Defining and Quantifying *Certified Angus Beef®* Brand Consumer Demand *(2013 revision)*

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Abstract

Beef demand is a key economic indicator to the beef industry. To determine the impact of premium brands, such as *Certified Angus Beef ®*, on beef demand, a standardized wholesale beef demand index was produced using quantity, price, population, inflation and demand elasticity data. Three indexes were developed in the research looking at USDA Choice-and-higher, CAB, and non-branded USDA Choice beef. Demand was measured from 2002 to 2012. The elasticity for each model was determined by surveying 20 agricultural economists using a Delphi procedure. An Olympic average of the results was used to estimate elasticity. Elasticity for the USDA Choice-and-higher product and CAB was -0.54 and -0.87, respectively. A 2002 base year was used in each model, and index values are expressed as percentages relative to 2002 demand. Aggregated USDA Choice-and-higher beef demand increased 52 percentage points during the study, improving as much as 25 points in a single year. CAB demand increased 79 percentage points in 10 years. Choice demand improved 3 percentage points during the same period but advanced as much as 20 points in one year. The 2009 to 2010 period produced some of the largest improvements in beef demand in recent history regardless of product category, advancing 24, 38 and 9 percentage points, respectively for each index. The largest year-over-year increase in CAB wholesale demand was 38 percentage points in 2010. Sales increased more than 97.9 million lb. compared to 2009, and the CAB cutout price increased $15.58 per lb. in deflated U.S. dollars. That led to a rare combination of the single largest year-over-year increase in per capita sales and second-largest increase in cutout values since 2002. The wholesale beef demand indexes in this research provide a consistent method to illustrate changing demand over time. Results show demand for higher quality beef, and possibly branded beef, has exceeded commodity Choice. Premium products may need separate consideration in industry metrics for the overall beef demand index. Further research regarding demand elasticity for specific beef brands and quality grades can potentially improve these demand estimates, but the trends in improving demand will likely remain unchanged.

Introduction

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 35 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

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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 24 percent in 2011 (CAB 2013). Successful company supply efforts, evolving industry management practices, and support from Angus breeders have shifted attention back to demand generation.

Demand for the CAB brand 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, provides three wholesale beef demand indexes differentiated by quality, and discusses benefits and challenges with using such indexes 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 (Tonsor et al. 2009). Since that time, demand reached a short-term low during the U.S. recession and has improved consistently as consumer incomes recovered through 2012.

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. For example, a consumer may compare a potential chicken breast purchase against 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 price increases and more as price decreases.

Figure 1
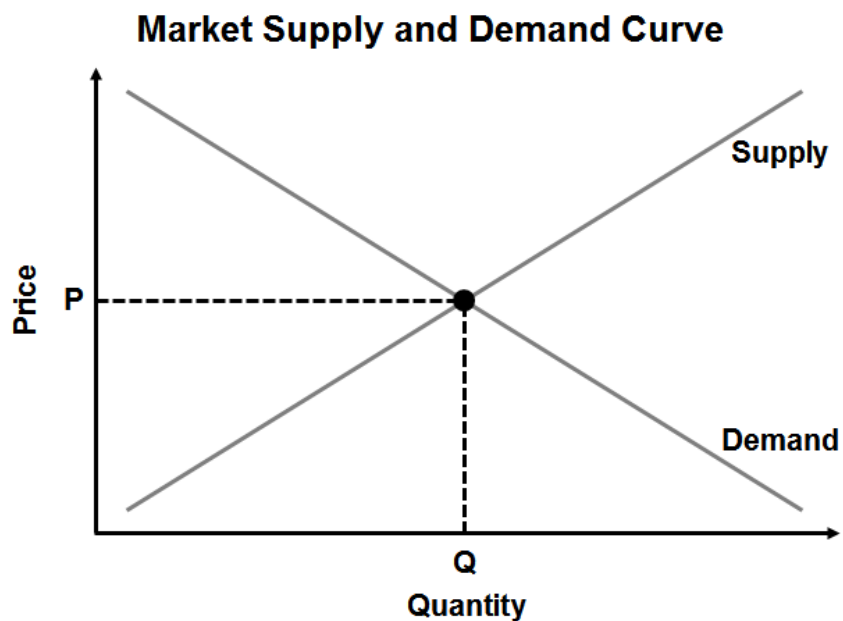

Market Supply and Demand Curve

Figure 2

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.

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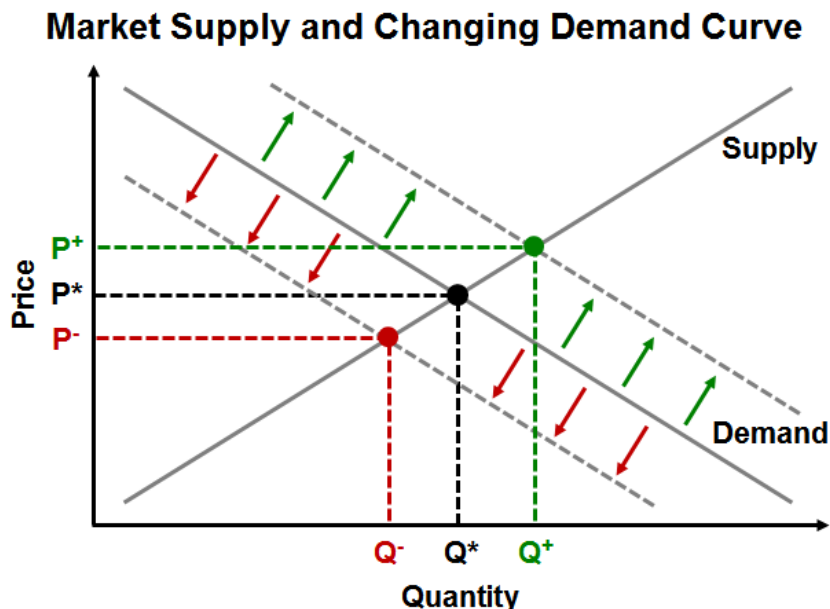
When economists discuss demand changes, they are focused on a shift in the demand curve not a change in P* or Q*. A movement in the demand curve away from the axis indicates increasing demand, while a shift toward the axis represents decreasing demand (Figure 2).

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.

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 a term often 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). However, neither of these figures illustrates annual demand change for the branded beef product.

Figure 3 provides insight on sales changes on an annual basis. The graph reveals a 273 million pound increase in CAB sales from 2006 to 2012. 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 increase in pounds sold 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 2012. With annual price and sales information, the demand picture is clearer. Perhaps demand did increase over this period, but the information in the two graphs needs combined to make that determination.

Population and inflation effects also need to be included in demand-related estimates.

Figure 5 uses 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.

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 2012. 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 3

Annual Consumption for the
Certified Angus Beef® brand

Figure 4

Annual Boxed Beef Cutout Value for the
Certified Angus Beef® brand

The graph 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, i.e. 2010, 2011 and 2012. 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.
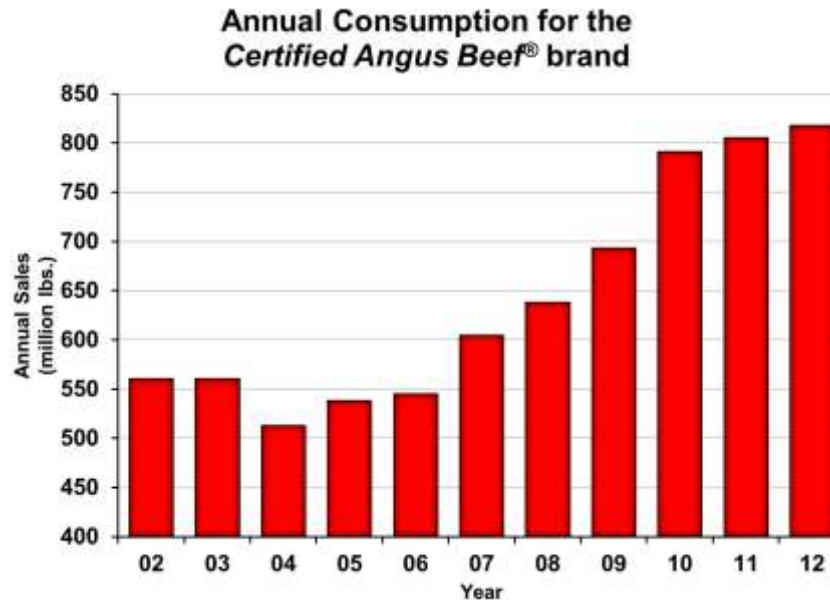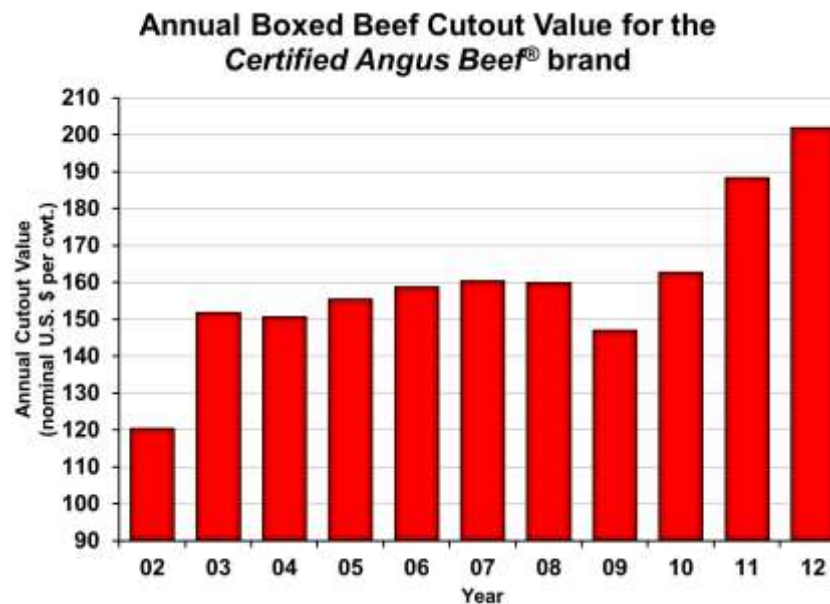
Demand indexes can combine these measurements, as well as information about demand curve shape, to provide a single direct measure of demand by accounting for the most influential characteristics that create shifts in demand.

Such 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, where elasticity is the percentage change in consumer purchases of a particular good in response to a 1 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.

Figure 5

Annual Consumption and Price for the *Certified Angus Beef*® brand
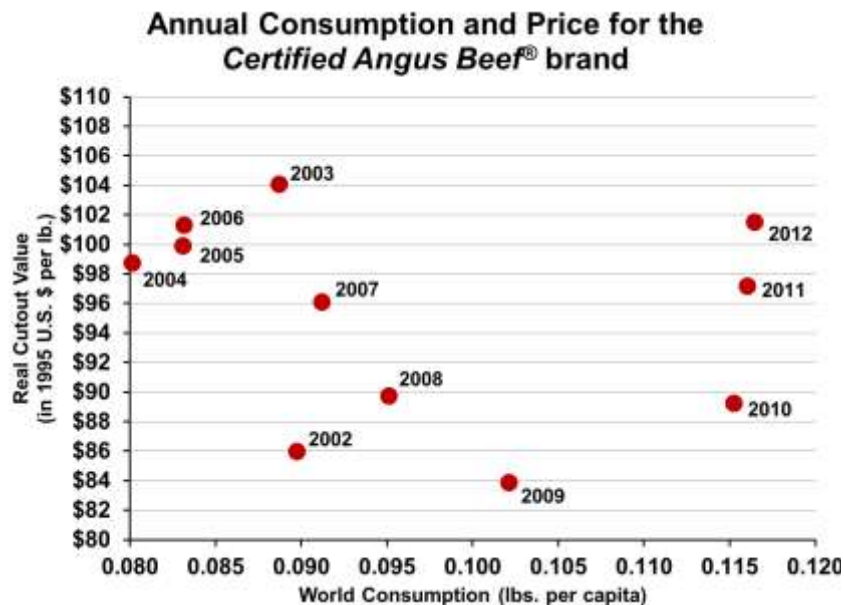
Data and Procedures

Detailed annual sales and price data for CAB were provided by Certified Angus Beef LLC (CAB 2013). USDA Choice-and-higher as well as unbranded Choice beef is included in the analysis for comparison. Annual wholesale boxed beef prices and load counts were collected from the USDA National Comprehensive Boxed Beef Cuts Report for the comparative beef index models (USDA 2013).

The period from 2002 to 2012 was used to create the three metrics based on available data. To account for inflation, the Producer Price Index for finished consumer foods deflated wholesale prices to 1995 inflation-adjusted U.S. dollars (BLS 2013).

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 2013).

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

These measurements were combined with annual sales, price, population and inflation data to develop an index benchmarked from 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-and-higher product are summarized in Figure 6. Tables including the metrics used to calculate the demand index, can be found in the Appendix.

Figure 6

The base year is 2002 in each demand model. The index values for proceeding years are quantified as percentage values compared to 2002 (Figure 6). For example, the demand for CAB in 2003 was 119.4 percent of 2002, while 2004 demand declined to 102.3 percent of 2002 demand.

Wholesale Beef Demand Index Values
Base Year = 2002

Source: USDA, Umer Barry and Certified Angus Beef LLC

The Olympic-average elasticity estimates for CAB and the other wholesale beef were -0.87 and -0.54, respectively, based on results of th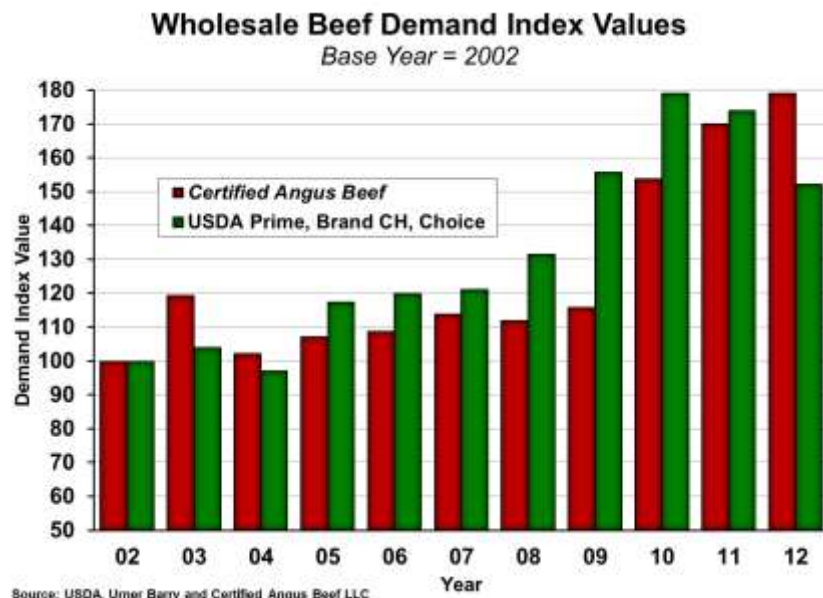e surveys of economists. After removing the highest and lowest survey responses for each elasticity estimate, CAB elasticity ranged broadly from -1.8 to -0.25, while other wholesale beef ranged from -0.85 to -0.33.

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. An elastic product demand is represented by an elasticity of less than -1.

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 increases, and as such, demand for CAB could be considered more elastic than Choice beef demand.

A logical assumption is that branded products might be expected to garner more consumer loyalty and thus face demand that is more inelastic. 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, to the extent that CAB has strong substitutes available in the retail counter, such as other branded or unbranded beef and private label products, demand for CAB would be more elastic than Choice beef demand.

This result is illustrated widely in published literature for brands in general. 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).

A sensitivity test was performed to analyze the results based on changing elasticity estimates for CAB product. Since the survey estimates mostly suggested demand for CAB was inelastic, the role of the sensitivity analysis was to see how the estimates in Figure 6 would change if introduced to a more elastic demand curve estimate.

As the elasticity estimate increased from -5 to -1, the relative value of the results changed slightly in the results from 2004 to 2009 (Figure 7). However, the long-term demand growth illustrated in the initial model was maintained regardless of elasticity increasing.

An overall trend from the sensitivity analysis shows the magnitude of the demand index measurements increased as the price elasticity of demand became more inelastic. Relative to CAB market data, the demand index measurements would be more variable if the elasticity of demand were more inelastic.

Figure 7
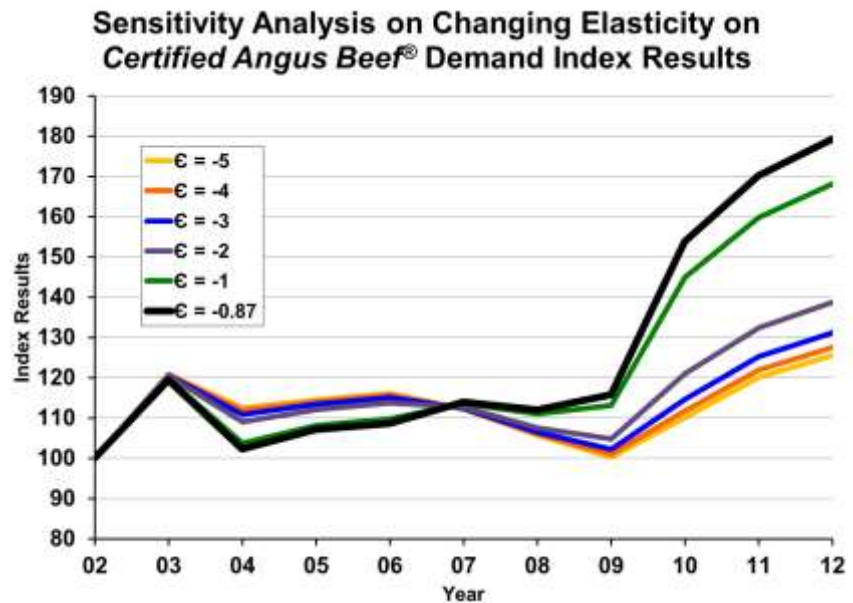
Although research indicates brand loyalty may be present, loyal customers are loyal to the brand (i.e., they are more likely to purchase that brand when price increases than to switch brands), but elasticity of demand for the quantity purchased by loyal customers is often greater, or more elastic, than 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. That could suggest that the price elasticity estimates used in the model are indeed too inelastic. However, if that is the case, the trends captured in the results will not go through dramatic relative changes.

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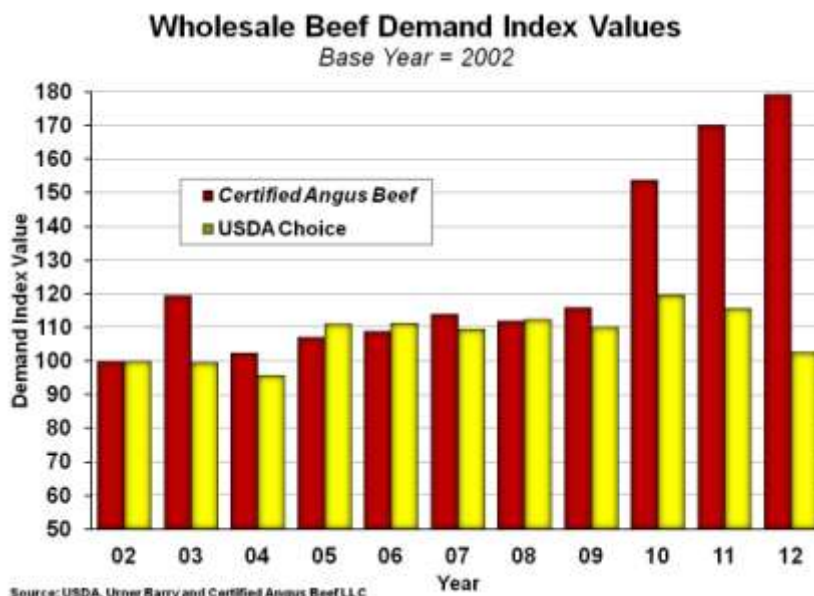
The CAB and Choice-and-higher wholesale beef demand indexes offer specific application for comparative analysis in demand changes over times. Comparing the two indexes provides no information about which beef product has stronger demand in any one year. Instead the indexes only provide a relative comparison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

The index is the most useful as a barometer for demand change over time. Figure 6 introduces a new demand index for comparison since the 2010 study. The USDA Choice-and-higher product index was added to provide a more similar benchmark against CAB demand. Since CAB product is considered a branded subset of the USDA Choice-and-higher marketplace, demand for the aggregate quality category was expected to share more similarities than the non-branded USDA Choice index used in the 2010 research (Figure 8).

The results show three different demand growth patterns among the indexes. Demand for the aggregated Choice-and-higher grading product actually outpaced CAB from 2008 to 2010. Then, demand for Choice-and-higher grading beef declined in 2011 and 2012, while CAB product continued its improvement (Figure 6).

The demand growth for beef in the Choice-and-higher quality marketplace showed similar growth patterns to CAB demand through the first nine years of the study. In fact, demand improved 79.2 and 53.8 percent, respectively, for each product category from 2002 to 2010.

Figure 8

Wholesale Beef Demand Index Values
Base Year = 2002

Source: USDA, Urner Barry and Certified Angus Beef LLC

The similar growth patterns during that time likely point to some of the shared characteristics the products are recognized for in the high-quality beef marketplace. However, as much as the early growth patterns point to the similarities, the divergence of demand patterns most noticeable in the last two years of the study suggest there are perceived differences in CAB relative to its greater product category in the mind of consumers. Demand eroded nearly 27 percentage points for Choice-and-higher product, while CAB demand increased 25 points.

It is reasonable to assume that Figure 8 points to at least some of the demand differences seen lately between CAB and the Choice-and-higher product category. The graph shows demand for CAB has outpaced non-branded Choice product consistently since 2009. Demand for CAB increased 79 percent over the 10 years and Choice demand increased 3 percent. Also, demand for non-branded Choice product peaked in 2010 at 119.6 and declined 17 percentage points over the next two years. The 2012 non-branded Choice index at 102.6 is the lowest value on the index since 2004 when the value was 95.7.

Each beef product category experienced relatively large year-over-year demand growth from 2009 to 2010. In each instance, increasing per capita sales came during rising boxed beef cutouts indicating a robust increase in demand. In 2010, CAB product sales increased more than 97.9 million lb. compared to the previous year, and the cutout price increased $15.58 per lb. in deflated U.S. dollars. That led to a rare combination of the single largest year-over-year increase in per capita CAB sales and second-largest increase in CAB cutout values since 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.

Explanations for the differences in the index results during the last five years cannot be fully explained within the scope of this research, but it bears mentioning that the U.S. recession was at its worst through much of the late 2000s. The U.S. beef marketplace experienced a considerable amount of change throughout this time between struggling restaurant demand, changing retail beef demand and improving beef exports. The first signs of domestic beef demand recovery started in 2010, which allowed beef demand to recover as well.

The U.S. recession created struggles for the foodservice industry as restaurant performance declined around 4 percent from January 2007 to January 2009. Recession-related struggles were likely the source for declining beef demand in 2007 and 2008. Restaurant performance improved throughout 2009 and 2010, but improvements were often inconsistent. A consistent period of improvement would be followed by periods of stagnant or declining performance. Same-store sales and customer traffic growth grew throughout 2011, but improvement was relatively moderate in 2012. Regardless, more consistent improvement in this sector during the last two years has likely contributed to better CAB and Choice demand (NRA 2013).

Index results also show a positive relationship with international sales and beef demand. Some of the best years for U.S. beef exports include 2003, 2010, 2011 and 2012 (LMIC 2013). It is no surprise that these were also some of the best years for wholesale beef demand. The demand boost comes as foreign consumers bid more for lower quality cuts of beef than U.S. consumers are willing to pay. As these cuts are sold to export markets, it increases the overall cutout value.

It is easy to see the effect U.S. beef exports can have on demand by examining 2004 index values for each model. Annual export sales for CAB were down more than 68 percent in 2004 and U.S. beef exports were down nearly 82 percent from 2003 due to trade barriers associated with bovine spongiform encephalopathy. As a result, the demand indexes registered some of the lowest values in 2004.

The CAB demand index had its largest year-over-year improvement in 2010 when demand improved 38 points reaching 154.8. That coincided with the nearly 100-million-pound annual increase in sales and 13 percent increase in per capita consumption even as cutout values grew. There was not another year in the model where both per capita consumption increased by more than 1 percent 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.

Beef demand remains a concern in the post-recession environment. Consumer incomes have made relatively small improvements in recent years, and incomes are a key beef demand consideration. Since the 2009 recession lows, the CAB cutout value has improved 6.6 percent annually and per capita consumption improved each year as well. Neither the Choice and better nor non-branded Choice product categories experienced this. In each instance, boxed beef values improved at the expense of per capita consumption.

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 from 2010 to 2012 – creating a unique combination of increased per capita consumption and boxed beef prices in 2010 for all beef categories. The result was an impressive year-over-year demand increase for each product. Prices and sales continued to grow

in 2011 and 2012 for CAB, and the result was positive demand growth in those years, while the other demand indexes experienced moderate declines.

The continued demand increases for CAB in the face of a still fragile economy indicate the brand was well positioned in balancing existing consumer demand with increasing supplies. Annual increases in demand were noted for the brand in eight out of the 10 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 and better 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. Differences between Choice and better product and its non-branded Choice component are also worth noting. It appears that non-branded Choice beef has struggled in recent years with consumption dropping an average 7 percent annually in each of the last two years as cutout values increased nearly 6 percent annually. Demand has deteriorated for this category in the last two years, while CAB product managed demand growth.

These differences between CAB and the other demand models 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 consistently generated the highest breed premiums in Superior Livestock Auction video markets from 2001 to 2010 receiving as much as $7.03 per hundredweight more than Brahman-influenced sale lots (Zimmerman et al. 2012).

These premiums can likely be sourced to the pull-through demand created by CAB. The increased demand noted from 2002 to 2012 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 when supply of the product is changing rapidly, such as was the case for CAB from 2009 to 2010. Uncertainty is introduced regarding the precision of the 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 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 recent years 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 %	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)
02	560,615,733	6,243,351,444	0.090	N/A	$120.39	140.1	$85.93	N/A	N/A	100.00	100.00
03	560,761,183	6,319,822,330	0.089	-1.18	$151.78	145.9	$104.03	21.06	1.36	87.10	119.44
04	512,777,409	6,396,726,866	0.080	-9.66	$150.70	152.7	$98.69	-5.13	12.29	96.50	102.27
05	538,190,123	6,473,525,274	0.083	3.71	$155.48	155.7	$99.86	1.18	8.50	93.23	107.11
06	545,030,349	6,551,256,997	0.083	0.07	$158.71	156.7	$101.28	1.43	8.42	93.17	108.71
07	604,832,452	6,629,668,134	0.091	9.66	$160.44	167.0	$96.07	-5.14	-1.83	84.36	113.89
08	638,225,915	6,708,196,774	0.095	4.29	$159.89	178.3	$89.67	-6.66	-6.83	80.07	112.00
09	693,354,744	6,786,381,274	0.102	7.39	$147.10	175.5	$83.82	-6.53	-15.79	72.36	115.84
10	791,279,651	6,863,770,931	0.115	12.84	$162.68	182.4	$89.19	6.41	-32.53	57.97	153.84
11	805,655,218	6,940,712,355	0.116	0.69	$188.36	193.9	$97.14	8.92	-33.55	57.10	170.12
12	817,599,674	7,017,543,964	0.117	0.37	$201.93	**199.0**	$101.47	4.46	-34.10	56.63	179.18

* 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 (2012 preliminary)

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

Table 2 – USDA Prime, Branded Choice and Choice Beef Wholesale Demand Index

Calendar Year	Total PR, Brand CH, & CH 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)
02	116,428	4,657,120,000	6,243,351,444	0.75	N/A	$114.91	140.1	$82.02	N/A	N/A	100.00	100.00
03	108,670	4,346,800,000	6,319,822,330	0.69	-7.79	$142.34	145.9	$97.56	18.95	14.43	93.86	103.95
04	109,431	4,377,240,000	6,396,726,866	0.68	-0.51	$140.33	152.7	$91.90	-5.80	15.30	94.57	97.18
05	122,738	4,909,520,000	6,473,525,274	0.76	10.83	$145.26	155.7	$93.29	1.51	-3.10	79.48	117.38
06	125,050	5,002,000,000	6,551,256,997	0.76	0.67	$147.29	156.7	$93.99	0.75	-4.37	78.44	119.83
07	129,521	5,180,840,000	6,629,668,134	0.78	2.35	$151.25	167.0	$90.57	-3.64	-8.82	74.78	121.11
08	138,485	5,539,400,000	6,708,196,774	0.83	5.67	$154.22	178.3	$86.49	-4.50	-19.82	65.76	131.52
09	151,619	6,064,760,000	6,786,381,274	0.89	8.22	$142.04	175.5	$80.94	-6.43	-36.68	51.94	155.83
10	156,541	6,261,640,000	6,863,770,931	0.91	2.08	$157.38	182.4	$86.28	6.61	-41.30	48.15	179.20
11	153,295	6,131,800,000	6,940,712,355	0.88	-3.16	$182.29	193.9	$94.01	8.96	-34.14	54.02	174.04
12	146,604	5,864,160,000	7,017,543,964	0.84	-5.41	$193.16	**199.0**	$97.07	3.25	-22.27	63.75	152.26

* 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 (2012 preliminary)

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

Table 3 - 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)
02	94,782	3,791,280,000	6,243,351,444	0.61	N/A	$113.89	140.1	$81.29	N/A	N/A	100.00	100.00
03	85,990	3,439,600,000	6,319,822,330	0.54	-10.37	$140.61	145.9	$96.37	18.55	19.21	96.91	99.45
04	88,292	3,531,680,000	6,396,726,866	0.55	1.44	$138.78	152.7	$90.88	-5.70	16.82	94.96	95.71
05	97,010	3,880,400,000	6,473,525,274	0.60	8.57	$143.93	155.7	$92.44	1.71	2.39	83.23	111.06
06	98,057	3,922,280,000	6,551,256,997	0.60	-0.12	$145.52	156.7	$92.87	0.46	2.61	83.41	111.34
07	100,338	4,013,520,000	6,629,668,134	0.61	1.12	$149.56	167.0	$89.56	-3.56	0.57	81.75	109.54
08	105,227	4,209,080,000	6,708,196,774	0.63	3.64	$152.73	178.3	$85.66	-4.35	-6.16	76.28	112.29
09	108,907	4,356,280,000	6,786,381,274	0.64	2.30	$140.58	175.5	$80.10	-6.49	-10.57	72.70	110.18
10	111,063	4,442,520,000	6,863,770,931	0.65	0.83	$155.74	182.4	$85.38	6.59	-12.20	71.38	119.62
11	106,026	4,241,040,000	6,940,712,355	0.61	-5.59	$180.12	193.9	$92.89	8.79	-1.15	80.35	115.61
12	98,091	3,923,640,000	7,017,543,964	0.56	-8.50	$190.24	**199.0**	$95.60	2.91	14.68	93.22	102.55

* 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 (2012 preliminary)

Assumed Choice Wholesale Price Elasticity**: **-0.54**

Assumed Choice Wholesale Price Flexibility: **-1.85**