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NATIONAL MARKET COW AND BULL BEEF QUALITY AUDIT – 1999

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Introduction

The National Non-Fed Beef Quality Audit – 1994 (NNFBQA-94) was conducted to benchmark the quality characteristics of market cows and bulls in the beef and dairy industries for purposes of encouraging implementation of quality management practices within the beef industry. From this audit, it was determined that producers were losing \$69.90 for each market cow and bull harvested due to quality defects. As a means of recovering the lost value, producers were provided three means by which they could begin to recapture the lost value: 1) Manage market cows and bulls to minimize defects and quality deficiencies, 2) Monitor the health and condition of market cows and bulls, and 3) Market cows and bulls in a timely manner. The audit, now referred to as the National Market Cow and Bull Beef Quality Audit – 1999 (NMCBBQA-99), was conducted again in 1999 to determine the quality and consistency of market cows and bulls and to measure improvement in quality and consistency since 1994. Specifically, objectives of NMCBBQA-99 were to 1) identify and quantify, numerically and monetarily, the incidence of quality defects in U.S. market cows and bulls, their carcasses and offal items; 2) characterize as many as possible of the causes of quality defects in market cows and bulls; 3) compare the results of the NMCBBQA-99 to the NNFBQA-94; and 4) identify strategies and tactics to pursue and employ efforts to reduce/eliminate specific defects in the quality and consistency of market cow and bull beef.

Materials and Methods

The NMCBBQA-99 was conducted in three phases:

Phase I – Face-to-Face Interviews: Researchers interviewed packers, auction market owners and operators, and affiliated organizations (government agencies, academia, further processors, trade associations). Interviewees completed the “Survey of Producer Controllable Quality Defects” and were asked to rank each defect on an 11-point scale to determine the severity of the defect from their perspective.

Phase II – In-Plant Audits: Twenty-four in-plant audits were conducted in 21 federally inspected packing facilities in 11 states. Audits were conducted between August and November 1999, a time frame similar to that of the NNFBQA-94. A minimum of 20% of all cattle in each lot were evaluated in three facility areas: the holding pen (n = 3,969), the harvest floor (n = 5,679), and the cooler (n = 4,959; 4,554 carcasses were not ribbed, 405 carcasses were ribbed). Traits evaluated in the holding pen included breed-type (beef vs. dairy), gender, occurrence and severity of cancer eye, evidence of lumpy jaw, presence of

horns, incidence and location of brands, occurrence of hide damage due to latent defects or insect damage, presence and location of abscesses, incidence and severity of lameness, condition of udder and sheath, occurrence of prolapse, muscling, body condition, and location and quantity of hide contamination. Traits evaluated on the harvest floor included number, location, and severity of bruises; incidence and cause of carcass, liver, tripe, tongue, heart, and head condemnations; presence and severity of arthritic joints; frequency of pregnancies; and frequency of detection of lead shot/bird shot on(in) carcasses. Traits evaluated in the cooler included carcass weight; muscling; finish; fat color; skeletal maturity; percentage of kidney, pelvic, and heart fat; packer grade; and plant grade. Additional traits recorded for carcasses that were ribbed included fat thickness, adjusted fat thickness, marbling score, lean maturity, and ribeye area.

Phase III – Strategy Workshop: The strategy workshop was conducted upon completion of Phase I and Phase II in order to present the current quality challenges and characteristics to participants. The goal of the strategy workshop was to, following review of new information, develop industry consensus and strategy for improving the quality and consistency of market cows and bulls. Participants also reached consensus on the “Quality Losses Per Market Cow and Bull Harvested” due to the quality challenges identified in Phase I and Phase II.

Results

Phase I – Face-to-Face Interviews

Quality challenges most frequently cited by packers tended to include those issues that affect the profit of the plant and/or the ability of the company to sell product. The leading quality challenges cited by packers included bruises, antibiotic residues, presence of lead shot in carcasses, arthritic joints, dressing percentage, and condition (leanness). Affiliated organizations tended to include issues that affected the industry as a whole, including pricing and prompt payment relative to trimming and testing issues, antibiotic residues, national individual-animal identification and verification, pathogen control, injection-site lesions, and presence of lead shot as the leading quality challenges facing the beef and dairy industries. Among all interviewees, the leading quality concerns were 1) frequency of antibiotic residues, 2) frequency of lead shot in carcasses, and 3) potential need to modify pricing of, and prompt payment in relation to current testing protocols for, market cows and bulls. The final top ten quality challenges, as determined by the participants at the Strategy Workshop, are presented in Table 1.

Phase II – In-Plant Audits

Results of Phase II are presented in Tables 2, 3, and 4. In the holding pen, compared to NNFBQA-94, there were more cattle free of cancer eye, fewer cattle with severe cancer eye (i.e., prolapsed eye balls, tumors), fewer cattle with native (non-branded) hides, fewer cattle that were sound (exhibiting no evidence of lameness), more light muscled cows, more moderately conditioned cattle, fewer over conditioned cattle, and more light conditioned cattle ($P < 0.05$, Table 2). On the harvest floor, compared to NNFBQA-94, fewer carcasses had major and medium bruises; more carcasses had minor bruises; fewer carcasses were free

of bruises; fewer carcasses, livers, tripe, hearts, and heads were condemned; and more tongues were condemned ($P < 0.05$, Table 3).

In the cooler, carcasses exhibited similar traits to cattle in the holding pens. Compared to the NNFBQA-94, carcasses in the NMCBBQA-99 were lighter muscled and had less external fat ($P < 0.05$, Table 4). Fewer carcasses had yellow fat as compared to the NNFBQA-94 ($P < 0.05$, Table 4). Additionally, in the cooler, carcasses were classified into one of eight packer grades for cow carcasses and one of four packer grades for bull carcasses. The mean packer grades for market cows and bulls, as assigned by Colorado State University personnel using USDA grade nomenclature, were Cutter/Canner⁺ and Bull⁺, respectively. Packer grades, assigned by Colorado State University personnel, were compared to in-plant descriptors to determine what characteristics were important to packers in classifying market cow and bull carcasses. Among the ribbed carcasses assigned the “packer grade” of Boner by Colorado State University personnel, seven different in-plant descriptors were used to classify carcass characteristics of 213 carcasses. Carcass characteristics by in-plant descriptor for carcasses assigned a packer grade of Boner are presented in Table 5. Carcasses classified as Boner, on average, had between 0.08 to 1.34 in of backfat, an average ribeye area between 7.7 and 17.5 in², an average marbling score between Practically Devoid 10 and Moderately Abundant 30, and a calculated USDA yield grade between 0.0 and 5.5 (Table 5).

Phase III – Strategy Workshop

The goal of the Strategy Workshop was to present results of the audits to industry leaders so that strategies and consensus could be developed and so that “Quality Losses Per Market Cow and Bull Harvested” in 1999 due to quality defects could be determined. The total value lost per market cow and bull harvested was \$68.82 (Table 6). Producers can begin to recapture the lost value by managing market cows and bulls to minimize defects and quality deficiencies, valued at \$13.82; monitoring the health and condition of market cows and bulls, valued at \$27.50; and marketing cows and bulls in a timely manner, valued at \$27.50.

More specifically, to assist producers in improving the quality and value of market cows and bulls, four directives to producers were developed:

1. Recognize and maximize the value of your market cows and bulls.
2. Be proactive to ensure the safety and integrity of your product.
3. Use appropriate management and handling practices to prevent quality defects.
4. Closely monitor herd health and market cull cattle timely and appropriately.

A Quality Assurance Marketing Code of Ethics also was developed to facilitate the implementation of the four directives.

I will only participate in marketing cattle that:

- *Are safe, wholesome and do not pose a public health threat.*
- *Are managed under state and national quality assurance guidelines.*
- *Continue to be mobile.*
- *Are free of any terminal condition (including advanced lymphosarcoma, septicemia, etc.)*

- *Are in acceptable body condition.*
- *Are free of prolapses with visible fetal membranes.*
- *Are free of advanced eye lesions.*
- *Are free of advanced lumpy jaw.*

Furthermore, I will do everything possible to humanely gather, handle and transport cattle in accordance with accepted animal husbandry practices.

Finally, I will humanely euthanized cattle when necessary to prevent suffering.

Implications

The results of the National Market Cow and Bull Beef Quality Audit – 1999 can be used to document the improvements in quality and consistency of market cows and bulls, and to focus the industry's attention on new, emerging issues. Results can be used by national and state quality assurance programs to focus educational initiatives on the leading quality challenges leading producers to further improvements in quality and consistency. Producers may use quality audit benchmarking data, if they obtain data concerning the performance of their cattle downstream in the marketing chain, to compare with their own herd performance for purposes of making sound, quality-focused management decisions on their ranches and farms.

Table 1. Ranking of the ten quality challenges (chosen as the top ten quality challenges for beef and dairy cattle combined) for each of beef cattle and dairy cattle based on aggregated responses of participants (n = 50) at the Strategy Workshop.

Beef Market Cows and Bulls		Dairy Market Cows and Bulls	
Quality Challenge	Score ^a ± SE	Quality Challenge	Score ^a ± SE
1 – Too frequent incidence of birdshot	-2.8 ^{b*} ± .6	1 – Too frequent antibiotic residues	-3.7 ^{b*} ± .6
2 – Too frequent and severe bruises	-2.2 ^{bc*} ± .4	2 – Too frequent injection-site lesions/knots	-3.3 ^{bc*} ± .7
3 – Too frequent rib and(or) multiple brands	-2.2 ^{bc*} ± .5	3 – Too frequent downers	-2.2 ^{cd*} ± .5
4 – Too frequent injection-site lesions/knots	-2.1 ^{bcd*} ± .5	4 – Too advanced arthritis/structural defects	-2.0 ^{cd*} ± .5
5 – Too advanced arthritis/structural defects	-2.0 ^{bcd*} ± .3	5 – Too severe emaciation	-2.0 ^{de*} ± .5
6 – Too advanced cancer eye damage	-2.0 ^{bcd*} ± .4	6 – Too frequent and severe bruises	-1.7 ^{de*} ± .4
7 – Too severe emaciation	-1.6 ^{cde*} ± .4	7 – Inadequate muscling	-1.5 ^{de*} ± .5
8 – Too frequent downers	-1.3 ^{cde*} ± .3	8 – Too frequent incidence of birdshot	-0.2 ^{ef} ± .6
9 – Inadequate muscling	-0.8 ^{de*} ± .4	9 – Too frequent rib and(or) multiple brands	-0.2 ^f ± .4
10 – Too frequent antibiotic residues	-0.8 ^e ± .5	10 – Too advanced cancer eye damage	0.2 ^f ± .7

^a Scores are based on the average of the participant responses in assigning a score for each quality challenge on an 11-point scale (-5 to +1 = trait below expectations; 0 = trait meeting expectations; +1 to +5 = trait exceeding expectations) after the top ten quality challenges for beef and dairy cattle combined were determined.

^{b,c,d,e,f} Means, within a column, bearing a common superscript letter, are not different (P > 0.05).
^{*} Means are different from zero (P < 0.05).

Table 2. Comparison of incidence of Bovine Ocular Neoplasia, lameness, muscling, and condition quality challenges in the 1994 National Non-Fed Beef Quality Audit versus the 1999 National Market Cow and Bull Beef Quality Audit.

Quality challenge	1994 Percentage	1999 Percentage
Bovine Ocular Neoplasia (no evidence)	91.5 ^b	95.7 ^a
Bovine Ocular Neoplasia (severe)	2.4 ^a	0.6 ^b
Native Hides	58.4 ^a	53.5 ^b
No Evidence of Lameness (Beef Cows)	88.6 ^a	73.4 ^b
No Evidence of Lameness (Dairy Cows)	76.5 ^a	60.8 ^b
No Evidence of Lameness (Beef Bulls)	72.8 ^a	63.7 ^b
No Evidence of Lameness (Dairy Bulls)	76.3 ^a	70.9 ^b
Light Muscled (Beef Cows)	9.6 ^b	44.4 ^a
Light Muscled (Dairy Cows)	11.6 ^b	72.1 ^a
Moderate to Heavy Muscled (Beef Cows)	59.6 ^a	9.4 ^b
Moderate to Heavy Muscled (Dairy Cows)	41.6 ^a	0.3 ^b
Moderate Body Condition Score (Beef Cows)	22.4 ^b	30.7 ^a
Moderate Body Condition Score (Dairy Cows)	19.3 ^b	25.2 ^a
Moderate Body Condition Score (Beef Bulls)	42.1 ^b	53.7 ^a
Moderate Body Condition Score (Dairy Bulls)	26.3 ^b	59.5 ^a
High Body Condition Score (Beef Cows)	46.4 ^a	24.2 ^b
High Body Condition Score (Dairy Cows)	49.1 ^a	16.3 ^b
High Body Condition Score (Beef Bulls)	40.6 ^a	10.8 ^b
High Body Condition Score (Dairy Bulls)	55.3 ^a	11.4 ^b

^{a,b} Percentages, within a row, bearing different superscript letters differ (P < 0.05).

Table 3. Comparison of incidence of bruising and condemnation quality challenges in the 1994 National Non-Fed Beef Quality Audit versus the 1999 National Market Cow and Bull Beef Quality Audit.

Quality challenge	1994 Percentage	1999 Percentage
Major Bruise (Cow Carcasses)	30.7 ^a	21.6 ^b
Major Bruise (Bull Carcasses)	7.4 ^a	6.9 ^b
Medium Bruise (Cow Carcasses)	53.9 ^a	41.7 ^b
Medium Bruise (Bull Carcasses)	19.5 ^a	16.7 ^b
Minor Bruise (Cow Carcasses)	51.5 ^b	77.2 ^a
Minor Bruise (Bull Carcasses)	25.3 ^b	44.4 ^a
No Bruises (Cow Carcasses)	20.3 ^a	11.8 ^b
No Bruises (Bull Carcasses)	63.8 ^a	47.1 ^b
Whole Cattle/Carcass Condemnations	2.6 ^a	1.1 ^b
Liver Condemnations	30.8 ^a	24.1 ^b
Tripe Condemnations	44.8 ^a	19.2 ^b
Heart Condemnations	11.0 ^a	7.2 ^b
Head Condemnations	11.1 ^a	6.7 ^b
Tongue Condemnations	5.9 ^b	9.5 ^a

^{a,b} Percentages, within a row, bearing different superscript letters differ (P < 0.05).

Table 4. Comparison of incidence of muscling, finish, and fat color quality challenges in the 1994 National Non-Fed Beef Quality Audit versus the 1999 National Market Cow and Bull Beef Quality Audit.

Quality challenge	1994	1999
	Percentage	Percentage
Light Muscled (Cow Carcasses)	67.1 ^c	88.9 ^b
Heavy Muscled (Cow Carcasses)	9.2 ^b	1.0 ^c
Finish Score ^a of 1 or 2 (Cow Carcasses)	57.4 ^c	72.3 ^b
Yellow Fat (Cow Carcasses)	41.0 ^b	30.8 ^c

^a Finish Scores were assigned on a 9-point scale: 1 = no external fat, 9 = excessive external fat.

^{b,c} Percentages, within a row, bearing different superscript letters differ ($P < 0.05$).

Table 5. Plant descriptors used to identify carcasses assigned the “packer grade” of Boner in plants included in the National Market Cow and Bull Beef Quality Audit.

Plant Descriptor (n)	Average Fat Thickness (cm)		Ribeye Area (cm ²)		Marbling Score		Calculated USDA Yield Grade	
	Min	Max	Min	Max	Min	Max	Min	Max
1 (12)	.3	.8	53.5	82.6	TR ⁴⁰	MT ²⁰	1.1	2.6
2 (4)	.8	2.3	54.2	73.5	SL ⁸⁰	MD ⁸⁰	2.6	3.4
3 (18)	.5	2.3	52.3	91.0	SL ⁸⁰	SLAB ³⁰	2.3	4.3
BK (1)	1.5	NA	57.1	NA	SM ⁰⁰	NA	3.1	NA
BU1 (57)	.3	2.5	49.7	92.3	TR ⁴⁰	SLAB ⁶⁰	0.5	5.4
BU2 (9)	.5	1.8	54.2	91.0	SM ³⁰	SLAB ¹⁰	2.1	4.5
ST (1)	.8	NA	101.9	NA	SL ²⁰	NA	1.2	NA
Overall (213)	.3	3.3	49.7	112.9	PD ²⁰	MAB ²⁰	0.0	5.4

Table 6. Benchmark Value-Losses for Quality Defects Identified in Phase II of the Audits, NFBQA-1994 vs. NMCBBQA-1999

<i>Value-Loss</i>	NFBQA-1994	NMCBBQA-1999 with 1994 Logic and Prices	NMCBBQA-1999, New Logic, Prices and Coverages
Whole Cattle/Whole Carcass Condemnations	\$11.99	\$5.25	\$4.11
Carcasses Passed for Cooking	0.03	0.03	0.03
Head Condemnations	0.89	0.54	0.54
Tongue Condemnations	0.46	0.75	1.17
Heart Condemnations	0.17	0.11	0.05
Tripe Condemnations	2.24	0.96	2.59
Liver Condemnations	0.23	0.18	0.14
Additional Handling Required for Disabled Cattle	0.78	0.56	0.56
Hide Value Loss Due to Hot-Iron Brands	4.56	5.58	3.10
Hide Value Loss Due to Latent Defects and Insect Damage	2.36	3.65	3.17
Carcasses Passed With Parts Removed	2.13	1.41	-- --
Arthritic Joint Trimming Loss and Primal-Cut Devaluation From Arthritic Joints	-- --	-- --	9.72
Bruise Trim and Primal-Cut Devaluation from Bruises	3.91	1.54	2.24
Producer-Related Trim Losses Caused by Application of Zero Tolerance Policy	1.87	0.59	0.46
Birdshot/Buckshot	-- --	-- --	0.52
Injection-site Lesions in Top Sirloin Butts and Outside Rounds	0.66	0.87	1.46
Yellow Color, External Fat	2.27	6.48	6.48
Dark-Cutting Beef	0.06	0.08	1.41
Inadequate Muscling	14.43	20.77	18.70
Excess External Fat	17.74	29.59	10.17
Light Weight Carcasses and Primal-Cut Devaluation From Light Weights	3.12	4.02	1.28
Additional Handling/Management of Carcasses Tested For Antibiotic Residues	-- --	-- --	0.92
TOTAL	\$69.90	\$82.96	\$68.82