef ®* Brand Consumption and Price**



The result is a scatterplot of the annual per capita quantity of CAB consumed and its corresponding boxed beef cutout value adjusted for inflation to 1995 U.S. dollars from 2002 to 2010. Each dot represents an equilibrium market price and quantity for a particular year. In other words, each dot is equivalent to the intersection of that particular year's supply and demand curves.

Figure 5 illustrates the combined dynamics of consumption and price but provides little information about demand change on an annual basis. Dots farther away from the axis likely represent an increase in demand. Also, information about the shape of the demand curve can help determine if dots that are close together represent separate demand curves or points along the same demand curve.

Demand indexes can combine these measurements, as well as information about demand curve shape, to provide a single direct measure of demand by accounting for the most influential characteristics that create shifts in demand.

A demand index creates a standardized measurement tool for estimating demand over time. The index accounts for quantity, price, population and inflation. Index-based demand models also utilize own-price elasticity measurements. The elasticity is the percentage change in consumer purchases of a particular good in response to a one percent change in price.

A demand index metric that compares CAB with commodity beef enables the industry to better understand changes over time in consumer demand and the brand's position within the beef industry.

## Data and Procedures
Detailed annual sales and price data for CAB were provided by Certified Angus Beef LLC (CAB 2011). Choice beef is included in the analysis for comparison. Annual prices for Choice boxed beef sales were collected from the USDA National Comprehensive Boxed Beef Cuts Report (USDA 2011).

The time period from 2002 to 2010 was used to create the two metrics based on available data. To account for inflation, the Producer Price Index for finished consumer foods was used to deflate wholesale prices to 1995 inflation-adjusted U.S. dollars (BLS 2011).

Wholesale beef prices in the United States result from both domestic and international sales. Often demand is illustrated for only domestic population. However, since CAB is exported, the model needs to account for potential worldwide consumption. Annual world population data was obtained from the U.S. Census Bureau to model the worldwide CAB marketplace (Census 2011).

One of the important aspects in building the demand index models were estimates for the own-price elasticities of CAB and Choice beef products.

To obtain an estimate of CAB demand elasticity we utilized a Delphi procedure. First, a survey was sent to 20 U.S. agricultural economists who specialize in beef demand. The survey asked for own-price elasticity estimates for the brand and commodity beef at the wholesale level.

Sixteen survey responses were received. Following the first round of the survey, the elasticity estimates were summarized and the results were distributed to the economists sampled, allowing them to adjust their original estimates. Following this second round, an Olympic average was used to estimate the elasticity for each model.

These measurements were combined with annual sales, price, population and inflation data to develop an index benchmarked off of 2002 demand. An index value greater than 100 indicates a demand increase and an index less than 100 shows a demand decline relative to 2002.

## Results
Demand indexes offer users a simple and easy-to-reference demand calculation. The wholesale beef index results for CAB and Choice product are summarized in Figure 6. A table, including the metrics used to calculate the demand index, can be found in the Appendix.

The base year is 2002 in each demand model. The index values for proceeding years are quantified as percentage values compared to 2002. For example, the demand for CAB in 2003 was 119.5 percent of 2002, while 2004 demand declined to 102.3 percent of 2002 demand.

Elasticity estimates for CAB and Choice product were -0.87 and -0.54, respectively, based on results of the surveys of economists. After removing the highest and lowest survey responses for each elasticity estimate, CAB elasticity ranged from -1.8 to -0.25 and Choice ranged from -0.85 to -0.33.

A sensitivity test was performed to analyze the results based on changing elasticity estimates for CAB product. As the elasticity estimate increased from -1.07 to -0.67, the relative value of the results didn't change. However, the magnitude of the demand index measurements increased as the elasticity of demand estimate increased. Relative to CAB market data, the demand index measurements would be more variable if the elasticity of demand were more inelastic.

Elasticity estimates between 0 and -1 indicate inelastic product demand. This means that a 1 percent change in price generates a change in quantity consumed of less than 1 percent.

In general, consumers are more sensitive to price changes for individual branded products compared to much broader commodities. Brands are a form of product differentiation, bundling a variety of characteristics for consumers to recognize. Substitution is more likely as the number of brands or attributes increase, and as such demand for CAB is more elastic than Choice beef demand.

A logical assumption is that branded products might be expected to garner more consumer loyalty and thus face more inelastic demand.  If so, consumers may be expected to be less responsive to price changes in their consumption of a branded product (e.g., CAB) than for the broader commodity as a whole (e.g., Choice beef).  However, CAB has strong substitutes available in the retail counter, such as other branded beef as well as unbranded or private label products. This is likely to make demand for CAB more elastic than Choice beef demand.

This result is illustrated widely in published literature.  For example, branded products have more elastic demand than private label and generic products for general food products (Cotterill, Putsis, and Dhar 2000), soft drinks (Cotterill 1994) and cheese (Cotterill and Samson 2002).

Although research indicates brand loyalty may be present, loyal customers are loyal to the brand (i.e., they are more likely to purchase that brand when price increases than to switch brands), but elasticity of demand for the quantity purchased by loyal customers is often greater, or more elastic, than for non-loyal customers (Krishnamurthi and Raj 1991).

Even though brand loyalty is common, those who are loyal to a particular brand are quite sensitive in their quantity purchases of the branded product to price changes when compared to consumers who are not brand loyal.
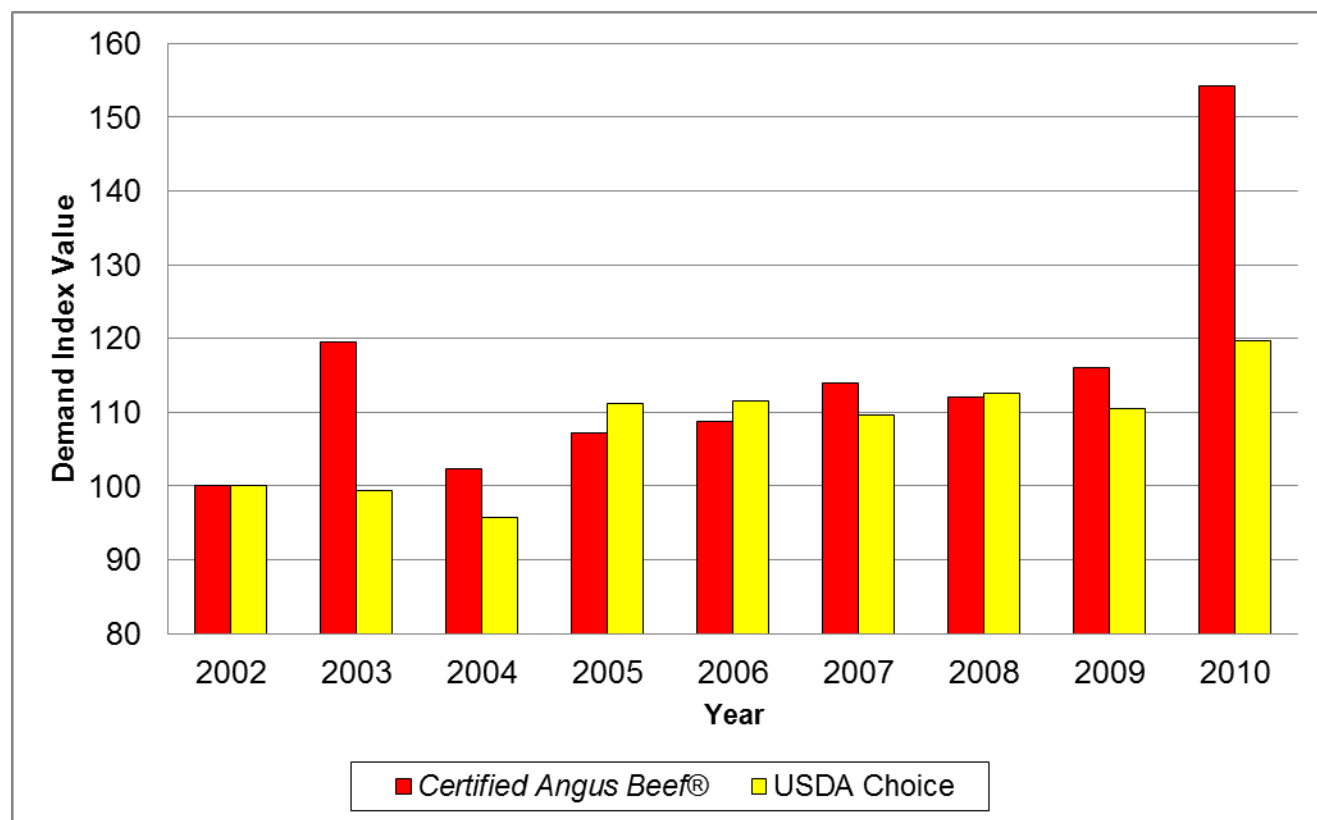
All that said, scanner data are now available that would make it feasible to empirically test whether CAB demand is more or less elastic, at least in the United States, than demand for other beef products and this would be a worthwhile future endeavor.

The CAB and Choice wholesale demand indexes offer specific application for comparative analysis in demand changes over times. Comparing the two indexes provides no information about which beef product has stronger demand in any one year.  Instead the indexes only provide a relative comparison of demand change from year to year.

The index is the most useful as a barometer for demand change over time. Figure 6 shows that the demand for CAB has outpaced Choice product since 2002. Demand for CAB increased 56 percent over the eight years and Choice demand increased 20 percent.

Each beef product experienced its largest year-over-year increase from 2009 to 2010. In each instance, increasing per capita sales came during rising boxed beef cutouts indicating a robust increase in  demand.

**Figure 6 – Wholesale Beef Demand Index (Base Year 2002)**



The model results explain demand trends over time for each beef product as it relates to larger macro-economic trends. Since each measure is based on wholesale demand, it includes sales to retailers, foodservice and international business. As demand changes in these sectors, it influences the overall demand for boxed beef.

The U.S. recession created struggles for the foodservice industry as restaurant performance declined around 4 percent from January 2007 to January 2009 (NRA 2011). Recession-related struggles were likely the source for declining demand for beef in 2007 and 2008.

Restaurant performance improved throughout 2009 and 2010, but improvements were often inconsistent. A six-month period of improvement would be followed by six months of stagnant or declining performance. However, long-term improvement in this sector during the last two years has likely contributed to increasing CAB and Choice demand.

Index results show a positive relationship with international sales and CAB demand. The two largest international sales years for CAB product since 2002 were 2003 and 2010. These were also the two best years for brand wholesale demand.

Export sales for Choice beef separate from all other beef are not readily available, but 2003 and 2010 also represent the two strongest years for total U.S. beef exports (LMIC 2011). The connection between U.S. beef exports and Choice demand is not nearly as strong with 2003 representing the second smallest demand value since 2002. However, each model produced its lowest index value in 2004 (although the CAB index was still greater than the base year 2002).

Annual export sales for CAB were down more than 68 percent in 2004 and Choice exports were down nearly 82 percent from 2003 due to trade barriers associated with bovine spongiform encephalopathy.

The CAB demand index reached an all-time high of 154 in 2010. The brand increased sales by more than 100 million pounds compared to 2009, and the brand's cutout value increased more than $5 per pound in deflated U.S. dollars. That led to a rare combination of the single largest year-over-year increase in per capita sales and advancing cutout values. There was not another year in the model where both per capita consumption and real cutout prices increased relative to the previous year.

Similarly, the demand for Choice product increases when per capita consumption and real cutout values increase. More dramatic increases in these metrics result in more substantial increases in demand.

## Implications

Wholesale demand index results are one industry segment removed from consumer purchasing behavior. However, the measurements provide a more holistic indication of industry demand by including purchase behavior from all meat industry sectors.

There is no doubt that the recession influenced CAB and Choice demand from 2007 to 2009. Improving domestic economic conditions coincide with growing export sales in 2010 to create a unique combination of increased per capita consumption and boxed beef prices. The result was an impressive year-over-year demand increase for each product.

The demand increase for CAB in 2010 indicates the brand was well positioned in balancing existing consumer demand with a substantial increase in supply. Annual increases in demand were noted for the brand in six out of the eight years studied. The declines in 2004 and 2008 can likely be credited to the BSE-related trade restrictions and the global recession.

The demand for Choice beef seemed to move in similar patterns to CAB. However, the commodity product seemed to be more dramatically affected by negative macroeconomic factors, such as trade barriers and overall economic health. It is also worth noting that demand for Choice product appears slower to rebound during times of recovery than CAB demand.

These differences between CAB and Choice demand cannot be fully understood without further analysis. It is likely the demand structures for each product vary considerably making each product uniquely different in how demand changes based on consumer preferences, relative prices and economic conditions.

Index results can offer insight concerning the strength of a particular product in the marketplace.

Marsh (2003) utilized a demand index to examine the effect of retail beef demand on fed and feeder cattle prices and overall production. He concluded that the nearly 66 percent reduction in an overall U.S. beef demand index that occurred from 1976 to 1999 resulted in a 40 percent decline in fed cattle prices and feeder prices were lowered by 48 percent, holding all else constant.

Improving demand at the consumer and wholesale level can have an equally dramatic positive influence on farm-level prices and production, and these effects can be illustrated by the success of CAB and the Angus breed.

In 2001, Angus-influenced steers and heifers consisted of 47 percent of U.S. slaughter levels. That number increased to 63 percent in 2010. The *Certified Angus Beef* ® brand accounted for more than 86 percent of Angus-influenced carcasses with Modest or higher marbling certified by the USDA (CAB 2010).

The dominance of Angus in the U.S. cowherd continues to offer producers dividends. *Certified Angus Beef®* brand carcass-based premiums remain strong, often as high as $5 per hundredweight for qualifying cattle (CAB 2010), and Angus genetics continue to generate additional auction market revenue for cattlemen. Predominantly Angus-influenced sale lots generated the highest breed premiums in 2008 and 2009 Superior Livestock Auction video markets receiving $6.55 per hundredweight more than Brahman-influenced sale lots (Zimmerman 2010).

These premiums can likely be sourced to the pull-through demand created by CAB. The increased demand noted from 2002 to 2010 improved the demand for each beef industry segment responsible for adding value to the Angus genetics developed by seedstock producers. Additional demand creation will continue to influence these later segments and offer new opportunities for brand producers throughout the vertically coordinated supply chain.

Demand indexes provide a succinct way to monitor demand change over time. However, they are also subject to several weaknesses.

The index provides only a snapshot of demand change, giving no information about why the demand curve shifted in the way it did. More analysis and demand modeling must be completed in order to determine the reasons the demand index changes over time.

The index also operates on the assumption demand elasticity is constant over time and across different levels of per capita supply. That may not be the case, and as such when supply of the product is changing rapidly, such as was the case for CAB from 2009 to 2010. We are less certain about the precise demand index change.

In addition, the demand elasticities used to estimate the indexes presented here are based on a survey of expert opinion. Empirical work to specifically estimate these different elasticities would be a valuable exercise. Research has shown that branded products, brand longevity, market share, and branded product promotion can all influence demand elasticity for the branded products. Knowing these influences would be extremely valuable not only for demand monitoring, but also for strategic brand management and promotion.

Finally, for a growing branded product that is experiencing both greater market penetration and supply growth, the demand index can change rapidly from one year to the next. Such growth must be tempered by the fact that a brand representing a small portion of the overall commodity market, can experience very rapid growth in percentage terms, but still be modest relative to overall market supply.

The demand indexes developed and presented here for CAB and Choice wholesale beef provide a consistent and reliable way to illustrate changing demand over time for these beef products. The results illustrate very robust demand growth for CAB in recent years.

The annual CAB demand index will provide the industry with an indicator of how global demand for CAB is progressing. If the impressive demand growth realized in 2010 can be sustained, the brand will continue to offer substantial opportunities for the beef industry and Angus producers to enjoy greater demand for high-quality fed and feeder cattle.

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# Appendix

## Table 1 - *Certified Angus Beef* ® Brand Wholesale Demand Index

| Calendar Year | Total CAB Sales[1] | World Pop Annual Estimate[2] | Per Capita CAB Consumption | Year to Year % Change in Consumption | CAB Nominal Cutout Value[3] | Producers Price Index[4] | CAB Real Cutout Value (1995 $) | Yearly % Change in Real Price | Constant Demand Yearly Expected % Change in Real Price (2002 = 100) | Constant Demand Expected (1995 $) Real Beef Price (2002 = 100) | CAB Demand Index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (lbs.) | (people) | (lbs./person) | (%) | (cents/lb.) | 1995 = 100 | (cents/lb.) | (%) | (%) | (cents/lb.) | (2002 = 100) |
| 2002 | 560,615,733 | 6,242,347,736 | 0.090 | N/A | $120.39 | 140.1 | $85.93 | N/A | N/A | 100.00 | 100.00 |
| 2003 | 560,761,183 | 6,317,998,040 | 0.089 | -1.17 | $151.78 | 145.9 | $104.03 | 21.06 | 1.34 | 87.09 | 119.46 |
| 2004 | 512,777,409 | 6,393,741,245 | 0.080 | -9.64 | $150.70 | 152.7 | $98.69 | -5.13 | 12.26 | 96.47 | 102.30 |
| 2005 | 538,190,123 | 6,469,688,764 | 0.083 | 3.72 | $155.48 | 155.7 | $99.86 | 1.18 | 8.45 | 93.19 | 107.15 |
| 2006 | 545,030,349 | 6,546,299,902 | 0.083 | 0.09 | $158.71 | 156.7 | $101.28 | 1.43 | 8.36 | 93.12 | 108.77 |
| 2007 | 604,832,452 | 6,623,914,961 | 0.091 | 9.67 | $160.44 | 167 | $96.07 | -5.14 | -1.92 | 84.28 | 113.99 |
| 2008 | 638,225,915 | 6,700,983,106 | 0.095 | 4.31 | $159.89 | 178.3 | $89.67 | -6.66 | -6.94 | 79.97 | 112.13 |
| 2009 | 693,354,744 | 6,776,763,237 | 0.102 | 7.42 | $147.10 | 175.5 | $83.82 | -6.53 | -15.96 | 72.22 | 116.06 |
| 2010 | 791,279,651 | 6,852,472,823 | 0.115 | 12.86 | $162.71 | 182.5 | $89.16 | 6.37 | -32.75 | 57.79 | 154.29 |

\* Modeled after the Beef Demand Index from Ted Schroeder, Kansas State University

\*\* Determined based on a survey of 20 U.S. agricultural economists with research focused on beef demand

[1] Provided by Certified Angus Beef LLC

[2] Annual World Population Estimate > http://www.census.gov/ipc/www/idb/index.php

[3] Based on the Calendar Year - Urner Barry *Certified Angus Beef* ® boxed beef value

[4] Producers Price Index ID# WPUSOP3110, Finished Consumer Foods

**Assumed CAB Wholesale Price Elasticity\*\*:** **-0.87**
**Assumed CAB Wholesale Price Flexibility:** **-1.15**

## Table 2 - USDA Choice Beef Wholesale Demand Index

| Calendar Year | Total Choice Loads Sold[1] | Total Choice Sales | World Pop Annual Estimate[2] | Per Capita Choice Consumption | Year to Year % Change in Consumption | Choice Nominal Cutout Value[1] | Producers Price Index[3] | Choice Real Cutout Value (1995 $) | Yearly % Change in Real Price | Constant Demand Yearly Expected % Change in Real Price (2002 = 100) | Constant Demand Expected (1995 $) Real Beef Price (2002 = 100) | Choice Demand Index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (40,000# loads) | (lbs.) | (people) | (lbs./person) | (%) | (cents/lb.) | 1995 = 100 | (cents/lb.) | (%) | (%) | (cents/lb.) | (2002 = 100) |
| 2002 | 94,782 | 3,791,280,000 | 6,242,347,736 | 0.61 | N/A | $113.89 | 140.1 | 81.29 | N/A | N/A | 100.00 | 100.00 |
| 2003 | 85,990 | 3,439,600,000 | 6,317,998,040 | 0.54 | -10.36 | $140.61 | 145.9 | 96.37 | 18.55 | 19.19 | 96.89 | 99.47 |
| 2004 | 88,292 | 3,531,680,000 | 6,393,741,245 | 0.55 | 1.46 | $138.78 | 152.7 | 90.88 | -5.70 | 16.76 | 94.92 | 95.75 |
| 2005 | 97,010 | 3,880,400,000 | 6,469,688,764 | 0.60 | 8.58 | $143.93 | 155.7 | 92.44 | 1.71 | 2.31 | 83.17 | 111.15 |
| 2006 | 98,057 | 3,922,280,000 | 6,546,299,902 | 0.60 | -0.10 | $145.52 | 156.7 | 92.87 | 0.46 | 2.50 | 83.32 | 111.45 |
| 2007 | 100,338 | 4,013,520,000 | 6,623,914,961 | 0.61 | 1.13 | $149.56 | 167 | 89.56 | -3.56 | 0.44 | 81.65 | 109.69 |
| 2008 | 105,227 | 4,209,080,000 | 6,700,983,106 | 0.63 | 3.67 | $152.73 | 178.3 | 85.66 | -4.35 | -6.34 | 76.14 | 112.50 |
| 2009 | 108,907 | 4,356,280,000 | 6,776,763,237 | 0.64 | 2.34 | $140.58 | 175.5 | 80.10 | -6.49 | -10.82 | 72.50 | 110.49 |
| 2010 | 111,063 | 4,442,520,000 | 6,852,472,823 | 0.65 | 0.85 | $155.41 | 182.5 | 85.16 | 6.31 | -12.49 | 71.14 | 119.70 |

\* Modeled after the Beef Demand Index from Dr. Ted Schroeder, Kansas State University

\*\* Determined based on a survey of 20 U.S. agricultural economists with research focused on beef demand

[1] Based on the Calendar Year - USDA AMS Report #LM_XB863

[2] Annual World Population Estimate > http://www.census.gov/ipc/www/idb/index.php

[3] Producers Price Index ID# WPUSOP3110, Finished Consumer Foods

**Assumed Choice Wholesale Price Elasticity\*\*:** **-0.54**
**Assumed Choice Wholesale Price Flexibility:** **-1.85**