



Dairy Beef Quality Assurance



Executive Summary

*Premiums and discounts
available for market dairy cows
sold at auction*

Introduction

Beef Quality Assurance

Beginning in the early 1980s the beef industry created a beef quality assurance (BQA) program that combined time-tested animal husbandry techniques with scientific knowledge. The program, which is primarily sponsored by the Beef Checkoff Program, provides specific recommendations to producers about a variety of management areas that impact the overall quality and consistency of beef products, as well as the health and well-being of the cattle in their care.



Because animals from dairy operations play such a significant role in the nation's beef supply, it is important to provide BQA education to this segment of the industry. The goal is to offer information that can help dairy producers improve the quality and consistency of market animals sourced from their dairies.

There are five key areas that beef quality assurance programs focus on:

1. Care and Husbandry Practices
2. Feedstuffs
3. Feed Additives and Medications
4. Processing/Treatment and Records
5. Injectable Animal Health Products

To gain a better understanding of the quality of the national beef supply and the effect of BQA education programs, the Beef Checkoff Program funds periodic quality audits at beef harvest facilities throughout the country. Audits focused on evaluating the quality of beef sourced from mature cows and bulls have been conducted in 1994, 1999 and 2007. This research has allowed the industry to gain a better understanding of the existing quality defects and economic losses that can be corrected or minimized through effective management, monitoring and marketing of cows and bulls.

The study summarized in this publication is based on procedures that have been utilized in previous quality audits and was designed to give dairy producers more information about how their animals are valued within the beef chain when they are sold through auction markets.

For more information about this research or the national BQA program, visit www.bqa.org.

“Improving the quality of market cows from dairy operations goes beyond pure economic considerations. It has a direct impact on consumer confidence in the quality of products suppliers of animal protein bring to the marketplace.”

—Lyle Koons, Procurement Manager, Cargill Regional Beef

Background and Methodology

Dairies have a “steak” in the beef business

Market dairy cows represent an important part of the total beef supply. According to the most recent U.S. Department of Agriculture (USDA) survey data, over 95 percent of market dairy cows go directly to harvest, and represent about 6 to 8 percent of the beef produced in the U.S. annually.

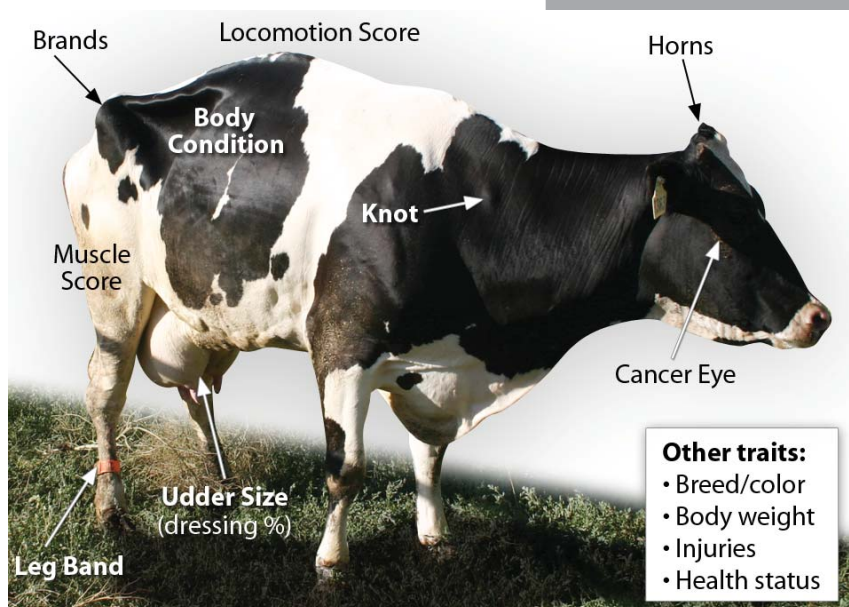
Results of the 2007 National Market Cow and Bull Beef Quality Audit (NMCBBQA) indicate there is still work that needs to be done to improve the quality and consistency of market dairy cows and bulls. Highlights from the most recent audit demonstrated that during the holding pen evaluations, dairy cows had the most visible defects compared to other gender/cattle types.

Many of these cattle were marketed through auction markets; however, there has not been any research to determine the effect that beef quality assurance-related defects may have on the sale price of these animals. Recognizing the growth of the dairy industry in the western United States, researchers in Idaho and California attempted to establish a baseline for the quality of dairy market cows and bulls being sold in auction markets and determine the relationship between those quality defects and sale prices. The results of this study should provide more meaningful information to dairy producers to optimize the value of their market dairy cows and bulls with the ultimate goal of improving the quality and consistency of market animals sourced from dairy operations.

Methodology

Data were collected at 10 major livestock auction markets with regular weekly sales (four locations in California, five locations in Idaho, and one location in Utah). The researchers collected information during two distinct seasons (spring 2008 and fall 2008) on major characteristics including gender, breed, number of head in a lot, total lot weight and selling price. Subjective scores based on established evaluation scales were assigned for body condition score (BCS), muscle score and locomotion score. Additionally, the researchers evaluated animals for specific BQA-related defects including:

- Foot abnormalities
- Mastitis evidence
- Retained placenta
- Brand presence
- Major brand(s) presence
- Horn presence/length
- Cancer eye score
- Prolapsed rectum/uterus
- Evidence of surgery
- Abscess/sore presence
- Other BQA defects including animals that were visibly sick or other conditions that might affect sale price



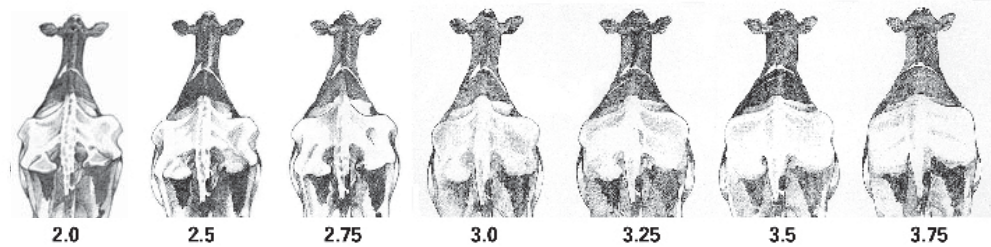
Methodology

Uniform data collection procedures were established in an initial training and were based on practices used for data collection in the previously conducted quality audits in processing facilities throughout the United States. A scoring sheet was developed to allow for consistent data collection.

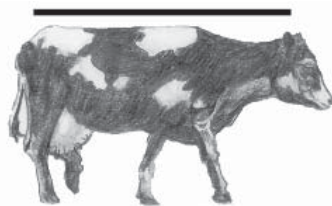
Total hd: _____	COW				BULL				Total Wt: _____ lbs	Price/cwt: \$ _____
hd	Holstein		Jersey		Other					
Color										
BCS	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
Muscle	1		2		3		4		5	
Locomotion	1		2		3		4		5	
									Foot abnormality	
Udder size	Sm	Avg	XL	Leg band	Bottle teats	Mastitis			Knot (neck)	
	Brand	Major	Horns: <1"	1-5"	>5"	Cancer eye: 0 1 2 3 4 5			Knot (shldr/rib)	
	Ret. placenta	Prolapse	Surgery evid.	Abscess/sore: knee hip hock			Knot (rump)			
Notes: (unhealthy, other defect)										

To evaluate subjective traits such as body condition score (BCS) and lameness, the researchers relied on industry evaluation tools. Body condition scores were evaluated based on a system that is commonly used within the dairy industry where 1 is "very thin" and 5 is categorized as "very fat." Lameness scores were also evaluated using a scoring system where 1 is "normal," and 5 is "severely lame."

Body condition scoring system (1 to 5)



Locomotion scoring system (1 to 5)



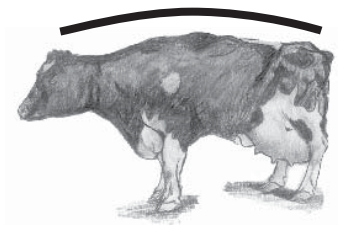
1 – NORMAL. Normal posture and gait, level back. All feet are placed with purpose.



2 – MILDLY LAME. Back is flat when standing, but arched when walking.



3 – MODERATELY LAME. Back is arched while walking AND standing, and strides are shorter but gait may appear normal. Cow will have a V-posture in her stance.



4 – LAME. Back is arched while walking and standing, AND gait is abnormal including favoring one or more legs.



5 – SEVERELY LAME. Back is arched and cow will not bear weight on one leg and may resist standing. Cows with this score should not be sold or transported, and should be euthanized.

Incidence rates of BQA traits in market cows were collected on 9,177 lots totaling 12,429 head during two seasons in 2008.

Sale price distribution of market dairy cows

Sale price (\$/cwt)	Cows (%)
<\$10	3.5
\$10-20	2.5
\$20-30	5.2
\$30-40	17.2
\$40-50	48.2
\$50-60	20.4
\$60-70	2.8
>\$70	0.1

The distribution of selling prices for market dairy cows is reported in the accompanying table. The mean sale price was \$42.23/cwt. The majority (86 percent) of cows sold for \$30 to \$60/cwt. Premiums and discounts were determined in comparison to a “par” animal. For the cow model, the par animal was a Holstein cow that sold as a single head lot during the fall and was healthy, weighed 1,400 to 1,599 lbs., had a 3.0 body condition score, 3.0 muscle score, 1.0 lameness

score, average-sized udder, and did not have horns, brands, knots, sores, cancer eye, foot abnormalities, leg bands, udder defects, or reproductive defects.

Body condition score

Based on the information collected during this project, it is clear that cow buyers desire moderate to heavy body condition (via premiums of \$0.00 to \$1.35/cwt for BCS 3.0 to 4.0 cows), while cows with a less than desirable BCS of 2.0 or 2.5 are in much less demand, but still represented a substantial amount (42.6 percent) of the market cows evaluated. Most importantly, emaciated and near-emaciated cows (BCS 1.0 or 1.5), which unfortunately comprised over 13 percent of the market dairy cows in this study, were strongly discounted (\$20.47 or \$12.19, respectively).

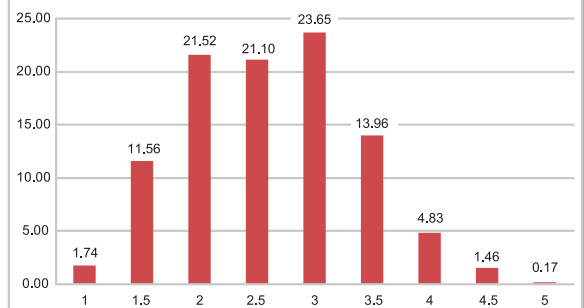
Body weight

The average body weight for cows in this study was 1,488 lbs. Previous quality audits did not evaluate body weight as only carcass weight was collected.

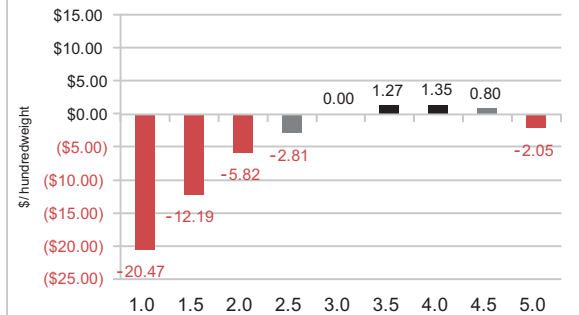
Premiums and discounts paid based on body weight were similar to BCS premiums and discounts. Lightweight cows (<1,000 lbs) were discounted substantially at \$6.72 compared to cows weighing 1,400 to 1,599 lbs (par). Cows weighing 1,000 to 1,199 lbs and 1,200 to 1,399 lbs were discounted \$2.89 and \$1.14/cwt, respectively, compared to par cows. Heavier cows (1,600 to 1,799 lbs and 1,800 to 1,999 lbs) were paid premiums of \$0.73 and \$0.97/cwt, respectively, compared to par cows. Very heavy cows that weighed 2,000 lbs or more received the same price as cows weighing 1,400 to 1,599 lbs.

The positive correlation between increased body weight and price for market cows indicates that dairy producers should consider

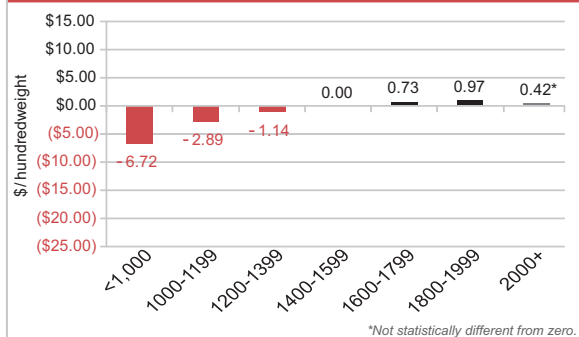
Body Condition Score Distribution



Body Condition Score and Price Distribution



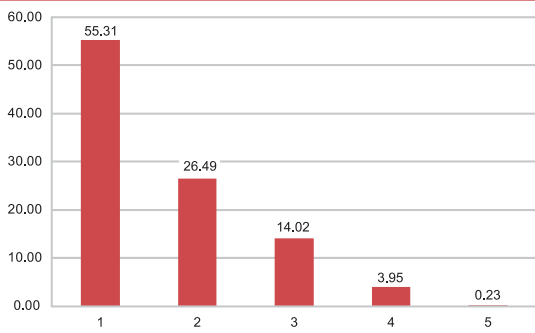
Body Weight and Price Distribution



*Not statistically different from zero.

Results

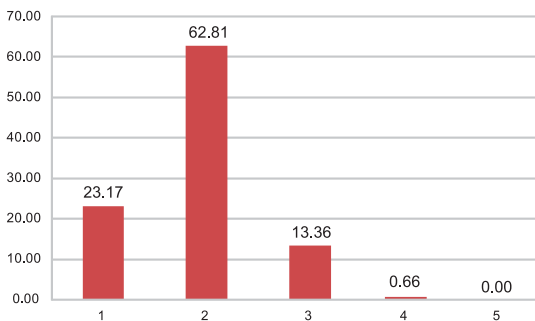
Locomotion Score Distribution



Locomotion Score and Price Distribution



Muscle Score Distribution



adding pounds to lighter weight market cows (<1,400 lbs) prior to sale. Benefits include avoiding the lightweight discount, accessing a premium for heavier cows, as well as the opportunity to sell more weight at a higher price.

Lameness

Discounts for lameness varied substantially depending on the severity. Cows with a locomotion score (LS) of 2 or 3 were discounted \$1.76 or \$2.88/cwt, respectively. However, cows that had a hunched back while standing and walking and favoring one limb (LS 4) were discounted at \$4.03/cwt. Due to the relatively high incidence of these animals (4.0 percent), it appears that the discount may not be severe enough to prevent them from being sold through auction markets.

Muscle score

In this study, just over 25 percent of the cows were considered to be light muscled. While heavier muscling is not a typical breed characteristic for dairy-type animals, it does impact carcass yield.

In this study, cows with a light muscle score of 1 or 2 were discounted at \$6.92 or \$1.80/cwt, respectively compared to cows with a muscle score of 3 (par).

Udder size

Udder size (small, average and extra large) was evaluated in market cows since it influences dressing percent at harvest. Dressing percentage is the percentage of the live animal weight that becomes the carcass weight at slaughter. The weight of the non-carcass items (hide, head, udder, etc.) is commonly referred to as the “drop” or offal value. When cows are sold on a live-weight basis, buyers will “adjust” the per hundred weight price based on a cow’s anticipated dressing percentage.

Based on previous research,¹ 8 to 11 percent of the total drop weight is comprised of mammary tissue and udder contents for dairy cows with average-sized udders (approximately 50 to 75 lbs). That same research also reported that a small udder (25 to 50 lbs) will only constitute 3 to 5 percent of her total drop weight. The influence of udder size on dressing percent in a cow with an extra large udder (greater than 75 lbs) has not been previously investigated; however, it is likely to represent upwards of 15 to 20 percent of her total drop weight, which significantly affects dressing percent at harvest in a negative manner.

In the current study, cows with extra large udders (i.e. failed suspensory ligament) were discounted \$1.18/cwt, which is likely due to buyers anticipating a less desirable dressing percent at harvest. In contrast, cows with small udders (i.e. cows that produced limited milk, were dry, or had not fully developed their mammary gland) received a \$0.54/cwt premium.

¹ Allen and Ahola, unpublished

Illness

Animals that exhibited a potential antibiotic residue risk based on their appearance were discounted by buyers. For example, animals that had reproductive defects such as a retained placenta or evidence of a recent surgery were discounted \$5.02/cwt and \$8.64/cwt, respectively. Additionally, animals that appeared to be sick were also discounted significantly. Sick cows were, on average, discounted \$15.77/cwt compared to animals that were not sick. The large discount given to sick cows is probably associated with an animal's likelihood of dying or becoming non-ambulatory prior to harvest, or being condemned or yielding a poor quality carcass at harvest.

Other BQA traits

In addition to major traits that impact prices received at auction, the researchers evaluated other traits commonly associated with beef quality assurance management recommendations. While these traits were not highly prevalent in the sample population, when present, they did have the potential to significantly impact sale prices.

Foot Abnormalities. Foot abnormalities (long toes, screw toe, etc.) were observed in about 0.5 percent of market dairy cattle. Cows with foot abnormalities received a discount of \$5.79/cwt compared to normal cows.

Leg Bands. The presence of one or more colored leg bands on a cow, which are commonly used in the dairy industry to identify a cow for a variety of reasons (e.g. not to be bred, treated with antibiotics, kicks during milking, etc.), did not affect selling price. Apparently buyers are not concerned that a leg band might be indicative of a trait that affects an animal's carcass value, such as a potential antibiotic risk.

Bottle Teats. The incidence of bottle teats was low (0.73 percent); however, over 3 percent of the cows had mastitis severe enough to be visible. Bottle teats did not affect selling price, however cows with visible mastitis sold for \$2.35/cwt less than cows with no apparent symptoms.

Ocular Neoplasia (“Cancer Eye”). Among the cows evaluated, only 0.25 percent exhibited ocular neoplasia. Unfortunately, a small percentage of those cows were assigned a score of 5, which indicates the eyeball is prolapsed from the orbit. Market dairy cows with ocular neoplasia in the pre-cancerous stage (score of 1 or 2) were discounted heavily and sold for \$6.78/cwt less than cows with no sign of “cancer eye.” A

“In these changing times of the dairy industry, all producers are seeking ways to improve their bottom line. This study confirms the necessity of marketing dairy animals in a timely fashion and provides potential objective tools to use to improve market cattle value.”

—James Zimmerman, Vice President, Empire Livestock Marketing, LLC

Results

severe discount of \$32.04/cwt occurred in cows with ocular neoplasia in the cancerous stages (3, 4 or 5 score) compared to cows free from this condition. This severe discount is likely due to the possibility that these animals will be condemned and deemed not suitable for processing at the harvest facility.

Strong economic disincentives for animals with ocular neoplasia appear to limit their presence to just one in 400 sold at auction. These results also suggest that animals identified as having early stages of ocular neoplasia should be marketed immediately to avoid severe discounts in the marketplace and to avoid negative consumer perceptions.

Retained Placenta. A small percentage (0.13 percent) of market dairy cows had a visible retained placenta, and were discounted \$5.02/cwt compared to normal cows. Evidence of recent surgery (displaced abomasum, caesarean section, etc.) was limited (0.14 percent), but if present, did lead to a discount of \$8.64/cwt. An increased risk of condemnation at harvest is probably the primary driver behind these substantial discounts.

Body Sores. The presence of “active” or recently acquired body sores was evaluated among dairy cattle. It was assumed by the project leaders that sores might identify animals that had recently fallen. Among cows, 0.72 percent had a sore with the majority being located in the hip region (0.49 percent), followed by the hock (0.15 percent) and knee (0.08 percent) areas. Sores on the hip or the knee led to a discount of \$4.58/cwt and \$4.85/cwt, respectively.

Visibly Sick. About 3 percent of market dairy cows were characterized as “visibly sick” since they displayed one or more of the following subjective characteristics: severe lethargy, extreme weakness, significant panting, drooping ears or extremely gaunt. While it was not possible to collect objective data including body temperature or respiration rate to verify illness, severely ill animals were easily recognized by evaluators. Severe cases often resulted in an animal not selling at any price or being sold contingent upon passing inspection at the packing plant. Additionally, these animals were more difficult for auction market personnel to handle and move because of their weakened or unresponsive state.

No Sales. Among dairy cows evaluated in this study, 1.48 percent of the animals offered for sale to auction market buyers were “no saled” or “passed out” since no buyers would purchase them at any price. These cows typically did not sell due to the presence of one or more major BQA defects, including, but not limited to: severe lameness, visible illness, emaciation, advanced cancer eye, or being extremely light-weight or light-muscled.

“Trickle-down economics is observed daily in the salvage cattle market; packer-buyers pay more for animals that will yield more or higher-quality products – and that goes straight to the producers’ bottom line.”

—Gary Smith, Ph.D., Monfort Endowed Chair in Meat Science, Colorado State University

As part of this project, the researchers developed a pricing model to predict selling price (and total value) of alternative animals being considered for market. The model helped identify major factors and/or discounts that should be avoided when marketing cull cows. While the authors of this report recognize that culling decisions are based on the fact that a cow's performance has been affected by various traits and that not all defects can be avoided, producers can optimize the value of an animal by:

1. First avoiding selling animals that are visibly sick, very lame, have open sores or injuries, cancer eye or evidence of surgery.
2. Identifying traits that are relatively minor in terms of severity, but more common in terms of incidence, such as below average body condition score and minor lameness. These traits can quickly add up and adversely affect an animal's selling price.
3. Recognizing potential opportunities to add value by improving carcass quality and yield by improving body condition score, body weight and muscling score.

The example application was done by comparing animals with different characteristics and BQA traits, and indicates potential revenue for the respective animals. Applying the model may also provide a view of additional revenue that could be gained by feeding market cows and bulls for a period of time, thus enhancing marketability by minimizing or eliminating certain BQA traits or other price demerits.

In this example, two market dairy cows with different characteristics are compared within the context of the model. The first animal (Animal A) is similar to what can be described as "par" conditions based on the research conducted in this project. Animal A is a Holstein cow that weighs 1,250 pounds, is branded, sold in the spring market and has a small udder and BCS of 4. Predicted price of this cow is \$51.32/cwt with price incentives for udder size (\$0.54), BCS 4 (\$1.35) and the brand (\$0.38). Deductions to the predicted price result from the spring sale (-\$0.77) and her weight of 1,250 pounds (-\$1.14). Total value of Animal A is estimated to be \$641.50 (\$51.32/cwt).

In contrast, the second cow analyzed in this example (Animal B) faces more negative price impacts due to quality factors. Similar to the first cow, she is Holstein, weighs 1,250 pounds, is branded and marketed in the spring. However, this animal has an extra large udder (-\$1.18), has a pre-cancerous condition in one eye (-\$6.78), BCS of 2 (-\$5.82), and a locomotion score of 4 (-\$4.03). She also exhibits evidence of mastitis (-\$2.35), a recent surgery (-\$8.64), and a visible sore on her hip (-\$4.58). Her projected sale price is \$14.25/cwt and total value is \$178.13.

The pricing model helped identify that the range of discounts was greater than the potential premiums, thus the best strategy for producers is to avoid major discounts through management and timely culling. This practice will optimize revenue opportunities and decrease the likelihood of market cows entering the marketplace in marginal condition.

Animal A



Animal B



Implications

The goal of this project was to provide dairy producers information that was not previously available about the potential value of their market cows and bulls. It also underscores that existing industry recommendations to cull animals in a timely manner are one of the best measures to maintain their value and enhance their carcass quality.

Based on this study, body condition score emerged as one of the most important factors in determining potential premiums that dairy producers might receive for their market cows when selling them through auction yards. Dairy producers should consider adding value via improved BCS to thin market cows prior to sale at auction to acquire readily available premiums for fleshy cows. The models developed as part of this study can also help a producer determine if such a strategy is cost-effective by comparing the potential added revenue with other costs such as feed and medicine, and the time and labor involved with keeping an animal on the dairy when she has no potential to return to the milking string.

While this study does support the concept that premiums exist in the marketplace for market cows of higher quality, an individual operation's economic analysis should also be a part of the decision-making process. The economic feasibility of trying to positively influence certain traits such as body condition score through management practices should be carefully considered especially in periods when input costs are high. The better strategy may be to simply avoid severe quality defects associated with major discounts such as severe lameness and severe emaciation by marketing animals sooner. Animals with extreme defects such as severe illness should be humanely euthanized on-farm to address both welfare and consumer perception issues.

The primary obstacle to educating dairy producers about Beef Quality Assurance principles has stemmed from the limited income generated from market dairy cows, and an apparent lack of perceived ability to add value. Ultimately, this research will help to meet consumer demand for high-value beef by improving the quality, consistency and safety of beef products from dairy cows.

Key points

- **Premiums** (+\$1-5/cwt) are available by selling heavier weight cows that are in a body condition score of 3.0 or higher.
- Avoid **minor discounts** (-\$1-5/cwt) by not selling lighter weight, thinner or slightly lame cows. Consider adding value to these animals prior to marketing.
- Selling emaciated cows, those with a lameness score of 4 or higher, or animals that are sick or have more than one BQA defect will result in **multiple major discounts** (-\$7-20/cwt). Sell these animals in a **timely manner**, or euthanize them on the farm.

Summary of BQA traits and associated discounts and/or premiums on selling price at auction compared to a par* animal (per hundredweight).

Trait	Range of	
	Discounts	Premiums
BCS 1.0 to 2.5	-\$20.47 to -\$2.81	
BCS 3.5 to 4.0		+\$1.27 to +\$1.35
Weight <1,400 lbs	-\$6.72 to -\$1.14	
Weight >1,599 lbs		+\$0.73 to +\$0.97
Muscle score 1 or 2	-\$6.92 to -\$1.80	
Locomotion score 2 or 3	-\$2.88 to -\$1.76	
Locomotion score 4 or 5	-\$12.62 to -\$4.03	
Small udder		+\$0.54
Extra large udder	-\$1.18	
Foot abnormality	-\$5.79	
Mastitis	-\$2.35	
Retained placenta	-\$5.06	
Surgery evidence	-\$8.64	
Knee or hip sore(s)	-\$4.85 to -\$4.58	
Visibly sick	-\$15.77	

* Par animal was a Holstein cow that sold as a single head lot during the fall and was healthy, weighed 1,400 to 1,599 lbs, and had a 3.0 MS, 1.0 LS, average-sized udder, and did not have horns, brands, knots, sores, cancer eye, foot abnormalities, leg bands, udder defects, or reproductive defects.

“There are premiums to be had for producers who sell high-quality market cows. When every dollar counts, it’s important for producers to remember that 6 percent of total beef production is attributable to market dairy cows. Paying attention to quality issues improves salvage value by making animals more desirable for buyers.”

—Kevin Good, Senior Market Analyst, CattleFax

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