



NAVIGATING PATHWAYS to SUCCESS



Executive Summary



Fellow Cattle Industry Members,

Those of us involved in the 2011 National Beef Quality Audit (NBQA) came away with an important conclusion: We must do a better job of telling our beef industry story. That emphasizes the question: What IS our story?

While the final pages of the 2011 report offered valuable guidance, results from the 2016 National Beef Quality Audit go further, providing additional actionable insights. They also prove that when it comes to a compelling story, we really do have a strong one to tell.

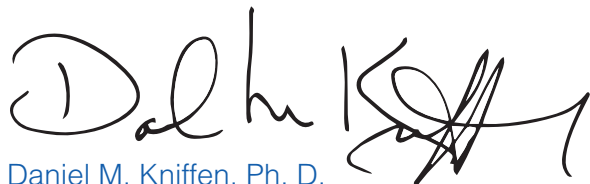
At the same time, this data adds to the body of critical information necessary to help our industry maintain its focus on continuous improvement.

Without question, statistics and data in this research have helped the industry make significant improvements in its processes and products through the years. The 2016 research should stimulate the same result. But unless our customers – cattle and beef buyers and consumers – are both knowledgeable about and comfortable with industry changes, optimal success cannot be achieved.

As we look to core strategies in the 2016-2020 Beef Industry Long Range Plan, we see this research addresses many of the industry's needs. It leads to work that will grow consumer trust in beef and beef production, as well as promote and strengthen beef's value proposition. Though it is only one step, there is no question it's a step in the right direction.

The NBQA is an important tool as we navigate the challenging pathway to generate greater beef demand and increase success in every sector of our industry. Beef Quality Assurance programs will be a key element of this picture. It stands to reason; now that we understand the roadmap and have identified the "what," we need to move forward to deliver the "how."

We look forward to using this valuable information as we navigate the pathways to success.



Daniel M. Kniffen, Ph. D.
Chairman, Beef Quality Assurance Advisory Board

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BACKGROUND

Since 1991, the beef checkoff-funded National Beef Quality Audit (NBQA) has delivered a set of guideposts and measurements for helping cattle producers and others determine quality conformance of the U.S. beef supply. These guideposts and measurements are based on the following:

- ▶ Only that which is measured can be effectively managed;
- ▶ Industry-wide research provides direction to cattle producers and other decision-makers throughout the supply chain to improve the quality and value of the U.S. beef supply; and
- ▶ Identifying and correcting quality shortfalls and non-conformance will lead to greater profitability through improved beef demand in both domestic and international markets, the capture of lost opportunities and commitment to the hard work of continuous improvement.

Early NBQAs focused on the physical attributes of beef and beef by-products – marbling, external fat, carcass weight and carcass blemishes. While these factors still influence consumer expectations for quality, the industry has already made huge improvements in these areas. Therefore, the cattle industry's concern has grown beyond traditional beef quality attributes to include food safety, sustainability, animal well-being, and consumer desires for more connection to the beef production industry.

Over the past 25 years, NBQA researchers have made significant changes to the research process that have led to an increasingly meaningful set of results. While the 2016 NBQA retains many of the core elements of the 2011 NBQA, it provides new data from which to build a more successful industry.

The 2011 National Beef Quality Audit suggested the industry was making progress in improving the quality of beef products. Now, data from the 2016 National Beef Quality Audit show continuing progress and add to the core knowledge from preceding audits. The research suggests:

- ▶ The beef industry continues to make progress in reducing defects that negatively impact beef quality;
- ▶ The beef industry continues to make progress in improving product quality traits desired by consumers;
- ▶ Beef channel segments don't always effectively communicate their needs and beef's benefits to each other or to consumers; however,
- ▶ The messages that need to reach consumers, and an established vehicle to carry those messages, exist.

Details of the 2016 NBQA research and its findings, as well as the implications for those in the beef industry, follow.

THE RESEARCH PROCESS

Elements of the 2016 National Beef Quality Audit were:

FACE-TO-FACE INTERVIEWS

Understanding what quality means to the various industry sectors and the values of the quality attributes will help the industry make modifications necessary to increase the value of its products.

Face-to-face interviews with 194 representatives of the different market sectors (feeders, packers, retailers, foodservice operators, and allied industry/government employees) were conducted from January through November, 2016, to help determine how seven different quality categories are defined, and also establish the relative importance and “must-have” requirement and “willingness to pay” quantification for those qualities.

IN-PLANT RESEARCH

Comparing data from 2016 to the previous five surveys assesses progress in improving quality, while providing a benchmark for future beef industry educational and research efforts.

To assess the current quality and consistency status of U.S. fed steers and heifers, researchers evaluated about 8,000 live cattle for attributes related to transportation and mobility, and about 25,000 carcasses on the slaughter floor for characteristics that can affect quality and value of cattle, carcasses and by-products. This research was conducted at 17 U.S. beef processing facilities.

Researchers also studied 9,106 carcasses in 30 processing facilities to assess various characteristics that determine quality and value, including quality and yield grade, weight and marbling. These assessments represented about 10 percent of a day’s production at each plant.

Evaluation of instrument grading in 18 processing facilities from five companies was also conducted, with data reviewed that represented more than 4.5 million carcasses over a one-year period. This data included information on grade, gender, breed type, marbling score, defects, fat thickness, *longissimus* muscle (LM) area, hot carcass weight (HCW) and kidney, pelvic and heart fat (KPH) percentage.

STRATEGY SESSION

More than 70 individuals representing every sector of the beef industry met in Denver, Colo. Dec. 13-15, 2016 to review the results of the face-to-face and in-plant research and discuss implications for the U.S. beef industry. Outcomes from that meeting provide quality guidance to the industry for the next five years, providing “how” answers for navigating the pathways to success.



Terms of Note:

- **HCW:** Hot carcass weight, the un-chilled weight of the carcass after slaughter and the removal of the head, hide, intestinal tract, and internal organs. It is used to determine yield grade and dressing percentage.
- **LM AREA:** Also, referred to as ribeye area, the *longissimus* muscle is exposed when a beef carcass is ribbed between the 12th and 13th rib.
- **FT:** Refers to the thickness of subcutaneous fat. The FT is used to determine yield grade.
- **KPH:** The internal fat surrounding the heart and kidneys and in the pelvic area; used to determine yield grade.
- **YG:** Yield grade estimates the amount of boneless, closely trimmed retail cuts from the high-value parts of the carcass – the round, loin, rib, and chuck. Rated numerically from 1-5, Yield Grade 1 denotes the highest yielding carcass and Yield Grade 5 the lowest.
- **QG:** A quality grade is a composite evaluation of factors that affect palatability of meat (tenderness, juiciness, and flavor). Beef carcass quality grading is based on degree of marbling and degree of maturity.
- **MS:** Marbling score (intramuscular fat) is the intermingling or dispersion of fat within the lean. Degree of marbling is the primary determination of quality grade.
- **DARK CUTTER:** A carcass subjected to undue stress before slaughter. The beef appears darker and less fresh, making it undesirable to consumers.



FACE-TO-FACE INTERVIEWS

OBJECTIVES

1. Identify how customers across different animal/product sectors describe seven different quality attributes;
2. Estimate the sectors' willingness to pay for each attribute;
3. Establish the relative importance of the quality attributes for each sector;
4. Document additional quality-related or financial items of concern to each customer sector.

RESEARCH METHODS/PROCEDURES

Interviews targeted individuals making purchasing decisions among packers, retailers, foodservice operators and further processors, and, peripherally, government and trade organizations. The interviews were administered across the United States from January through November, 2016.

Factors assessed were:

1. How and where cattle were raised
2. Lean, fat, and bone
3. Weight and size
4. Visual characteristics
5. Food safety
6. Eating satisfaction
7. Cattle genetics

NOTABLE CONCLUSIONS

Food Safety

As in 2011, food safety surfaced as the most important quality factor during relative importance scaling, as shown in Table 1.

In fact, to many respondents, food safety was believed to be implied as part of doing business in the beef industry. When compared to the 2011 NBQA, more companies across the board required food safety guarantees. About 50 percent of foodservice companies in the 2016 NBQA survey stated they required some guarantee of food safety before they would conduct business.



Food safety is everything. It's paramount. End of story.”
- Packer

Table 1. Quality Challenges - Ranked according to priority

1991	1995	2000	2005	2011	2016
External Fat	Overall Uniformity	Overall Uniformity	Traceability	Food Safety	Food Safety
Seam Fat	Overall Palatability	Carcass Weights	Overall Uniformity	Eating Satisfaction	Eating Satisfaction
Overall Palatability	Marbling	Tenderness	Instrument Grading	How and Where Cattle were Raised	Lean Fat and Bone
Tenderness	Tenderness	Marbling	Market Signals	Lean Fat and Bone	Weight and Size
Overall Cutability	External and Seam Fat	Reduced Quality Due to Use of Implants	Segmentation	Weight and Size	How and Where Cattle were Raised
Marbling	Cut Weights	External Fat	Carcass Weights	Cattle Genetics	Visual Characteristics

Quality

The eating satisfaction quality factor, which was primarily defined as “customer satisfaction” by all sectors, was ranked second by all marketing sectors except packers, who ranked lean, fat, and bone second. Compared to the 2011 audit, a greater percentage of companies were willing to pay a premium for guaranteed quality attributes. However, overall these companies were willing to pay lower average premiums than the companies interviewed in 2011.

While not a single packer listed eating satisfaction as a “must-have,” 55 percent said they would be willing to pay an average premium of 10 percent if it could be guaranteed.

Tenderness and flavor continue to be the two specific beef quality factors that drive customer satisfaction.

“ All of the forks of the organization come down to customer satisfaction. It’s what we hang our hat on.”
- Further Processor

Size and Consistency

To many respondents, consistency in size was more important than increase in size. Branded beef items seemed to address the consistency issue, however uniformity of product size is a challenge in the commercial beef market. The average number of branded beef items increased in the marketplace, which seemed to match concerns expressed about size inconsistencies in beef boxes.

“ If the range of weight and size is too great then it’s difficult to have a consistent offering. We incorporate weight and size with our suppliers. It gives us a range of sizes so we can better manage consistency.” - Retailer

Increasing carcass sizes are, however, a concern in their own right for some in the industry. Large carcasses are making it harder for further processors to meet customer specifications for thickness and weights. This is partially reflected in the fact that 66 percent of further processors would be willing to pay a premium for a guaranteed weight and size.



GENETIC TECHNOLOGIES

While not captured in the questions of the formal interview, among the topics of interest to those in government organizations were the emergence of novel genetic technologies and the effect those technologies could have on the future of the beef industry. Specifically, the technology would utilize an organism's natural virus defense system to target genes within a piece of DNA, and either delete the gene or replace it with a new, more preferred alternative.

Although this technology is still gaining traction in the applied sciences, the implications on production, trade and policy are a new frontier for the beef industry going forward.

“As we wait for genomics and other techniques that will help us progress, let's not overlook the simple tried-and-true strategies like cross breeding. Complimentary cross breeding and heterosis by itself can go a long way toward improving production efficiency and our product, while lowering our costs.”
Seedstock Operator and Feedyard Operator

FACE-TO-FACE INTERVIEWS *Cont'd*

Beef Quality Assurance

BQA is not currently a recognized leader in consumer-facing channels, with regard to animal care, health and well-being concerns. This is consistent with 2011 findings. Less than 5 percent of companies cited BQA in their responses, demonstrating that the penetration of BQA in the marketplace is severely lacking.

Although companies are listing key components of the BQA program as important to their businesses, they are not specifically citing “BQA” by name, even when asked a leading question. Educating packers, retailers, foodservice, and further processing entities about the BQA program could improve marketing weaknesses and public perceptions that plague our industry.

“Perception is reality and drives more regulation than science.” - *Government Agency*

“The protein industry in general suffers from uneducated consumers. I think there is a lot of noise around ‘big ag,’ and a lot of misconceptions about what that is and how it should exist in the world.” - *Foodservice Operator*

“We look at the adoption of Beef Quality Assurance practices as a way to ensure that we are doing all of the little things correctly to minimize stress on animals, promote strong immune systems, and provide good conditions for cattle to thrive. This helps our cattle to be more comfortable, healthy, and productive.”
- *Cow-Calf Producer*

INDUSTRY STRENGTHS AND WEAKNESSES

Product quality was the most cited strength of the steer and heifer sector of the beef industry by the entirety of supply chain sectors. Retailers and foodservice companies identified marketing, and lack of progression toward process transparency, as the largest weakness within this category.

“The strength of the industry? The product! Even though it can have a relatively high price, people still love it.” - *Packer*

“The strength of the steer and heifer industry is the ability to supply a wholesome product. No other beef compares to U.S. beef.” - *Packer*

“There are several strengths to the industry. There's high consumer demand for the product. Producers are improving the quality of beef, while the processing side of the industry has figured out how to be more efficient and use less resources. It's producing a fairly low-cost product that is incredibly high in quality.” - *Government Agency*



PRODUCERS WEIGH IN

An online survey was conducted in October and November, 2016, to gather producer input and provide additional context to the NBQA research. More than 800 producers responded to the survey, with questions asked in an aided, closed-ended format and adjusted as needed for the producer sector.

How producers defined certain **terms**:

- **How and Where the Animals Were Raised:** Animal Well-being (64 percent) and Traceability (57.6 percent);
- **Weight and Size:** Live Weight (75.3 percent) and Frame Size (67.1 percent);
- **Food Safety:** Beef Quality Assurance (75.8 percent) and No Violative Residues (64.7 percent);
- **Eating Satisfaction:** Flavor (80.5 percent), Tenderness (80.1 percent), and Customer Satisfaction (79.5 percent);
- **Traceability:** Animal Identification (67.9 percent), Ability to Trace Outbreaks (66.4 percent), and Ability to Trace to Ranch (64.4 percent);
- **Animal Well-Being:** Animals are Safe and Have Been Provided For (87 percent), Animal Handling/ Stockmanship (85.9 percent) and Animal Welfare (78.7 percent).

Steer/heifer producers rated **Weight and Size** and **Food Safety** as the most important attributes (20.8 and 17.5 percent, respectively).

Survey respondents said **Product Quality** (72.7 percent) and **Food Safety** (64.5 percent) were the greatest strengths in the industry. The weaknesses were associated with **Profitability** (65.2 percent) and **Cost** (45.7 percent).

About the respondents...

- Almost half (48 percent) had fewer than 50 head of cattle; almost 32 percent had between 50 and 200 head.
- More than 69 percent considered themselves commercial cow/calf producers; 16.4 percent were seedstock operators and 7.7 percent were feeders.
- Most producers (86.8 percent) were also owners.

IN-PLANT RESEARCH

TRANSPORTATION, MOBILITY & HARVEST FLOOR ASSESSMENTS

METHODS/PROCEDURES

Collaborating institutions collected data at 17 beef packing facilities from March to November, 2016, representing approximately 8,000 live cattle, which were evaluated for attributes related to transportation and the animals' mobility. In addition, about 25,000 cattle/carcasses were evaluated on the harvest floor.

NOTABLE CONCLUSIONS

Progress from 1995 was evident in the 2016 NBQA research, demonstrating that over time cattle producers have made strides to improve the overall quality and consistency of the cattle supply in the United States.

A new area of measurement for 2016, transportation, suggested beef packers are sourcing cattle from further distances. While the average distance traveled to the packing plant was within about a 155 mile radius, cattle traveled from a maximum of 870 miles, shown in Table 2. The average time for transportation was 2.7 hours, at a distance of 135.8 miles.

Another new measurement, mobility scoring of fed cattle entering the packing plant, suggested cattle mobility overall was good. Researchers utilized a 4-point scale (North American Meat Institute, 2015) where 1 is normal and 4 is extremely reluctant to move. In addition, non-ambulatory animals were classified as downers. The research established a strong benchmark, with 99.8 percent of animals being scored a 1 or 2 as shown in Figure 1. Furthermore, 96.8 percent of cattle received a mobility score of 1, with the animal walking easily and normally, with no apparent lameness.

Transportation is a necessary component of beef production, and along with the presence of horns, animal handling practices and other factors can play a role in bruising, which is a detriment to the overall value of a beef carcass and can result in a net loss of weight and product yield. While there were fewer carcasses without bruises in 2016, bruising was generally less severe than in previous years (Figure 2).

Table 2. Mean values for time and distance traveled, number of cattle in the loads, trailer dimensions, and the subsequent area allotted per head for all trailer types surveyed¹

	n	Mean	Std. Dev.	Min	Max
Time traveled (h)	220	2.7	2.4	0.25	12.0
Distance traveled (miles)	217	135.8	132.5	8.0	870
Number of cattle in load	220	36.6	4.8	10	47
Number of compartments used	217	3.5	0.9	2	6
Trailer dimensions (ft ²)	212	439.7	276	192.0	636.0
Area allotted per head (ft ²)	212	12.2	1.8	9.2	24.5

¹Approximately 10% of cattle trucks were sampled within a day's production at each plant.

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Figure 1. Mobility score of fed cattle arriving at the packing plants¹

Mobility Score	Description
1	Normal, walks easily, no apparent lameness
2	Exhibits minor stiffness, shortness of stride, slight limp, keeps up with normal cattle
3	Exhibits obvious stiffness, difficulty taking steps, obvious limp, obvious discomfort, lags behind normal cattle
4	Extremely reluctant to move - even when encouraged, statue-like

Source: North American Meat Institute (2015).

¹ Because of rounding, percentages do not total 100.

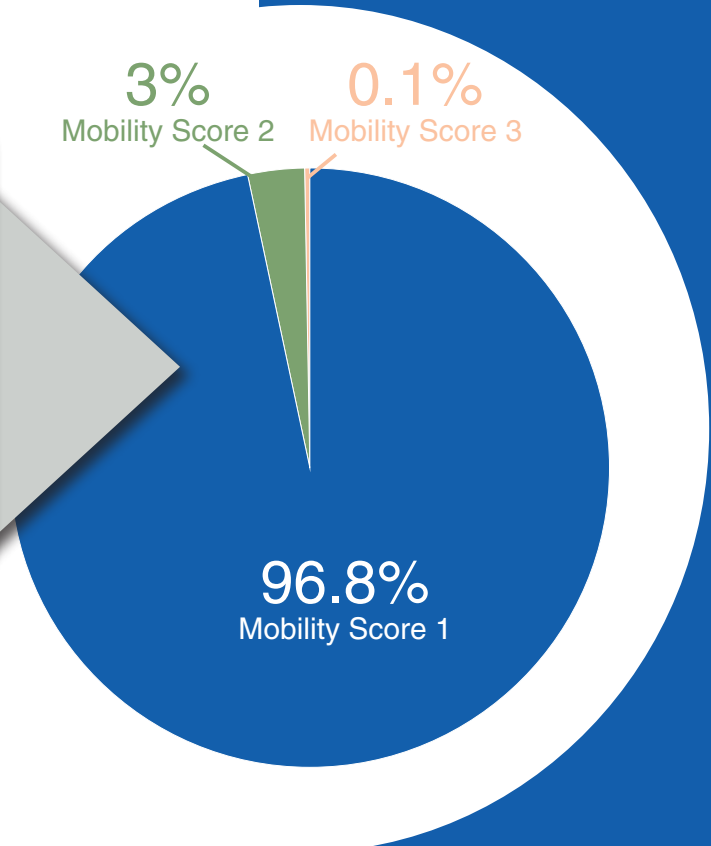
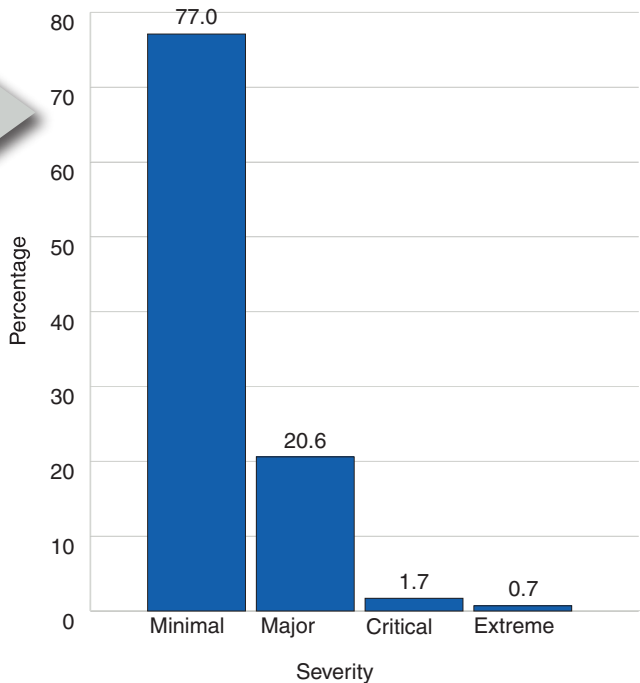


Figure 2. Bruise severity (% of bruises observed)

Bruise size key	
Minimal	< 1 lb surface trim loss
Major	1-10 lb trim loss
Critical	> 10 lb trim loss
Extreme	Entire Primal



TRANSPORTATION, MOBILITY & HARVEST FLOOR ASSESSMENTS *Cont'd*

Table 3. Percentages of hide-on carcasses with predominant hide color or breed type

Item	NBQA-2000	NBQA-2005	NBQA-2011	NBQA-2016
Black	45.1	56.3	61.1	57.8
Holstein (black & white)	5.7	7.9	5.5	20.4
Red	31.0	18.6	12.8	10.5
Yellow	8.0	4.9	8.7	4.8
Gray	4.0	6.0	5.0	2.9
Brown	1.7	3.0	5.0	1.3
White	3.2	2.3	1.4	1.1

Predominant hide color was black (57.8 percent), with an increasing percentage of Holstein animals observed (20.4 percent, versus 5.5 percent in 2011), shown in Table 3. Though not as high as 2011, individual animal identification was prominent, with 95.6 percent of animals having some form of identification (Table 4).

The research also noted more cattle without a brand in 2016. Nearly three-quarters of the cattle (74.3 percent) had no brand, compared with 55.2 percent in 2011 (Table 5). Butt brands continued to be the most prominent location.

There were more cattle with no horns in 2016. In fact, the prevalence of horns in 2016 (16.7 percent) was almost half the prevalence found in 1991 (31.1 percent) (Table 6).

Table 4. Percentages of hide-on carcasses that were identified individually and type of identification used¹

Item	NBQA-2005	NBQA-2011	NBQA-2016
With identification	90.3	97.5	95.6
No identification	9.7	2.5	4.4
Lot visual tags	63.2	85.7	61.5
Individual visual tags	38.7	50.6	55.0
Electronic tags	3.5	20.1	16.9
Metal-clip tags	11.8	15.7	9.2
Bar-coded tags	0.3	0.0	0.05
Wattles	0.0	0.5	0.01
Other	2.5	5.3	2.6

¹Total exceeded 100% due to animals having multiple forms of identification.

In addition, there were fewer head and tongue condemnations (Table 7). However, there were more liver, lung and viscera condemnations observed in 2016 than NBQA 2011.

Evaluation and observation of carcasses suggested other progress compared to the first NBQA in 1991. For instance, 99.5 percent of hanging carcasses observed in NBQA 2016 had no visible blemishes that would suggest the presence of injection site lesions – a key issue when beef quality initiatives were first introduced in the 1990s. Other results, when compared to those early years, were equally positive.

The results from the transportation, mobility and harvest floor assessments in the 2016 NBQA provide additional information from which the beef cattle industry can measure and improve on its current management practices.

Table 5. Percentages of hot-iron brands on hide-on carcasses¹

Item	NBQA-1991	NBQA-1995	NBQA-2000	NBQA-2005	NBQA-2011	NBQA-2016
No brands	55.0	47.7	49.3	61.3	55.2	74.3
Butt brand	29.9	38.7	36.3	26.5	35.2	18.6
Side brand	13.8	16.8	13.7	7.4	9.0	6.3
Shoulder brand	0.8	3.0	3.6	1.2	2.5	1.3
Cattle with multiple brands	2.1	6.2	4.4	3.6	9.9	1.6

¹Total exceeded 100% due to animals having multiple brands.

Table 6. Percentages of hide-on carcasses evaluated for presence of horns

Item	NBQA-1991	NBQA-1995	NBQA-2000	NBQA-2005	NBQA-2011	NBQA-2016
With horns	31.1	32.2	22.7	22.3	23.8	16.7
No horns	68.9	67.8	77.3	77.7	76.2	83.3

Table 7. Percentages of offal condemnations

Item	NBQA-1991	NBQA-1995	NBQA-2000	NBQA-2005	NBQA-2011	NBQA-2016
Liver condemnations	19.2	22.2	30.3	24.7	20.9	30.8
Lung condemnations	5.1	5.0	13.8	11.5	17.3	18.2
Tripe condemnations	3.5	11.0	11.6	11.6	nd ¹	nd
Viscera condemnations	0.1	nd	nd	nd	9.3	16.3
Head condemnations	1.1	0.9	6.2	6.0	7.2	2.7
Tongue condemnations	2.7	3.8	7.0	9.7	10.0	1.9

¹nd =not determined.





IN-PLANT RESEARCH COOLER ASSESSMENTS

OBJECTIVES

1. To document and analyze the quality and consistency of the U.S. steer and heifer industry;
2. To quantify progress that has been made since the previous audit and identify areas that require additional focus.

METHODS/PROCEDURES

Research was conducted at 30 federally-inspected beef processing facilities, selected to represent the fed beef industry across the United States (Figure 3). Assessments occurred from January 2016 to December 2016 and were completed by personnel from six collaborating institutions.

Beef carcasses were selected throughout the day's production to represent approximately 10 percent of each production lot. Each carcass was evaluated for HCW, LM area, apparent breed type, sex class, carcass defects, any certified or marketing program, and whether the animal was 30 months or older as determined by dentition.

NOTABLE CONCLUSIONS

While the industry is improving the quality of beef being produced, quality is being accompanied by an increase in size and fatness. The mean USDA Yield Grade (YG) in 2016 was 3.1, increasing slightly compared to the mean yield grade of 2.9 in 2011 (Table 8). More significantly, however, the frequencies of YG 3, 4 and 5 in 2016 increased compared to 2011. The largest percentage of carcasses (29.9 percent) were Choice YG 3.

Figure 3. Fed cattle plants

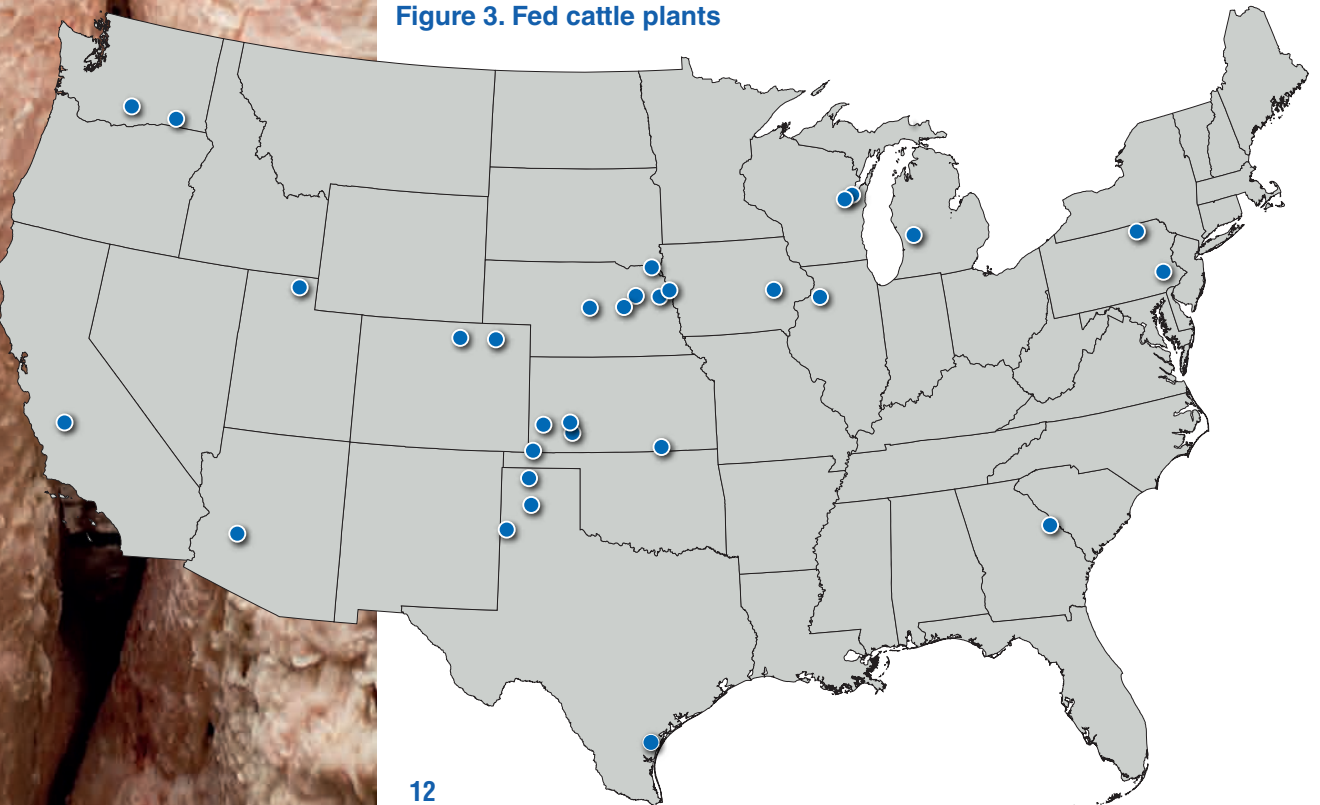


Table 8. Means for USDA carcass grade traits

Trait	NBQA-1991 (n = 7,375)	NBQA-1995 (n = 11,799)	NBQA-2000 (n = 9,396)	NBQA-2005 (n = 9,475)	NBQA-2011 (n = 9,802)	NBQA-2016 (n = 9,106)
USDA yield grade	3.2	2.8	3.0	2.9	2.9	3.1
USDA quality grade ¹	686	679	685	690	693	696
Adjusted fat thickness, in	0.59	0.47	0.47	0.51	0.51	0.56
HCW, lbs	760.6	747.8	786.8	793.4	824.5	860.5
LM area, in ²	12.9	12.8	13.1	13.4	13.8	13.9

¹600 = Select⁰⁰, 700 = Choice⁰⁰, and 800 = Prime⁰⁰ (USDA, 2016).

Since 1995 there has been a continued increase in HCW. Almost half (44.1 percent) of carcasses surveyed in 2016 exceeded 900 lb and 25.7 percent of carcasses exceeded 950 lbs; in 2011, 11.1 percent exceeded 950 lbs, and in 2000 4.6 percent.

Key reasons for increasing weights at the packing segment are labor, infrastructure and energy costs. It costs as much to process a small carcass as a large one. However, cattle availability is also a factor. Reduced cattle numbers limit the packers' incentive to discount heavy-weight carcasses.

This means that while the total number of cattle slaughtered is the lowest in years, total beef production has increased. Among upshots of increased carcass size and decreased carcass numbers is a positive sustainability outcome by producing a greater amount of beef with the same amount of resources.

Because consumers generally prefer thicker steaks with a smaller surface area, larger carcasses can create some challenges. Heavier carcasses with a larger LM area could result in a steak that is too large for many consumers.

The 2016 NBQA revealed a dramatic increase in the frequency of Prime and Choice, and a decrease in the frequency of Select (Figure 4). One of the reasons for this is the increase in dairy-type carcasses. Of carcasses that graded Prime, 32 percent were classified as dairy-type, and of the dairy carcasses surveyed, 8 percent graded USDA Prime. In NBQA 2016 vs. NBQA 2011, there was a 6.0 percentage point increase in dairy-type and 5.4 percentage point decrease in native cattle.

Figure 4. Changes in Prime and Choice combined over time

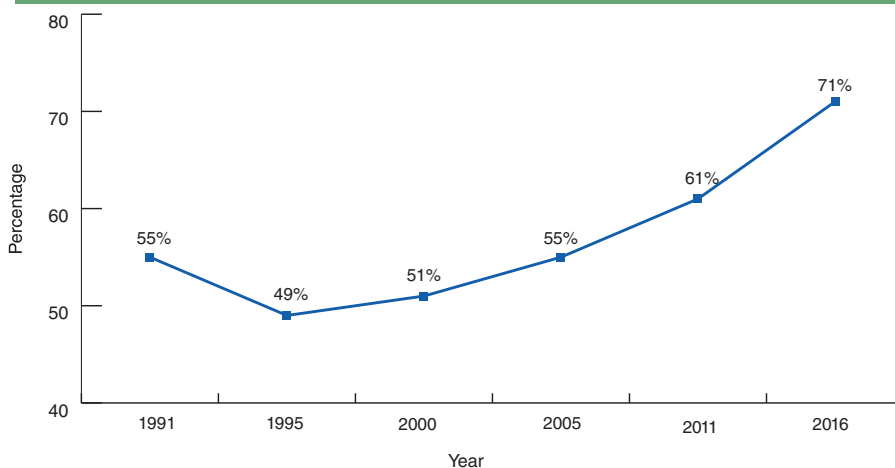


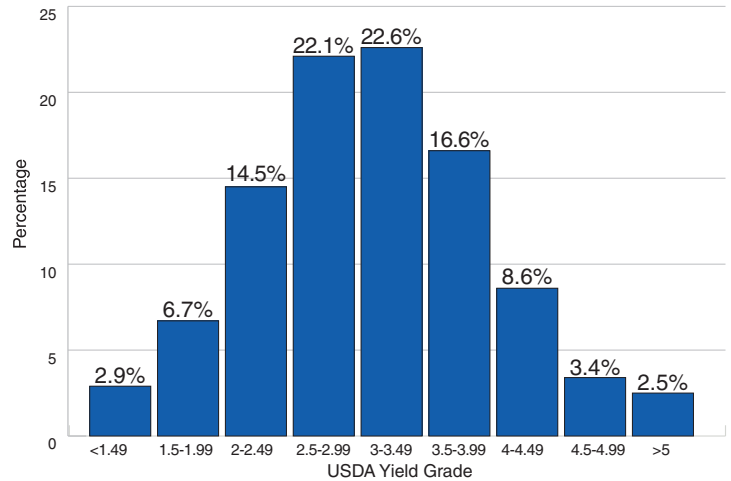
Table 9. Least squares means for carcass traits within estimated breed types

Trait	Estimated Breed Type		
	Native (n = 7,106)	Dairy (n = 1,342)	<i>Bos indicus</i> (n = 106)
USDA yield grade	3.1 ^a	3.0 ^b	2.6 ^c
USDA quality grade ¹	705 ^b	717 ^a	667 ^c
Adjusted fat thickness, in	0.59 ^a	0.354 ^c	0.475 ^b
HCW, lbs	860.2 ^a	845.7 ^b	859.6 ^{ab}
LM area, in ²	14.1 ^a	12.48 ^b	14.2 ^a

^{a-c}Means within a row with a different superscripts letter differ (P < 0.05).

¹ 600 = Select⁰⁰, 700 = Choice⁰⁰, and 800 = Prime⁰⁰ (USDA, 2016).

Figure 5. Frequency distribution of carcasses by one-half yield grade increments



The mean USDA quality grade increased from previous audits, continuing the trend that started with the 1995 NBQA. While the greatest proportion of carcasses were within the lowest third of the grade for Choice and Prime, the majority of carcasses qualifying for Select were in the top half of the grade.

Throughout the NBQAs, there has been a consistent trend of carcasses with higher USDA quality grades. Carcass frequency distribution for YG and carcass weight are shown in Figure 5 and Figure 6, respectively.

Though 2016 research featured both positive and negative results when it comes to blemishes, condemnations and other attributes that can have an impact on animal value, the numbers overall remain small, and industry efforts to address these issues since 1995 have been generally encouraging. Dark cutting carcasses in 2016 were found to be 1.9 percent, the lowest in NBQA history.

Figure 6. Frequency distribution by carcass weight group

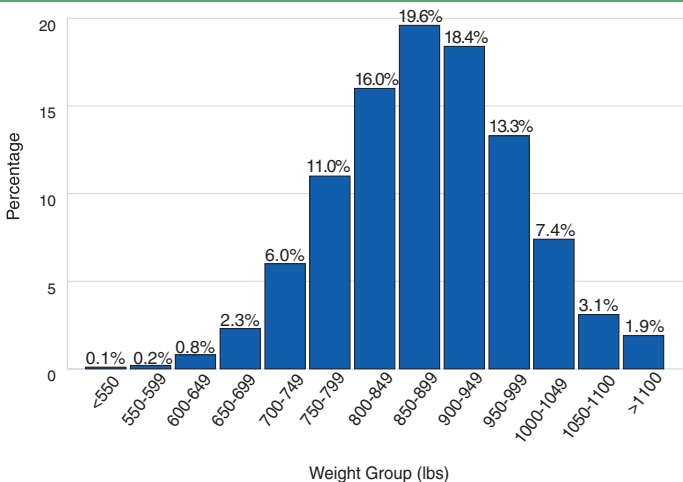


Table 10. Percentage distribution¹ of carcasses stratified by USDA quality and yield grades

USDA Yield Grade	USDA Quality Grade, %			
	Prime	Choice	Select	Other ²
1	0.07	4.06	4.79	0.55
2	0.94	23.61	10.90	1.05
3	1.78	29.94	6.20	1.49
4	0.97	9.31	1.40	0.40
5	0.22	1.86	0.33	0.12

¹ Carcasses with missing values for USDA quality or yield grades are not included.

² Other includes: Standard, Commercial, Utility, dark cutter, blood splash, hard bone, and calloused ribeye.

IN-PLANT RESEARCH INSTRUMENT GRADING ASSESSMENT

METHODS/PROCEDURES

One week of instrument grading data was collected each month from five beef processing corporations encompassing 18 facilities between January and December, 2016. The in-plant assessment included a total of 9,106 carcasses, while the instrument grading encompassed 4,544,635 carcasses (Table 11).

NOTABLE CONCLUSIONS

The instrument grading assessment reported a slightly decreased frequency of YG 2 and increased frequency of YG 4, but the identification of YGs between in-plant grading and instrument grading was very consistent (Figure 7).

The similarity of results between the in-plant and instrument grading assessment gives confidence to the current and previous cooler assessments and supports increasing prevalence of instrument grading throughout the industry (Figure 8). The trends are remarkably comparable to those observed in 2011.

Figure 7. Instrument and in-plant comparison of frequency of USDA yield grades

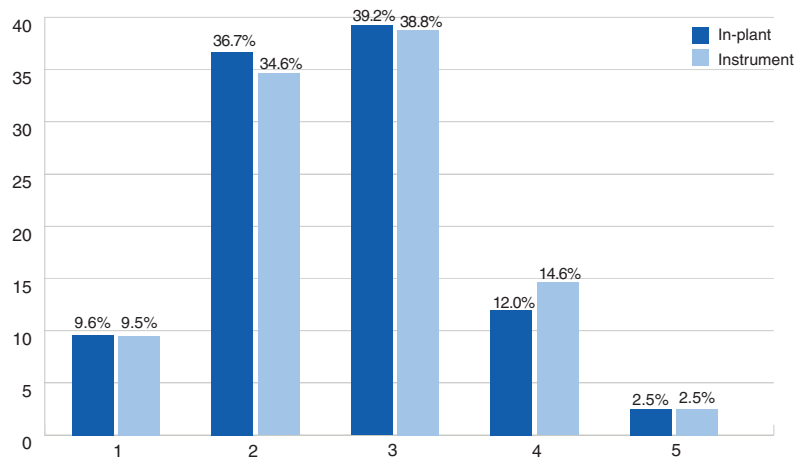


Figure 8. Instrument and in-plant comparison of frequency of USDA quality grades

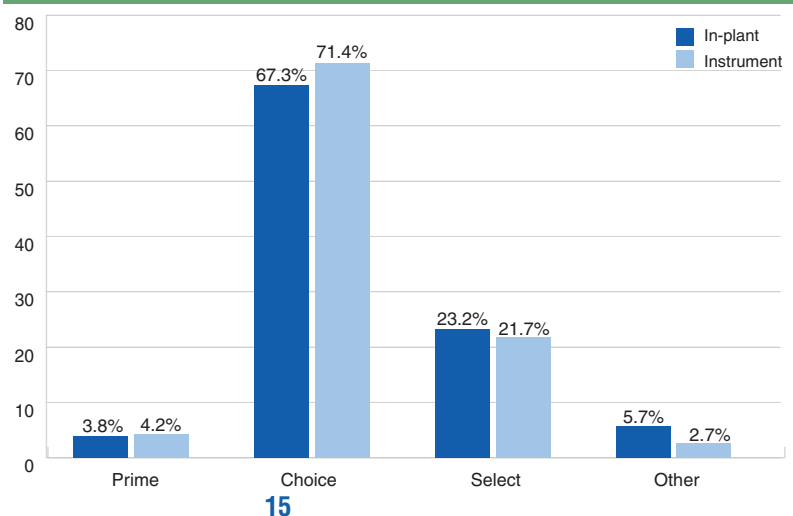


Table 11. Means for USDA carcass grade traits between in-plant survey and instrument data

Trait	In-Plant Survey (n = 9,106)	Instrument Data (n = 4,544,635)
USDA yield grade	3.1	3.1
Fat thickness, in	0.56	0.54
HCW, lbs	860.5	867.7
LM area, in ²	13.9	13.8
KPH, %	1.9	2.1
Marbling score ¹	470	475

¹ 100 = Practically devoid⁰⁰, 300 = Slight⁰⁰, 400 = Small⁰⁰, 500 = Modest⁰⁰, 700 = Slightly Abundant⁰⁰, and 900 = Abundant⁰⁰ (USDA, 2016).



STRATEGY SESSION

OBJECTIVES

1. Review results of the NBQA research phases and discuss implications for the U.S. beef industry;
2. Develop strategies that provide an industry blueprint for the next five years

METHODS/PROCEDURES

More than 70 individuals representing every sector of the beef industry met in Denver, Colorado December 13-15, 2016. The individuals, representing cow-calf producers, seedstock producers, stockers, feeders, packers, further processors, retailers, foodservice operators and others involved in the beef industry, obtained an overview of the face-to-face and in-plant research to help identify strategies for utilizing the data to design and develop industry improvements.

NOTABLE CONCLUSIONS

A primary need identified in the session was for greater education and communication of BQA to the supply chain and consumers. Strategy session participants also discussed how greater certification of BQA followers could enhance respect for and validity of the program.

Participants broke their suggestions into three categories:

Food Safety and Animal Health

- ▶ Implement information-sharing systems, based on modern animal identification and record-keeping technologies, to improve global market access;
- ▶ Improve uptake of preventive health strategies and good cattle husbandry techniques, key components of the BQA program, to insure future effectiveness of antimicrobials;
- ▶ Continue efforts to improve supply chain safety interventions.



Food safety is the prerequisite for being able to export, and it protects the product. It's important to legitimacy and confidence in USA as a leader.”

- *Government Agency*

Eating Quality and Reduction of Variety

- ▶ Develop more measurable information systems and supply chain coordination;
- ▶ Increase research and genetic strategies to improve eating satisfaction;
- ▶ Utilize advancements in genetic selection technologies to breed for carcasses with increased eating satisfaction, uniformity, and desirable end-product specifications;
- ▶ Implement or refine sorting strategies and systems across the industry to maximize uniformity of cattle, carcasses and end product.

“ Checkoff-funded research has identified genetic markers that influence beef tenderness. Those markers now contribute to genomically enhanced EPDs in multiple cattle breeds. Seedstock and cow-calf producers must utilize these informed tools of carcass EPDs and selection indexes to continue advancing carcass quality and consumer satisfaction.” - *Seedstock Producer*

Optimizing Value and Eliminating Waste

- › Implement information-sharing systems based on modern animal identification and record-keeping technologies to assist in sending informed market signals to producers for greater (or lesser) valued carcasses and improve system efficiency;
- › Increase industry-wide uptake of proven genetic selection technologies and invest in the development, testing and acceptance of techniques to cost-effectively improve traits more quickly.

“ We need the manufacturer to keep as much (of the trim) as they can. We almost look at trim as a throw-away item now because of the tracking involved.” - *Retailer*

“ The ability to hit our thickness targets means a lot to our specs.” - *Foodservice Operator*

Barriers to Implementing Strategies

- › Communication between sectors that hinders profitability, and lack of vertical coordination;
- › Slow genetic intervals and reluctance to invest in modern genetic selection tools;
- › No clear system for traceability or ability to connect existing traceability information to enhanced price discovery systems;
- › Lack of trust across industry sectors;
- › Lack of effective alternatives to antibiotics;
- › Lack of incentives for all cattle production segments to improve carcass quality and uniformity;
- › Not enough incentive to make BQA a priority.

“ The industry needs to open up to the public and tell them what they are doing without being scared of the public taking it negatively.” - *Further Processor*

“ We don't communicate well enough. It's difficult to make changes with an island mentality.” - *Packer*

“ The cattle industry and beef processors are slow to react to customers who are changing their buying patterns; they have done things a certain way for a long time and are slow to react when change is upon them. They haven't been as dynamic with understanding what customers are looking for and trying to find ways to provide those products.” - *Retailer*



LOST OPPORTUNITIES

Lost opportunities are calculated for each audit to give perspective to the value of industry losses for not producing cattle that meet industry targets. During the strategy workshop, participants set a target consensus for Quality Grade, Yield Grade and carcass weight. The target consensus is presented in Table 12. These goals, with the actual prevalence of each from the audit and summary prices for 2016, as reported by USDA, are used to calculate these values.

Challenges arise each audit in this exercise as prices sometimes are not reported, or changes in data collection occur. New issues for 2016 include lack of yearly prices for lungs and tongues as well as no collection of tripe condemnations. The total lost opportunities for previous audits are adjusted to 2016 prices to give an accurate comparison between years (Table 13).

Table 12. Target consensus for quality grade, yield grade and carcass weight

Quality Grade	
Grade	Target
Prime	5%
Upper 2/3 Choice	35%
Low Choice	35%
Select	25%
Standard/Ungraded	0%
Yield Grade	
Grade	Target
1	10%
2	45%
3	40%
4	5%
5	0
Carcass Weight	
Range	Target
<600 lb	0%
600-800 lb	20%
801-900 lb	30%
901-1000 lb	50%
>1000 lb	0%

Table 13. Lost opportunities in quality issues for NBQA-1991, 1995, 2000, 2005, 2011, and 2016 (using 2016 prices)

	2016	2011	2005	2000	1995	1991
Quality Grade	-\$15.75	-\$30.44	-\$26.62	-\$29.66	-\$33.23	-\$33.14
Yield Grade	-\$12.91	-\$5.93	-\$15.60	-\$15.53	-\$10.20	-\$22.19
Carcass Weight	-\$10.88	-\$6.41	-\$4.46	-\$3.44	-\$5.68	-\$4.52
Hide/Branding	-\$0.84	-\$1.95	-\$1.90	-\$2.39	-\$2.67	-\$2.43
Offal	-\$8.68	-\$2.57	-\$2.63	-\$2.82	-\$1.59	-\$0.99
Total	-\$49.06	-\$47.30	-\$51.21	-\$53.84	-\$53.37	-\$63.27

FINAL CONCLUSIONS

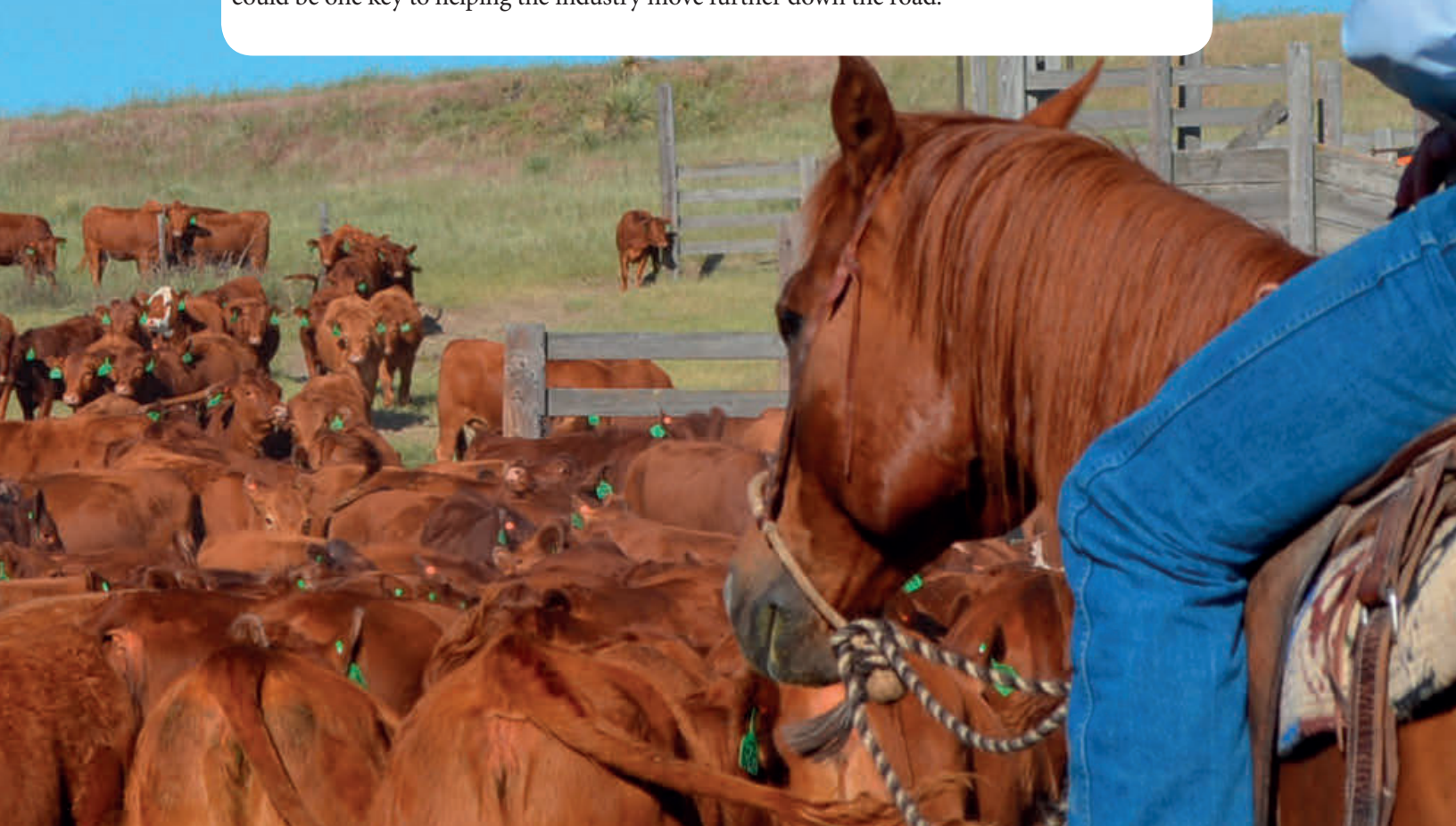
Politicians sometimes talk about “a path forward.” The beef industry, having spent the last quarter century significantly improving the quality of its product, has a robust path as it analyzes its progress in all sectors of the industry.

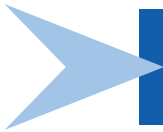
Results from the 2016 National Beef Quality Audit acknowledge room for improvement in every area. While Audit findings acknowledged the decrease in cattle with hide brands, the decreased presence of horns, and an increase in the frequency of Prime and Choice carcasses, it is evident further improvement is needed with liver condemnations and carcasses with bruising. Participants at the Strategy Session, meanwhile, discussed some of the potential ways the research could be used internally to move forward with these and other improvements.

Nevertheless, these industry leaders also recognized that the data show beef is a terrific product, and that those in the industry have a valuable story to tell. It doesn't help that many in the industry don't fully know or understand the best way to tell it.

With consumers today wanting to know more about their food – where it comes from and how it was produced – the opportunity for those in the beef industry to utilize NBQA research for improving is, as they say, a “no brainer.” Focusing on continuous improvement while touting the many quality attributes of the product and the commitments to quality made by its participants makes tremendous sense.

An important strategy for improved industry health and success came through loud and clear, both in the research and at the Strategy Session: utilizing BQA and its principles to increase consumer confidence and enhance industry commitment would encourage greater beef demand, and improve industry unity. Carrying this BQA message throughout the industry all the way to consumers has a harmonization quality that would benefit every audience. And it could be one key to helping the industry move further down the road.





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