Technical Note: Comparison of USDA Yield Grading Characteristics of Steer and Heifer Carcasses Evaluated by Subjective and Objective Methods

(T. J. McEvers et al., West Texas A&M University, Merck Animal Health and Oklahoma State University)
The Professional Animal Scientist 28 (2012):477-481

Five studies involving beef steers (n = 2,562) and heifers (n = 2,440) were compiled to compare yield grade captured using video image analysis technology or USDA grading personnel. No differences in distribution of Yield Grade 1, 2 or 3 were detected between evaluation methods; however, the proportions of Yield Grade 4 and 5 carcasses were lower when evaluated by USDA grading personnel.

- Carcass classification disagreement by 1 (i.e., Yield Grade 1 vs. Yield Grade 2) and 2 (i.e., Yield Grade 1 vs. Yield Grade 3) YG categories occurred at a rate of 36% and 3%, respectively.
- Moreover, using logistic regression to calculate the probability of agreement, the subset of Yield Grade 4 carcasses was further evaluated. At a video image analysis-assessed yield grade of 4.00, the probability of USDA assessment of Yield Grade 4 was 57% and increased to 86% when video image analysis assessed a yield grade of 4.99.

In summary, minimal differences between the two yield grade assessment methods were observed for Yield Grades 1, 2 and 3; however, carcasses assessed by USDA had lower yield grade values than those calculated using video image analysis technology for Yield Grade 4 and 5 carcasses.

Impact of Clover Additions to Toxic or Nontoxic Endophyte-Infected Tall Fescue on Animal Performance and Economics of Stocker Programs

(P.A. Beck et al., University of Arkansas and The Samuel Roberts Noble Foundation, Inc., Ardmore, Oklahoma 73401)
The Professional Animal Scientist 28 (2012):433-442

During the autumn and spring grazing periods of four years, performance of growing steers grazing six 1.8 acres toxic endophyte-infected tall fescue was compared with the nontoxic endophyte-infected tall fescue cultivars Jesup MaxQ (n = 6) and Texoma MaxQII, either with nitrogen applied in autumn and spring (n = 3 pastures per cultivar) or grown in combination with white clover (n = 3 pastures per cultivar). Growing steers (n = 252, body weight = 505 lb in the autumn, and n = 343, body weight 505 lb in the spring) were stocked to pastures at 1.64 steers/acre in the autumn, whereas initial stocking rates were adjusted to match forage mass each spring. Enterprise budgeting was used to compute net returns.
• Performance of steers grazing nontoxic endophyte-infected tall fescue was increased by 0.46 lb/d in the autumn and 1.26 lb/d in the spring compared with toxic endophyte-infected tall fescue.
• Cows did not affect average daily gain in the autumn but increased average daily gain in the spring by 0.44 lb/d; however, stocking rates and grazing days per acre were decreased with clovers regardless of season.
• Interseeding clovers into toxic endophyte-infected tall fescue pastures had no effect on body weight gain per acre.
• Body weight gain per acre for nontoxic endophyte-infected tall fescue was 79% greater than toxic endophyte-infected tall fescue, and nontoxic endophyte-infected tall fescue with nitrogen produced 17% more body weight gain per acre than clover.
• Neither nitrogen nor clover affected body weight gain per acre of toxic endophyte-infected tall fescue pastures.
• Although clover pastures were not as productive, net returns were increased because of reduced costs of production.

Using clover resulted in similar improvements in average daily gain for both toxic endophyte-infected and nontoxic endophyte-infected tall fescue pastures. Profitability of nontoxic endophyte-infected tall fescue-based stocker programs was at a minimum three times greater than toxic endophyte-infected tall fescue-based stocker programs in any scenario.

**Evaluation of Different Methods of Cattle Hip Height Data Collection**

(J.A. Parish et al., Mississippi State University)

Reporting accurate cattle hip height is important for calculation of frame score and expected progeny differences. The objectives of this study were to
1) evaluate the accuracy of the following hip height collection methods: visual appraisal using a premeasured board placed on the opposite side of the animal from the observer; measurement of the difference in distance down to the hips from the distance down to the floor with a descending tape placed above the animal and measurement using an altitude stick; 2) determine if head restraint affects hip height data accuracy; and 3) assess reproducibility of hip height measurements using different observers. Hip heights were collected on cows (n = 329) and calves (n = 341).

• Cow hip height was greater for measurement of the difference in distance down to the hips from the distance down to the floor with a descending tape placed above the animal than visual appraisal using a premeasured board placed on the opposite side of the animal from the observer and an altitude stick (53.3, 53.7 and 52.7 inches, respectively).
• There was a significant interaction for restraint × chute score for cows and calves.
• Hip height was greater for calves with heads unrestrained (43.4 inches) compared with restrained (42.7 inches) in a squeeze chute.
• As chute score increased (1, 2, 3), calf hip height (43.5, 43.2, 42.4 inches, respectively) decreased.
• Pearson correlation coefficients between observers were significant and all 0.86 or greater, indicating that the measurements were quite reproducible.

Hip height measurements can vary due to collection method, head restraint and chute score.

**Supplemental Trace Minerals (Zinc, Copper, Manganese and Cobalt) as Availa-4 or Inorganic Sources for Shipping-Stressed Beef Cattle**

(E.B. Kegley et al., University of Arkansas and Zinpro Corporation)

Male beef calves (n = 288, average body weight 525 lb) were obtained from sale barns. Within each set (n = 3), calves were allocated randomly within four weight blocks to pen (2 pens/block; 11 to 13 calves/pen). Pens within a block were assigned randomly to treatment. During the 42-d backgrounding period, calves were on 0.95-acre paddocks, had ad libitum access to bermudagrass hay and were fed corn-soybean meal supplements that served as the carrier for treatments. Treatments consisted of supplemental Zn (360 mg/d), Cu (125 mg/d), Mn (200 mg/d) and Co (12 mg/d) from inorganic (zinc sulfate, manganese sulfate, copper sulfate and cobalt carbonate) or organic (zinc amino acid...
complex, manganese amino acid complex, copper amino acid complex and cobalt glucoheptonate; Availa-4, Zinpro Corporation, Eden Prairie, Minnesota) sources.

- Calves supplemented with organic trace mineral sources had a greater final weight (598 vs. 589 lb for organic and inorganic, respectively, and average daily gain 1.70 vs. 1.46 lb/d for organic and inorganic, respectively) than calves supplemented with isolevels of trace minerals from inorganic sources.

- Supplementation with organic trace minerals tended to reduce the percentage of calves that received a second antibiotic treatment.

- When calves that had initial antibodies to infectious bovine rhinotracheitis virus (IBRV) were removed, the naive calves supplemented with inorganic trace minerals had a greater antibody response to IBRV vaccination.

Organic trace mineral supplementation improved growth performance of shipping-stressed calves compared with those fed equivalent levels of inorganic sources.

**ALPHARMA BEEF CATTLE NUTRITION SYMPOSIUM: Implications of Nutritional Management for Beef Cow-Calf Systems**

(R. N. Funston et al., University of Nebraska and USDA, ARS, Fort Keogh Livestock and Range Research Laboratory, Miles City, Montana)

*Journal of Animal Science 2012. 90:2301-2307*

The beef cattle industry relies on the use of high-forage diets to develop replacement females, maintain the cow herd and sustain stocker operations. Forage quantity and quality fluctuate with season and environmental conditions. Depending on class and physiological state of the animal, a forage diet may not always meet nutritional requirements, resulting in reduced average daily gain or body weight loss if supplemental nutrients are not provided. It is important to understand the consequences of such body weight loss and the economics of providing supplementation to the beef production system.

Periods of limited or insufficient nutrient availability can be followed by periods of compensatory body weight gain once dietary conditions improve. This may have less impact on breeding animals, provided reproductive efficiency is not compromised, where actual body weight is not as important as it is in animals destined for the feedlot. A rapidly evolving body of literature is also demonstrating that nutritional status of cows during pregnancy can affect subsequent offspring development and production characteristics later in life. The concept of fetal programming is that maternal stimuli during critical periods of fetal development have long-term implications for offspring.

Depending on timing, magnitude and duration of nutrient limitation or supplementation, it is possible that early measures in life, such as calf birth body weight, may be unaffected, whereas measures later in life, such as weaning body weight, carcass characteristics and reproductive traits, may be influenced. This body of research provides compelling evidence of a fetal programming response to maternal nutrition in beef cattle.

Future competitiveness of the U.S. beef industry will continue to be dependent on the use of high-forage diets to meet the majority of nutrient requirements. Consequences of nutrient restriction or supplementation must be considered not only on individual animal performance but also the developing fetus and its subsequent performance throughout life.

**Relationships Between Feed Efficiency, Scrotal Circumference and Semen-Quality Traits in Yearling Bulls**

(A. N. Hafla et al., Texas A&M University, Oklahoma State University, Kansas State University and Ohio State University)

A meta-analysis was conducted to examine phenotypic relationships between feed efficiency, scrotal circumference and semen-quality traits in yearling bulls. Data evaluated were obtained from five postweaning trials involving Angus (n = 92), Bonsmara (n = 62) and Santa Gertrudis (n = 50) bulls fed diets that ranged from 1.70 to 2.85 Mcal ME/kg DM. Following an adaptation period of 24 to 28 d, feed intake was measured daily and body weight measured at 7- or 14-d intervals during the 70-77 d trials. Ultrasound carcass traits (12th rib backfat thickness, backfat; longissimus muscle area) and scrotal circumference were measured at the start and end of each trial. Semen samples were collected by electroejaculation within 51 d of the end of the trials, when age of bulls averaged from 365 to 444 d, and were evaluated for progressive sperm motility and morphology. Residual feed intake was calculated as
the difference between actual dry matter intake and expected dry matter intake from linear regression of dry matter intake on average daily gain and mid-test BW\(^{0.75}\), with trial, trial by average daily gain, and trial by mid-test BW\(^{0.75}\) as random effects.

- Across all studies, bulls with low residual feed intake phenotypes consumed 20% less dry matter intake and had 10% less backfat but had similar average daily gain, scrotal circumference and semen-quality traits compared to high residual feed intake bulls.
- Gain-to-feed ratio was strongly correlated with average daily gain (0.60) and weakly correlated with initial body weight (-0.17) and dry matter intake (-0.26).
- Residual feed intake was not correlated with average daily gain, initial age or body weight but was correlated with dry matter intake (0.71), gain-to-feed ratio (-0.70) and backfat (0.20).
- Initial scrotal circumference (-0.20), gain in scrotal circumference (-0.28) and percent normal sperm (-0.17) were correlated with gain-to-feed ratio, but only sperm morphology was found to be weakly associated with residual feed intake (0.13).

These data suggest that residual feed intake is not phenotypically associated with scrotal circumference or sperm motility but is weakly associated with sperm morphology.

**Relationships Between Feedlot Health, Average Daily Gain and Carcass Traits of Angus Steers**

(C. D. Reinhardt et al., Kansas State University, University of Nebraska and Certified Angus Beef)  

Angus steers (n = 17,919) fed at a single feedlot in southwestern Kansas between 1997 and 2007 were used to evaluate the relationships between feedlot health, average daily gain and carcass traits. Cattle were not commingled and were predominantly preconditioned and backgrounds before shipment to the feedlot.

- Morbidity decreased and average daily gain increased with increasing initial body weight; percentage Choice was related (linear) to arrival body weight in steers that were not treated for disease, but with only 2.8% units separating the least (< 650 lb) and the greatest percentage Choice groups (827-902 lb).
- There were linear and quadratic decreases in average daily gain, final body weight, hot carcass weight, quality grade and yield grade with increased number of times treated.
- With decreasing quality grade, there were linear and quadratic decreases in average daily gain, final body weight, hot carcass weight and yield grade.
- Increasing yield grade from YG 1 and 2 to YG 3 increased percentage Choice by 16.1 points, and there was an additional 1.6-point increase moving to YG 4 and 5 (linear and quadratic).

Average daily gain was very similar among cattle that graded Prime, Choice and Select, suggesting that performance and quality grade are not genetically linked; instead, much of the difference in quality grade can be explained by differences in yield grade.

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Tom R. Troxel  
Professor and Associate Department  
Head - Animal Science

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