NATIONAL BEEF QUALITY AUDIT – 2016: SURVEY OF CARCASS CHARACTERISTICS THROUGH INSTRUMENT GRADING ASSESSMENTS

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Abstract – Instrument grading data were collected from 18 beef processing facilities from January to December 2016 (*n* = 4,544,635 carcasses). Mean USDA yield grade (YG) factors were YG (3.1), adjusted fat thickness (1.37 cm), *M. longissimus* area (88.9 cm^2), hot carcass weight (393.6 kg), and kidney, pelvic, and heart fat (1.9%). Frequency distribution of YG were YG 1 (9.5%), YG 2 (34.6%), YG 3 (38.8%), YG 4 (14.6%), and YG 5 (2.5%). Monthly mean marbling scores were January (Small^{73}), February (Small^{80}), March (Small^{81}), April (Small^{77}), May (Small^{70}), June (Small^{67}), July (Small^{70}), August (Small^{75}), September (Small^{74}), October (Small^{76}), November (Small^{83}), and December (Small^{79}). Instrument grading data in the National Beef Quality Audit reflect its increasing predominance throughout the U.S. fed beef industry.

Key Words – beef, quality, instrument grading

I. INTRODUCTION

Following the first National Beef Quality Audit (NBQA) in 1991, successive audits were conducted about every 5 years, and NBQA-2011 was the first to include the instrument grading assessments. Instrument grading was approved for official United States Department of Agriculture (USDA) measurement of *M. longissimus* muscle (LM) area in 2001, as well as yield grade (YG) and marbling score in 2007 [1]. These data represent an overview of the current fed beef industry and the seasonal trends associated with carcass traits, value, and quantity determining characteristics.

II. MATERIALS AND METHODS

Instrument grading data (*n* = 4,544,635 carcasses) were collected from 5 beef processing corporations, with a total of 18 facilities over a 12-mo period (January 2016 to December 2016). Data were collected from one week of production each month. Data collected included: harvest date, grade date, gender, breed type, marbling score, defects (hard bone, blood splash, dark cutter), certified programs, adjusted fat thickness (AFT), LM area, hot carcass weight (HCW), and kidney, pelvic, and heart (KPH) fat percentage.

All analyses were performed using JMP Software and Microsoft Excel for Mac 2016. The Fit Y by X function was used for analysis of variance, and least squares means comparisons were conducted using Student's t-test. Correlations were determined using the multivariate functions.

III. RESULTS AND DISCUSSION

Mean USDA YG was 3.1 with a distribution of YG 1 (9.5%), YG 2 (34.6%), YG 3 (38.8%), YG 4 (14.6%), and YG 5 (2.5%). The YG distribution from NBQA-2011 was YG 1 (15.7%), YG 2 (41.0%), YG 3 (33.8%), YG 4 (8.5%), and YG 5 (0.9%) [2]. Mean YG factors were AFT (1.37 cm), LM area (88.9 cm^2), HCW (393.6 kg), and KPH (2.1%). Mean YG factors from NBQA-2011 were AFT (1.20 cm), LM area (88.45 cm^2), and HCW (371.28 kg) [2]. The increase in HCW from NBQA-2011 was the most notable. NBQA-2011 data reported 95.1% of carcasses within the HCW range common to USDA certified programs (272.2 to 453.6 kg), as compared to 88.4% in the current study [2].

The lowest percentage of YG 4 (11.08%) and 5 (1.47%) were observed in May of 2016. NBQA-2011 also reported the lowest percentage of YG 4 (6.9%) and YG 5 (0.6%) in May of 2011 [2]. The greatest percentage of YG 4 (16.76%) and YG 5 (2.94%) occurred in January of 2016, which was consistent with January 2011 (YG 4: 9.1%, YG 5: 1.1%) [2]. Throughout the entirety of the year, frequency of YG 4 and YG 5 carcasses increased substantially from NBQA-2011 (+5.6 percentage points and +1.4 percentage points, respectively) [2]. Mean AFT was at its minimum in May of 2016 (1.26 cm) and its maximum in November 2016 (1.47 cm). Native heifer carcasses possessed the thickest AFT ($P < 0.05$) through the entire year, while dairy steer and dairy heifer carcasses consistently had the lowest AFT ($P < 0.05$).

Mean LM area was the smallest (86.69 cm^2) in June 2016, and reached its peak (91.38 cm^2) in November 2016. Native steer carcasses had the largest LM area throughout the year, reaching the highest point (93.99 cm^2) in November 2016. Mean HCW reached its lightest point (384.8 kg) in May 2016, and its heaviest point (406.5 kg) in October 2016. The lowest mean HCW from NBQA-2016 (384.8 kg) was greater than the highest mean HCW from NBQA-2011 (381.3 kg). Native steer carcasses were heaviest HCW ($P < 0.05$) over all months, and reached their heaviest (422.3 kg) in November 2016. Dairy heifer carcasses possessed the lightest HCW and reached their lightest weight (345.1 kg) in September 2016.

Of all carcasses surveyed, steers accounted for 65.9% and heifers 34.1%. Mean marbling score was Small[75], whereas mean marbling score in NBQA-2011 was Small[49] [2]. Carcasses grading Prime on Monday (6.43%) was higher than the average frequency of carcasses grading Prime overall (4.2%). Prime reached its highest frequency (5.0%) in November 2016, and lowest (3.0%) in August 2016. Choice was highest (72.6%) in February 2016, and lowest (68.7%) in August 2016. Mean marbling score reached its peak (Small[80]) in November 2016, and its lowest point (Small[67]) in June 2016. Dairy heifer carcasses possessed the highest marbling score ($P < 0.05$) throughout the year, with the highest mean marbling score (Modest[40]) in September 2016. The highest incidence of dark cutters (0.74%) occurred in October 2016, and the lowest (0.33%) in January 2016.

IV. CONCLUSION

The instrument grading portion of the NBQA permitted the unique opportunity to evaluate trends in carcass traits over an entire year. Mean AFT and HCW decreased to reach the lowest point in May 2016, and continued to increase through December 2016. Similarly, mean marbling score reached its peak in March 2016, declined to its lowest point in June 2016, and increased through the remainder of the year. Current trends are remarkably similar to those observed in NBQA-2011.

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