

National Beef Quality Audit 2016/17 Plant Carcass Audit



An Executive Summary for the Canadian Beef Industry





The 2016/17 National Beef Quality Audit

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Canada's National Beef Strategy Vision and Mission

Vision: A dynamic profitable Canadian cattle and beef industry.

Mission: To be the most trusted and competitive high quality beef cattle producer in the world recognized for our superior quality, safety, value, innovation and sustainable production methods.



Introduction



Processing Floor Audit



Cooler Audit



Economic Analysis



Conclusions and Next Steps

Introduction

The Canadian beef and cattle industry has a long and proud history of producing safe high-quality beef products. The vision established by the Canadian Cattlemen's Association in 1994, the Canadian Cattlemen: Quality Starts Here ✓ (QSH) program and the development and execution of the National Beef Quality Audit are tangible examples of this commitment.

The National Beef Quality Audit (NBQA) was first undertaken in 1995 with the intent to measure quality defects which could be managed primarily through the efforts of cattle producers. The 2016/17 audit is the fourth to be completed and has occurred 6 years following the third audit in 2010/11. In addition to benchmarking quality parameters, the NBQA supports the development of strategies to reduce the incidence of defects. The ultimate objective of the NBQA is to enhance the quality and safety of Canadian beef while increasing the profitability of the Canadian beef and cattle industry.

Processing Floor Audit

Slaughter plants from eastern and western Canada participated in the NBQA processing floor audit. The plants surveyed slaughter more than 75% of cattle processed in Canada and the sample selected for the audit represents approximately 1% of the annual slaughter during the study period. The processing floor audit utilized three technicians as well as a veterinarian to provide oversight and to assist in evaluation of carcasses. Each plant was visited from two to three consecutive days in September-October 2016 (Fall visit), January-February 2017 (Winter visit) and May-June 2017 (Spring visit) to capture seasonal trends in the prevalence data. Three technicians were located on the processing floor to collect data during slaughter. Observations were made immediately after stunning, following removal of the hide and on the offal collection table. Cattle were assessed for brands, horns, tag, bruises, surface injection site lesions, grubs, body condition score, and liver abscesses. Canadian Food Inspection Agency (CFIA) data was used for condemnations.

Cooler Audit

In the cooler, data was recorded using the Canadian grading standards (CFIA, 1992) and included: ribeye area (REA, cm²), fat depth, marbling score and hot carcass weight by instrument grading systems. Data from the Canadian Beef Grading Agency (CBGA) was used for quality grade (Prime, AAA, AA, A and devoid) and dark cutters.

Methods used for individual attributes are outlined throughout this report and were as per those utilized in previous Canadian NBQA studies¹.

Comparisons to Prior Audit

To measure progress since the 2010/11 audit, comparisons of the frequency of defects as well as their cost were made. Formulas for calculating costs were those previously employed in the 2010/11 audit to facilitate consistent comparison. To better enable benchmarking, prices published in past audits have been updated to reflect the current audit period. The estimated economic values and comparisons made to the prior audits are all presented in nominal dollars. Industry price averages and boxed beef pricing were sourced through Canfax Research Services.

Project Funding

This NBQA study was jointly funded through the Beef Cattle Industry Science Cluster under the Growing Canada Agri-Innovations Program and beef producer funds through the Canadian Beef Cattle Check-Off. The Beef Science Cluster, managed by the Beef Cattle Research Council (BCRC), is a partnership between Canada's beef industry and Agriculture and Agri-Food Canada. Under the partnership, industry research funds are leveraged and allocated to projects that have the greatest potential to benefit the competitiveness of the Canadian beef industry.

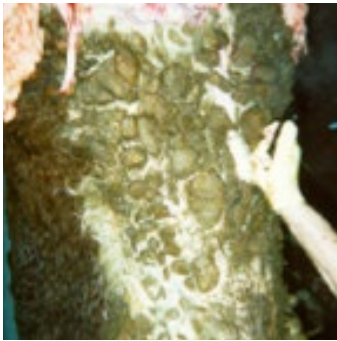
¹ Van Donkersgoed J, Jewison G, Bygrove S, Gillis K, Malchow D, McLeod G. Canadian Beef Quality Audit 1998-9. Canadian Veterinary Journal 2001; 42:121-126

Van Donkersgoed J, Jewison G, Mann M, et al. Canadian Beef Quality Audit 1998-9. Canadian Veterinary Journal 1997; 38:217-225



Processing Floor Audit

Tag



Tag is the manure and mud on the hide of an animal. Tag damages the hide and results in contamination of the carcass during removal of the hide. Any visual demerits, such as manure, dirt or rumen content, on the carcass during skinning must be

trimmed. Taggy cattle also result in additional labor costs in the processing plant, production line slowdowns, and damage to equipment in the leather making process.

A tag score that ranged from 0 for a clean dry hide to 10 for a very dirty wet hide was used. It included a subjective score of 0 to 3 for the area and extent of tag on each of the legs, belly, and sides, and a score of 1 if the hide was wet rather than dry.

Audit results indicated the percentage of tag remained high (85%) in steers and heifers (fed cattle) throughout the year – steady with the 2010/11 audit. Similar to 2010/11, weather conditions were extremely wet in the fall of 2016 and feedlot pens were in poor condition and difficult for producers to clean because of the weather.

The percentage of tag in cows and bull (non-fed cattle) was 57.3% and while this is considerably lower than fed cattle (85%) it is significantly higher than the 2010/11 audit of 20.6%. A lower proportion is anticipated due to the differences in housing, with cows and bulls typically housed on range and feedlot cattle housed in confined pens. However, heavy rain throughout the third quarter of 2016 resulted in wet pasture conditions as well. There was a higher seasonal incidence of tag in the winter in non-fed cattle (compared to the winter in the 2010/11 audit).

In 2016/17, occurrence of tag in non-fed cattle was almost three times the 2010/11 level. This variance is due to a greater proportion of cattle with tag scores of 5 and over.

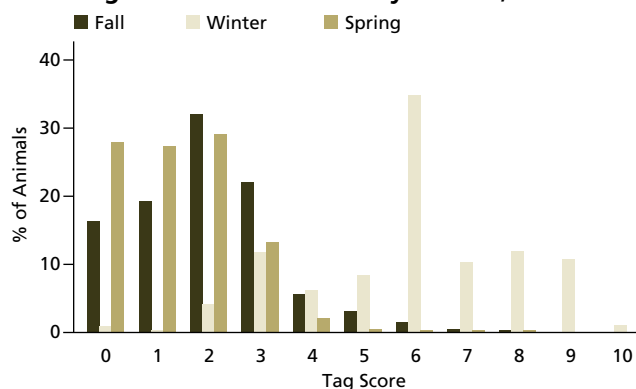
Tag prevalence by season, % with tag

2016/17 Audit	Fed	Non-fed
Fall	83.7%	44.0%
Winter	99.2%	81.7%
Spring	72.2%	44.5%
Total with tag	85.0%	57.3%
2010/11 Audit	Fed	Non-fed
Fall	88.5%	10.1%
Winter	89.7%	17.9%
Spring	76.5%	33.6%
Total with tag	85.3%	20.6%
2016/17	Fed	Non-fed
Scores 0-4	73.1%	90.2%
Scores 5-10	26.9%	9.8%
2010/11	Fed	Non-fed
Scores 0-4	84.9%	99.1%
Scores 5-10	15.1%	0.9%

Tag cost the beef industry \$10.21/head on average or \$29.8 million in 2016 versus \$26 million in 2011 and \$30.6 million in 1999. These costs are a result of hide damage, trim losses and increased labour costs at the packing plant.

Tag may be reduced by designing pens and working areas to enhance drainage, through the use of bedding materials and by scraping of pens as required.

Tag Score of Fed Cattle by Season, 2016/17



Horns



Horns cause economic losses from bruising, head condemnations, and extra labor in the packing plant. Producers are encouraged to use hornless bulls in breeding programs or to dehorn cattle early in age using the recommendations and

requirements in the Canadian Code of Practice for the Care and Handling of Beef Cattle.

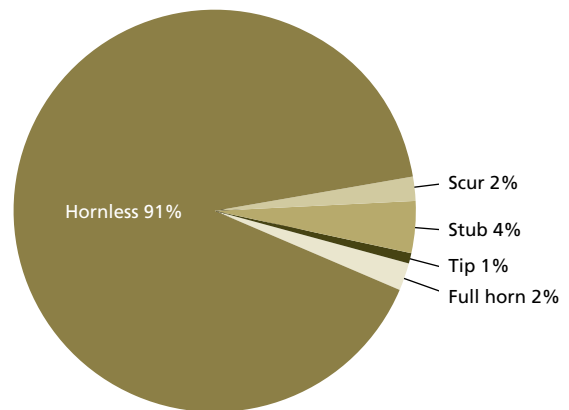
The frequency and type of horns were recorded during the audit. Horns that were < 2 inches long were called **scurs**; those 2 to 3 inches long were called **stubs**; those > 4 inches long with a tipped point were called **tipped**; and those > 4 inches long with a sharp point were called a full **horn**.

The majority of fed and non-fed cattle in the 2016/17 audit were hornless, with these animals accounting for 90.8% and 91.7% of the fed and non-fed cattle, respectively. Less than 3% of the cattle had full horns. The percentage of hornless cattle is slightly higher in fed (3%) and non-fed (2%) cattle compared to the 2010/11 audit. Processors lost \$176,086 in 2016 (\$0.06/head) versus \$192,535 in 2011 (\$0.06/head) and \$106,003 (\$0.032/head) in 1999 due to extra labour costs for knocking off the horns. The industry loss in 2016 is smaller than in 2011 with similar labour costs and lower prevalence.

Horn type and prevalence

2016/17 Audit	Fed	Non-fed
Hornless	90.8%	91.7%
<2" – scur	1.6%	2.7%
2-4" – stub	4.1%	3.5%
4" – tip	1.0%	0.7%
Full horn	2.6%	1.4%
2010/11 Audit	Fed	Non-fed
Hornless	87.5%	89.4%
<2" – scur	3.9%	4.2%
2-4" – stub	5.2%	4.0%
4" – tip	0.8%	0.6%
Full horn	2.6%	1.8%

Horn Prevalence – Fed Cattle, 2016/17





Processing Floor Audit *(continued)*

Body Condition Score



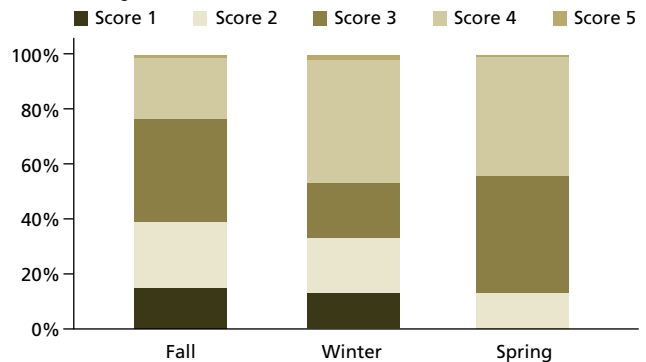
Body condition score (BCS) is a subjective measure to assess the amount of body fat an animal is carrying. BCS was recorded from 1 (very thin) to 5 (grossly fat). Body condition scoring can be used to determine and adjust feeding programs,

sort and manage cattle for feeding and slaughter, and predict herd fertility.

Non-fed cattle had higher BCS than in the 2010/11 audit, which marks an improvement. Of the non-fed cattle, less than 2% were fat and the percentage of skinny (1) cattle ranged from 0.9% in the spring to 15.4% in the fall. The average score for non-fed cattle was 2.69 in the fall (2.35 in 2010/11) to 3.02 in the winter (2.8 in 2010/11) and 3.3 in the spring (3.0). The improvements since 2010/11 now have cow BCS at recommended levels.

Typically, the condition of non-fed cattle is poorer than that of fed cattle since non-fed cattle are cattle that are culled from the beef or dairy herd. Producers should work with their nutritionist to determine optimal condition scores at various times of the year for their cow herd. Further information can be found at: www.bodyconditionscoring.ca

Body Condition Score - Non-Fed 2016/17



Body Condition Scores Distribution by Season

Score	2016/17 Audit						2010/11 Audit					
	% of Fed			% of Non-fed			% of Fed			% of Non-fed		
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
1	0.0%	0.0%	0.0%	15.4%	13.4%	0.9%	0.0%	0.0%	0.0%	19.4%	13.9%	6.2%
2	0.5%	4.0%	0.8%	24.0%	19.8%	12.5%	0.0%	0.0%	0.0%	39.9%	22.1%	23.2%
3	1.3%	5.9%	8.4%	37.3%	20.0%	42.7%	1.0%	1.0%	5.0%	30.5%	34.1%	41.9%
4	45.2%	61.8%	86.8%	22.6%	45.0%	43.3%	51.2%	70.1%	80.9%	6.2%	28.4%	24.3%
5	53.0%	28.3%	4.1%	0.7%	1.9%	0.7%	47.8%	28.8%	14.1%	4.0%	1.5%	4.3%
AVG	4.51	4.14	3.94	2.69	3.02	3.3	4.5	4.3	4.09	2.4	2.8	3.0

Livers

The ELANCO scoring system was used to assess livers. 0 = no abscesses; A = 1 or 2 small unorganized abscesses; or 2 to 4 well organized abscesses or abscess scars ; and A+ = 1 or more large active abscesses with inflammation of the liver tissue. A+ livers are associated with reduced feedlot performance.

Liver abscesses in feedlot cattle can be reduced by good feed management practices, such as, bunk management and effective ration changes, and antimicrobial prophylaxis.

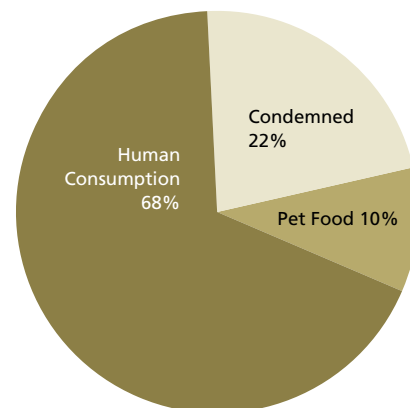
The occurrence of liver abscesses decreased 3-4% for fall and winter fed cattle, but increased 10% in the spring season, comparing 2016/17 with 2010/11. Non-fed cattle in 2016/17 had more abscesses than in the 2010/11 audit by 10.4% in the fall, 1.4% in the winter and 34.9% in the spring. The increase in spring abscesses in non-fed cattle could indicate a return to feeding open cows for spring sale when prices are seasonally higher.

In the 2016/17 audit, 19.3% of livers from fed cattle scored A+ compared to 9.9% in 2010/11 and 2% in 1999. In feedlot cattle this may be due to changes in feeding practices, such as the feeding of wheat, which may increase the risk of grain overload which leads to liver abscesses. Cattle are also being raised to heavier weights with longer days on feed.

The percentage of livers from fed cattle that were suitable for human consumption in the 2016/17 audit (68%) was steady with the 2010/11 audit (69%) but remains lower than the 1999 audit (76%). There remain more condemned livers relative to pet food livers, similar to the 2010/11 audit.

The economic loss from liver discounts in 2016 is estimated at \$20.98/head for all cattle, with a total industry loss of \$61.2 million. This compares to an industry loss of \$9.36/head for all cattle in 2011 or \$29.9 million and \$8.8 million in 1999. The increase comes from a larger discount for pet food and condemned livers.

Fed Cattle Liver Categories 2016/17



Liver Scores by Season

Score	2016/17 Audit						2010/11 Audit					
	% of Fed			% of Non-fed			% of Fed			% of Non-fed		
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
0	64.0%	74.5%	67.1%	50.6%	53.1%	59.7%	60.9%	70.2%	77.1%	61.0%	54.5%	94.6%
A	1.2%	2.7%	6.9%	14.3%	6.3%	12.6%	23.1%	3.8%	8.2%	18.8%	2.5%	3.6%
A+	23.7%	13.5%	19.9%	8.3%	18.1%	14.2%	5.1%	16.1%	10.4%	1.2%	6.6%	0.8%
Scars	11.2%	9.4%	6.6%	38.0%	18.3%	16.6%	10.9%	9.3%	3.9%	18.9%	36.1%	0.8%



Processing Floor Audit *(continued)*

Surface Injection Site Lesions

Injection site lesions result in trim and tough beef. The occurrence of surface injection site lesions has increased significantly in both fed and non-fed cattle from 0.56% and 7.34% in the 2010/11 audit to 4.45% and 13.69% respectively in the 2016/17 audit. This could be attributed to the increased use of dart guns to treat cattle on pasture, as injection site lesions are found in the shoulders of both fed and non-fed cattle. The fed cattle are potentially summer grass cattle as the minor lesions are showing up in the fall (4.3% in 2016/17 vs. 0.44% in 2010/2011) and winter (3.4% in 2016/17 vs. 0.24% in 2010/2011). Injection site lesions cost the industry \$0.56/head or \$1.63 million in 2016 compared to \$0.21/head or \$662,951 in 2011. This was due to higher prevalence rates.

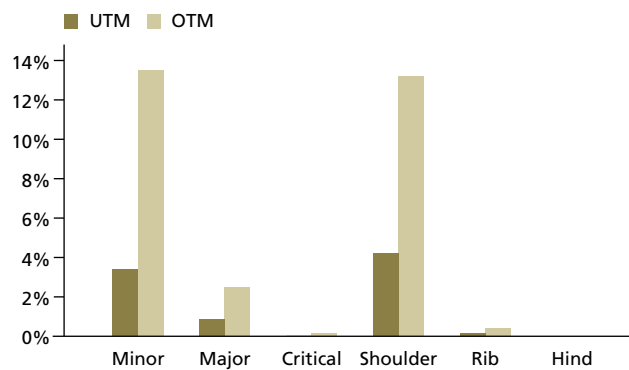
Surface injection site lesions on the carcass were measured; however, most injection site lesions are found deep in the muscle. Purveyor audits of primal and subprimals, where the interior of cuts can be examined, are required to more accurately assess the incidence of injection site lesions.

To reduce injection site lesions there are best practices which can be followed. These include:

- Veterinarians and producers are encouraged to give all injections in the neck rather than the hip
- Give drugs subcutaneously where label directions permit
- Avoid extra-label use of drugs that may cause adverse tissue reactions and drug residues

- Change needles every 10 to 15 uses or when dull, burred, or bent
- Keep equipment and injection site lesions clean
- Give no more than 10 ml of product in any 1 site and avoid the use of dart guns
- Keep multiple injections 2 to 3 inches apart
- Inject straight and deep in the muscle for intramuscular (IM) injections
- To use the tented method for subcutaneous injections (other than for Micotil because of human safety issues)
- Use proper size needles based on the route and size of the animal

Percentage of Carcasses with Injection Site Lesions, 2016/17



Surface Injection Lesion Prevalence

	2016/17 Audit						2010/11 Audit					
	Fed			Non-fed			Fed			Non-fed		
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
Minor	4.3%	3.4%	2.3%	16.8%	14.9%	0.6%	0.4%	0.2%	0.8%	9.7%	3.1%	2.4%
Major	1.8%	0.4%	0.4%	2.6%	4.1%	0.1%	0.0%	0.0%	0.0%	4.2%	0.2%	1.1%
Critical	0.1%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.1%

Brands

Brands are used by some producers as a permanent form of animal identification, as they may be helpful in identifying stolen or lost cattle and determining animal ownership. Brands permanently damage the hide and reduce hide value. Branding, either hot or freeze, cause temporary pain to animals. This management practice is considered an animal welfare issue by some people.

Brands are still used in some range cattle for identification. This permanent form of identification serves some value when cattle from multiple owners share common pastures, such as community pastures. All cattle in Canada are identified with a Canadian Cattle Identification Agency (CCIA) ear tag. As well, it is common practice in feedlots to identify cattle with a management tag. These forms of cattle identification are now used in feedlots to individually manage cattle. Cattle are only branded in feedlots if it is required for financing reasons.

In the 2016/17 audit, 12.5% fed cattle and 13.1% non-fed cattle had brands up from 8.9% and down from 23% respectively in 2010/11. On fed cattle, there were fewer hip brands at 4% of the fed cattle, more rib brands at 7.7% and slightly more shoulder brands at less than 1%. Non-fed cattle had fewer brands in 2016/17 at 2.3% hip brands, 10.1% rib brands and 1% shoulder brands. The larger percentage of rib brands on fed cattle and continued higher proportion in non-fed cattle results in the largest economic loss to industry. Multiple brands were observed on 0.3% of cattle in the 2016/17 audit.

The economic loss to the industry because of hide damage due to branding for all cattle was \$1.07/head or \$3.1 million in 2016 compared to \$0.88/head or total \$2.8 million in 2011 and \$15.8 million in 1999.

If cattle must be branded for permanent identification, it is recommended to use a single iron brand and a small brand to reduce animal pain, and to use a shoulder or hip brand rather than a rib brand, to reduce hide losses. Staff should be properly trained on how to use a brand, either the hot or freeze iron brand. The trend world-wide is to eliminate or modify practices that cause pain to animals.

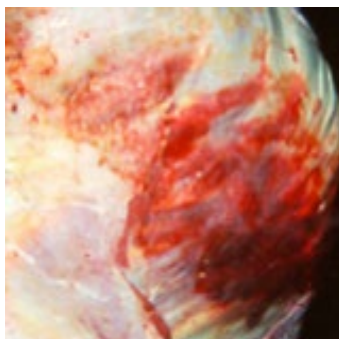


Brands by Location				
% with Brand	2016/17 Audit		2010/11 Audit	
	Fed	Non-fed	Fed	Non-fed
Hip	4.0%	2.3%	5.4%	8.6%
Rib	7.7%	10.1%	3.4%	13.7%
Shoulder	0.9%	1.0%	0.3%	2.4%
Total	12.5%	13.1%	8.9%	23.0%



Processing Floor Audit *(continued)*

Bruising



Bruising is caused by rough cattle handling, poorly designed facilities (sharp corners, protrusions, slippery floors, slamming gates, narrow entry ways, steep loading/unloading docks), horns, poor fat coverage on non-fed cattle, riding of cattle,

wild temperament of cattle, extra handling, under or overcrowding on livestock trucks, too low compartments in trucks, poor driving (slamming on brakes, rapid turns, rapid acceleration), narrow and low truck gates, slippery truck floors.

The number, location, and severity of bruises were recorded on whole hanging carcasses before trimming. Bruises were scored for their number per carcass, location (brisket, chuck, rib, loin, round), and severity. Bruises result in significant trim and devalue primal cuts (minor results in approximately 0.66 lb of trim; major approximately 1.5 lb of trim, and critical over 3.2 lb of trim). Severe bruising, such as that seen in non-ambulatory animals, can result in condemnation of the entire carcass.

In the 2016/17 audit, 32.6% of fed cattle and 63% of non-fed had bruises, compared to 34.0% and 85.7%, respectively in the 2010/11 audit. On fed cattle in the 2016/17 (2010/11) audit, 16.6% (12.5%) of chucks were bruised, 15.5% (14.4%) of loins, 10.0% (9.7%) of ribs and 4.6% (5.8%) of rounds. These values were very similar to those in the previous audit.

On non-fed cattle in the 2016/17 (2010/11) audit, 41.5% (60.4%) of rounds were bruised, 25.0% (38.0%) of loins, 16.8% (22.8%) of ribs, and 16.7% (26.5%) of chucks. The economic loss to the industry in 2016 due to bruises on the carcasses was estimated at \$1.90/head or \$5.55 million compared to \$2.10/head or \$6.7 million in 2011.

Bruising can be reduced by low stress cattle handling, properly designed facilities, and good transportation. Factors to reduce bruising include:

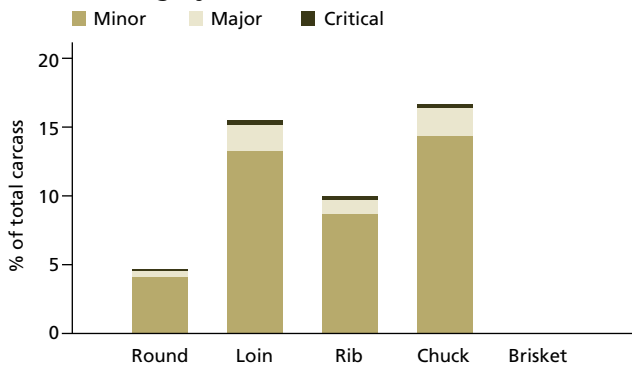
- Properly trained employees who use low stress cattle handling practices
- Drivers who have completed the Canadian Livestock Transport (CLT) Certification program
- Minimal use of prods and sticks
- Reduced noise when handling cattle
- Reduced need for handling
- Well designed facilities, including loading and unloading facilities
- Culling of wild temperament cattle
- Dehorned cattle or use of polled cattle
- Reduce mixing of strange cattle
- Transport physically fit cattle
- Use of special provisions to transport compromised cattle
- Load cattle to optimal density
- Keeping males and females separate
- Using trucks with wide gates
- Keeping trucks in good repair

Bruising Prevalence, % of Total Carcass

	2016/17 Audit			2010/11 Audit		
	UTM	OTM	Total	UTM	OTM	Total
Minor (~.66 lb trim)	29.3%	48.7%	31.8%	26.3%	45.3%	30.2%
Major (~1.5 lb trim)	4.7%	21.4%	6.8%	8.5%	47.9%	16.4%
Critical (>3.2 lb trim)	0.7%	4.2%	1.1%	1.4%	8.1%	2.7%
Total	32.6%	63.0%	36.5%	34.1%	85.7%	44.4%

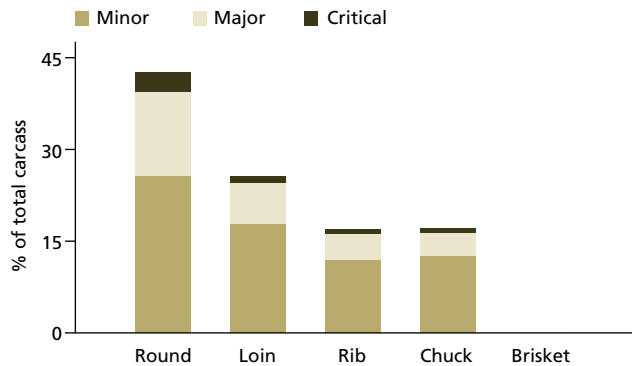


Bruising by Primal on Fed Cattle, 2016/17



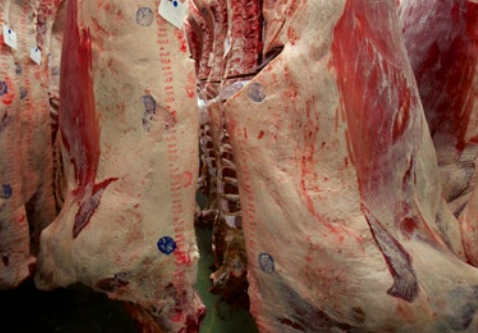
Fed cattle bruising is relatively steady, while non-fed bruising is down substantially from 2010/11. There is still work to be done in reducing non-fed bruising.

Bruising by Primal on Non-Fed Cattle, 2016/17



Condemnations of Whole Carcasses

In 2016/17, the Canadian Beef Grading Agency (CBGA) reported that 0.14% of all carcasses slaughtered were condemned. This compares to the 2010/11 audit reporting 0.25% and the 1999 audit reporting 0.3% carcass condemnation. The 2016 economic loss due to carcass condemnation is estimated at \$3.20/head or \$9.3 million compared to \$3.44/head or \$10.97 million in 2011.



Cooler Audit

Hot Carcass Weights

The slaughter plant target weight range in 2016/17 moved higher to 600-1000 pounds. The 2016/17 industry average weights for steers and heifers were 904 and 824 pounds, respectively. This was up from the 2010/11 industry average weights of 846 and 778 pounds. In the 2016/17 audit 86.3% of fed cattle fell within the target weight category; this compares to 86.6% in the 2010/11 audit and 57.4% in the 1998/99 audit. In the 2016/17 audit, fed cattle off-weight carcasses resulted in a loss of \$20/head or \$47.7 million. This is down from the 2010/11 audit when losses were \$25/head or \$63.3 million and the 1998/99 audit of \$41/head or \$111 million. It should be noted that there are regional difference in off-weight discounts.

Ribeye Area and Fat Depth

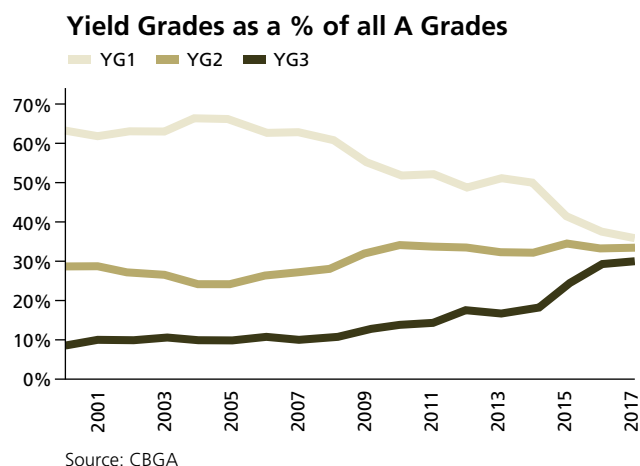
In the 2016/17 audit, average rib-eye areas on youthful cattle was $93.2 \pm 15.30 \text{ cm}^2$. These findings indicate there was a trend overall to increase with respect to the 2010/11 audit ($91.5 \pm 12.70 \text{ cm}^2$), 1998/99 (REA = $90 \pm 13 \text{ cm}^2$), and 1994/95 audit ($84 \pm 12 \text{ cm}^2$).

Extrapolating from the grade fat findings in the 2016/17 audit, the average grade fat for the A grades were 16.6 mm. This is up 76% from the 2010/11 audit of 9.42 mm overall (11.8 mm in Fall, 9.0 mm in Winter and 7.50 mm in Spring).

Carcass Yield Grade

For 2017, CBGA reported that 36% of the fed cattle with A grades had a yield grade of Canada 1 (YG1), 33.5% had a yield grade of Canada 2 (YG2) and 30.4% had a yield grade of Canada 3 (YG3). This compared with 2010/11 CBGA averages of 52.4%, 33.5% and 14.2%, respectively.

There was a significant effect of season on the frequencies of the lean meat yield grades within the A grade population. Spring was the season with the highest percentage of carcasses harvested as YG1, followed by Winter and Fall. This seasonal effect on the yield grade may be a consequence of the predominant backgrounding system in each season, namely calf-fed or yearling-fed, used to raise the cattle. In recent years there has also been a trend in the yield class distribution. The graph below shows the percentage of carcasses in each yield class from 2000 to 2016 based on national data from the CBGA. Since 2004 the percentage of carcasses in the YG1 class has declined while the animals classified as YG3 increased sharply since 2014. A contributing factor to this change has been an increase in carcass weights over time. The average steer carcass weight increased from 857 pounds in 2011 to 892 pounds in 2017.



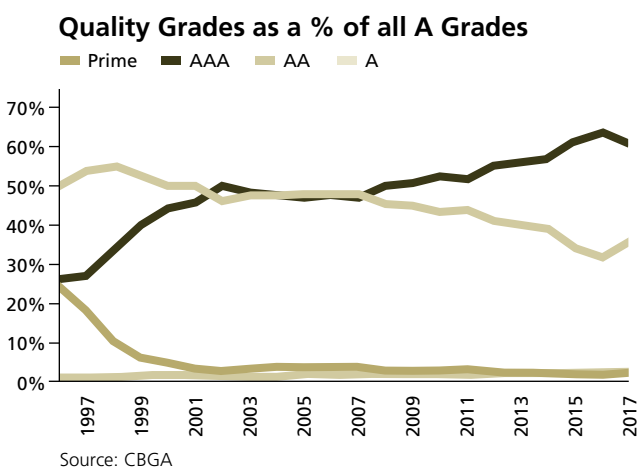
The cost to industry from discounts on yield grades has increased from \$12.57/head or \$32 million in 2010/11 to \$12.81/head or \$33 million in 2016/17 as a higher prevalence was offset by lower discounts.

Canadian Quality Grades

For cattle with A grades in 2016, CBGA reported 2.6% prime, 64.1% AAA, 31.7% AA and 1.5% A. This compares to the 2010/11 CBGA averages of 1.2% prime, 52.5% AAA, 43.4% AA and 2.8% A, showing continued improvement since the last audit in terms of the percentage of carcasses with higher levels of marbling.

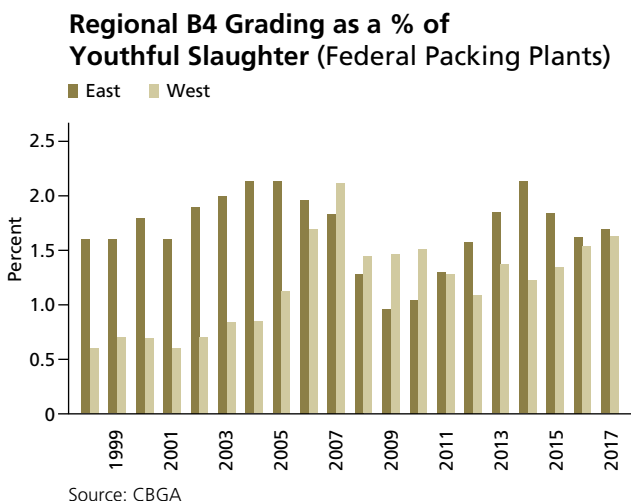
There was a significant effect of season on the quality grade distribution. In the Fall and Spring, the percentage of Canada AA increased whereas in the Winter the proportion of Canada AAA exceeded AA. As for yield grade, the seasonal effect on the quality grade may be a consequence of the predominant backgrounding system used in each season.

The percentage of animals assigned the Canada AAA grade has steadily increased since 2007, with a slight drop in 2017. As noted previously a decrease in the number of carcasses classified as yield grade 1 has also been observed in recent years.



CBGA reported 0.07% of youthful animals as B1 (devoid of marbling) in 2016, steady with 2010/11. In 2016, 0.02% of carcasses were classified as B2 by the CBGA due to yellow fat, up slightly compared to 0.01% in 2010/11. Yellow fat is generally seen as less attractive by consumers in global markets and typically results from finishing animals on grass. Dark cutters (B4) at 1.64% of youthful cattle in 2016 was up from 1.28% in 2010/11 and 0.84% in 1998/99. Regionally dark cutters have varied widely over the last seven years from a low of 1.04% in 2010 to a high of 2.13% in 2014 in the west. The variance in the east has been slightly narrower from a low of 1.09% in 2012 to a high of 1.63% in 2017.

For mature cattle in federally and provincially inspected plants, CBGA reported that 5.02% of graded cows were overfat and consequently received the D4 grade in 2016/17. This was higher than the 3.55% reported in 2010/11 or the 6.30% reported for the 1998/99 audit. D1 cows (good muscling, not overfat) also went up from 1.11 to 2.88% (2016/17) and D3 cows (very thin) went down from 37.1 to 24.4% (2016/17).





Economic Analysis

The 2016/17 processing floor audit estimates an average loss of \$41/head for quality defects on fed cattle and \$23/head for non-fed cattle with a total cost of \$110.9 million for all cattle. This is up 64% for fed cattle (\$25/head in the 2010/11) and up 11% for non-fed cattle (\$21/head) – however total industry losses increased 54% from \$78.8 million in 2011. Progress was made in some areas although a significant increase in the cost of quality defects related to livers and injection site lesions were observed.

The 2016/17 cooler audit estimates an average loss of \$37/head for fed cattle and \$13/head for non-fed cattle for a total industry loss of \$98 million. This is up from the 2010/11 audit with larger losses from yield grade discounts on fed cattle.

Overall the cost of defects has increased 19% to \$78/head on fed cattle and also increased 10% to \$37/head on non-fed cattle since the 2010/11 audit with a combined total cost of \$209 million. Much of the increase is due to a higher prevalence of liver abscesses and discounts on yield grades. Small increases in costs associated with brands, injection site lesions and tag also contributed to the larger losses.

As the value of product and the cost of labour to address these quality defects increases over time – industry needs to stay focused on finding solutions.

The table outlines the results of the economic analysis in a \$/per head and percentage change relative to the 2010/11 audit. Benchmarking of economic parameters is complicated by the price and prevalence changes since the previous audit. Changes in market values of affected product and wage rates to address them as well as industry practices and technological solutions have occurred. Despite these limitations the economic analysis is useful in providing an estimate of the relative cost of various quality defects. These values can be used to help guide future quality enhancement initiatives as well as related research.

Quality Defect Costs per head and % Change Since 2010/11 Audit

	\$/head			% Change		
	Total	Fed	Non-fed	Total	Fed	Non-fed
Processing Floor Audit	\$37.98	\$40.88	\$23.44	+57%	64%	11%
Tag	\$10.21	\$10.55	\$8.51	25%	22%	35%
Horns-Direct Cost	\$0.06	\$0.06	\$0.06	0%	0%	0%
Liver Discounts	\$20.98	\$24.24	\$4.60	124%	121%	83%
Injection Site Lesions	\$0.56	\$0.33	\$1.69	169%	725%	86%
Brands	\$1.07	\$1.04	\$1.24	21%	65%	-36%
Bruising	\$1.90	\$1.46	\$4.14	-10%	22%	-30%
Carcass Condemnations	\$3.20	\$3.20	\$3.20	-7%	-7%	-7%
Cooler Audit	\$33.64	\$36.83	\$13.17	-4%	-9%	8%
Weight Discounts	\$16.35	\$19.60	\$0.00	-18%	-20%	
Yield Grade	\$11.32	\$12.81	\$0.00	11%	2%	
Quality Grade	\$5.96	\$4.42	\$13.17	20%	28%	8%
Total	\$71.62	\$77.71	\$36.61	21%	19%	10%

Conclusions and Next Steps

Processing Floor Audit

Incremental progress is being made with reductions in the prevalence of horns, bruising, and condemnations. Improvements in body condition scores of non-fed cattle have cows back at recommended levels around 3.0. However, the 2016/17 NBQA also identified continued and new challenges in a number of areas. The number of fed cattle with brands increased 9% since the last audit, while non-fed brands are down 23%. This increase is potentially related to theft with record high prices since 2015. There has been a substantial increase in injection site lesions; and while overall prevalence remains small at 4.45% on fed cattle and 13.7% on non-fed cattle this is a trend to monitor.

The most significant issue identified by the processing floor audit was the increase in the incidence of A+ livers in fed cattle. In the 2016/17 audit 19.3% of livers from fed cattle scored A+ on the Elanco scoring system compared to 9.9% in the 2010/11 audit and 2% in 1999. The high rate of abscesses since the 2010/11 audit has persisted and increased effort is needed to reduce their level through nutritional management and/or pharmaceutical interventions.

Cooler Audit

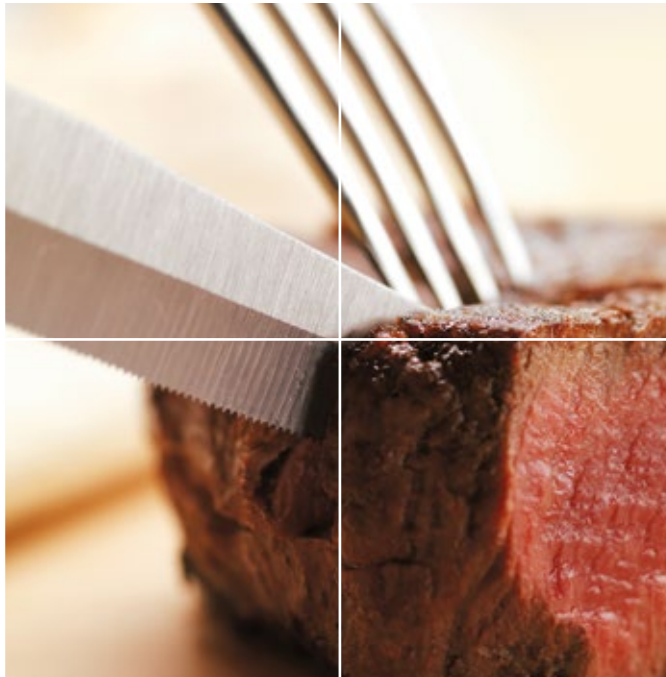
The Canadian beef and cattle industry seeks to achieve the dual objectives of increasing carcass yield and simultaneously enhancing eating quality. While the beef grading system is not yet able to directly consider key attributes influencing eating quality such as tenderness, it does evaluate marbling. It is well known that marbling is the last fat to be deposited and has a positive effect on the eating quality of some cuts. However, there is a temporal relationship between muscle and fat deposition and fat will continue to accumulate without increases in muscle at higher live weights. The ideal carcass would be one that meets both a high quality and yield grade (e.g. Prime or AAA, Y1 yield grade). In 2017, 14.6% of A grades were AAA/Y1 compared to 19.1% in 2011.

Some of the trends observed in the present audit compared with previous audits include the improvement in the carcass quality grade and rib-eye areas. It appears the improvements in the marbling scores may have affected lean meat yield. This trend may lead towards over-finished cattle and less efficiency in the production systems.

The incidence of dark cutters (B4 grade) has remained high since the 2010/11 audit, resulting in losses of \$10.6 million to the cattle sector. Methods to assess the B4 grade using computer vision grading instruments will assist in determining any trend in the most objective manner in future years.

Next Steps

The National Beef Quality Audit continues to provide important feedback to Canadian cattle producers around quality defects which impact the carcass. Increasing the frequency of audits and associated feedback to the supply chain is a priority. Technology transfer efforts to communicate best practices through programs such as Verified Beef Production™ (Plus) will help support continued progress.



A Beef Research Cluster Initiative

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