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Carcass Traits and Consumer Acceptability of Striploin Steaks From Band-Castrated, Intratesticular Zinc-Injected or Sexually Intact Beef Cattle

J.J. Ball et al., University of Arkansas, Division of Agriculture, Department of Animal Science; and Department of Agricultural Sciences, West Texas A&M *Translational Animal Science* 3:93-101; <https://doi.org/10.1093/tas/txy093> (January 2019)

Alternative castration methods are of importance to producers because consumers are increasingly sensitive toward painful animal management practices. At present, nearly all male cattle remaining as bulls upon arrival at U.S. feedlots are castrated (92.5 percent), and of the castrated bulls, the most popular methods are surgical (50.4 percent) and banding (42.9 percent), with no reported use of chemical castration. Reproductive sterilization utilizing zinc gluconate injection in the testes has been evaluated in companion animals as an alternative to traditional neutering methods; however, zinc injection has been minimally explored in beef cattle as an alternative to traditional castration methods. The objective of this study was to determine the effects of castration (complete removal of scrotum and testicles using a band) and intratesticular zinc injection upon feedlot arrival on carcass traits and consumer acceptability of striploin steaks obtained from carcasses of male beef cattle.

- One hundred and eighty beef bulls (BW = 741 ± 24 pounds) were blocked by body weight and assigned randomly to one of three treatments on day 0: 1) INJ; received 1 mL (100 mg Zinc) of a Zinc solution in each testis, 2) BAN; received blood-restrictive rubber band placed upon the

dorsal aspect of the scrotum, and 3) BUL; bulls with testicles remaining intact.

- Cattle were harvested by block on three separate dates when blocks reached similar body weight and visual subcutaneous fat thickness depth. Striploins were removed from the left carcass sides, vacuum packaged and aged for 14 days, and then frozen at -4°F. Frozen striploins were sliced into 1-inch-thick steaks and remained frozen until analyses. Steaks (n = 3/animal) were used to assess consumer acceptability via consumer taste panel (n = 152 panelists), Warner-Bratzler shear force, percentage cook loss and cooked color values.
- **Results:** The percentage of cattle grading USDA Choice or better and overall consumer acceptability was increased for BAN compared with INJ, whereas INJ and BUL cattle had greater hot carcass weight, longissimus muscle area and crest height than BAN. Hence, INJ possessed similar carcass characteristics and consumer acceptability compared with BUL. Shear force, cooking loss and instrumental cooked color values were minimally affected by intratesticular zinc injection.

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- **Results:** The INJ treatment evaluated in the present study may be a viable option for sterilization, but not castration of more mature beef cattle upon feedlot entry because meat quality and consumer acceptability were more similar to BUL than BAN.

However, INJ may have value in a natural market setting that does not allow the use of growth implantation, places merit on carcass yield rather than quality, and where sterilization is desirable.

Weaning Weight Trends in the U.S. Beef Cattle Industry

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Calf body weight at weaning is an important measure of cow-calf enterprise productivity because calf sales represent 80 to 90 percent of annual gross income in operations marketing their calves at or near the time of weaning. Management modifications, coupled with selection for increased weaning body weight throughout the U.S. beef cattle industry, has resulted in dramatic increases in weaning body weight over the past 44 years. In fact, national cattle evaluation genetic trends suggest the rate of selection for increased body weight at weaning has been steady in most breeds since about 1980. Breed association records document increases in weaning body weight adjusted for calf age, age of dam and sex. For example, weaning body weight of Angus bulls and heifers has increased 39 and 40 percent, respectively, from 1972 to 2016. Similarly, fed steer and heifer carcass weights continue to increase steadily. The objective of this study was to characterize trends in calf body weight at the time of weaning in commercial cow-calf enterprises.

- This study included three time-series data sets that recorded calf body weight at weaning in U.S. commercial cow-calf operations. The first time series of data contained weaning body weight summaries from four enterprise analyses and production performance record systems for the years of 1991 through 2015. Farming and ranching operations participating were primarily located in Kansas, North Dakota, Texas, New Mexico, Oklahoma, Minnesota, South Dakota, Utah, Missouri, Nebraska, Wisconsin and Michigan.
- The second time series of data included forecasted mean delivery body weight for lots of beef calves offered for sale through Superior Livestock Auction (SLA) video sales. Only lots of calves that were identified as “nonweaned” were included in the data set. Calves in this data series were removed from their dams at the time of delivery. Thus, the forecasted delivery body weight is an estimate of weaning body weight. Annual means of forecasted delivery date and body weight were calculated for lots of beef calves offered for sale between 1995 and 2016. The SLA data were restricted to two regions of the United

States, by sale and delivery month within each region and by implant status (implanted or not implanted).

- The north central/Rocky Mountain region (NC) included lots of calves originating from the states of Colorado, Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wisconsin and Wyoming. Data from this region were further restricted to lots offered for sale during the months of June, July and August and delivered in October or November each year.
- The south central region (SC) included data from the states of Arizona, Kansas, Missouri, New Mexico, Oklahoma and Texas. Data from this region were further restricted to lots offered for sale during the months of June, July, August and September and delivered during the months of September, October and November each year.
- The third time series of data included mean unadjusted and 205-day adjusted weaning body weight for 147,086 beef calves reported to the Alabama Beef Cattle Improvement Association (BCIA) since 1983. Data from commercial operations reporting to the Alabama BCIA consisted of both spring and fall calves from 1983 to 2017. Data from 1986 were excluded from analysis due to the low number of operations reporting that year.
- **Results:** Weaning body weight and projected delivery body weight are no longer increasing in the North. Given stabilized weaning body weight in the North, stabilized age-adjusted and unadjusted weaning body weight in Alabama, and slowing increase in weaning body weight in the breed association data, we hypothesize that projected delivery body weight in the SC region will plateau eventually. Consequently, commercial cow-calf producers should monitor progress in weaning body weight as well as enterprise cost of production. Assuming lack of significant progress in calf body weight at weaning, efforts to enhance enterprise profitability should focus on reducing cost of production and capturing value of genetic potential for superior postweaning performance.

Performance-Enhancing Technologies for Steers Grazing Tall Fescue Pastures With Varying Levels of Toxicity

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Fescue toxicosis is a term used to qualify the clinical disease associated with reduced dry matter (DM) intake, reduced average daily gain (ADG) and elevated body temperature when cattle consume tall fescue forage containing mycotoxins produced by the *Epichloë coenophiala* fungus. Several approaches to alleviate fescue toxicosis have been studied including those made at the plant level by incorporating complementary legumes or fescue replacement and those made at the animal level including treating cattle with various pharmacological compounds or providing supplemental dietary nutrients. A meta-analysis of research results indicated that cattle grazing toxic tall fescue pastures respond to growth promoting implants, medicated feed additives and feed supplementation. Therefore, the objective of this study was to evaluate the cumulative response of providing a growth promoting implant, ionophore and supplementation with a digestible fiber-based feed provided to growing cattle grazing tall fescue pastures with a range of toxicity based on ergovaline (EV) concentration.

- The experiment was conducted over two grazing seasons (fall for 91 days and spring for 84 days). Steers (n = 80 within season, body weight [BW] = 433 ± 34 pounds [fall] and 257 ± 11 pounds [spring]) were stocked at 1 and 1.5 calves/acre in fall and spring, respectively, to 16 pastures with varying levels of toxicity based on interim ergovaline (EV) concentration within season.
- Pastures were assigned to either mineral (MIN, n = 8) only management (MGMT) or a cumulative MGMT (CM, n = 8). The CM treatment included an implant containing 40-mg trenbolone acetate, 8-mg estradiol and 29-mg tylosin tartrate (Component TE-G with Tylan, Elanco Animal Health, Greenfield, IN), 150 mg/calf daily monensin (Elanco Animal Health) and 1 percent body weight of a 50:50 corn gluten feed:soybean hull supplement (as-is basis).
- **Results:** Cumulative management strategies including growth-promoting implant, ionophore and supplemental feeding offer a best management practice solution to improve the welfare and weight gain of growing cattle grazing toxic tall fescue. Further research is needed to evaluate this program at varied stocking rates and in combination with dilution of endophyte-infected fescue pastures with other nontoxic grasses or legumes.
- **Results:** In addition, carry-over effects of cumulative management strategies on calf performance throughout the feedlot finishing phase of production and carcass composition need assessment to establish protocols for cattle producers that stocker cattle on fescue pastures and market after the stocker phase of production or retain ownership through feedlot finishing.

Anti-Mullerian Hormone and Follicle Counts as Predictors of Superovulatory Response and Embryo Production in Beef Cattle

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Since the development of cattle superovulation and nonsurgical embryo recovery in the 1970s, the unpredictability and variability of the superovulatory response has remained a major obstacle. Hasler reviewed developments that have occurred the past 40 years in the cattle embryo transfer industry and reported that the average number of transferrable embryos has remained essentially unchanged at about six transferable embryos per superovulation and embryo collection. While some females consistently produce a number of embryos, others of similar age, breed and management perform poorly.

Anti-Mullerian hormone (AMH) is a glycoprotein that is expressed in granulosa cells of growing follicles. Secretion of AMH is greatest in 2 to 5 millimeter follicles, which represent the pool of follicles that would likely respond to superovulatory treatment. Anti-Mullerian hormone has been classified as a good predictive marker of the ovarian response to follicular stimulation for oocyte retrieval and in vitro embryo production, as well as an endocrine marker that could help predict superovulatory responses of cows. The present study was conducted to further investigate the use of AMH and/or follicle counts as a predictor of

subsequent superovulatory response and embryo production in beef cows.

- A total of 79 cows, including 31 Angus, 2 Chianina, 10 Polled Hereford, 1 Maine-Anjou, 15 Shorthorn, 3 Simmental and 17 crossbred of various breeds were housed at the Food Animal Veterinary Services donor care facility located in Rensselaer, Indiana. The embryo donors consisted of 14 yearling to 2-year-old heifers, 24 head of 3- to 5-year-old cows, 27 head of 6- to 8-year-old cows and 14 head of 9- to 13-year-old cows. Donor body condition score (BCS; 1 to 9 scale) ranged from 4 to 8 and averaged 6.0.
- Before the initiation of superovulation, ultrasonography was used to scan the ovaries of each donor to record the number of 3- to 5-millimeter follicles present. Concurrent with ultrasonography, a 10-milliliter blood sample was collected. After clotting and centrifugation, recovered serum was placed in 5-milliliter polypropylene tubes and stored in a chest freezer at -60°F to -68°F until analysis for AMH.
- **Results:** This study confirms that relative AMH level is positively correlated with number of small antral follicles in the ovaries of cows and might be used to either predict superovulatory response or possibly adjust superovulatory regimen to improve super-ovulatory response. Antral follicle counts at the initiation of superovulatory treatments might be a more practical alternate to AMH for embryo transfer practitioners to use in predicting super-ovulatory response.
- **Results:** Further study is needed to determine the effectiveness of using either AMH assay or follicle counts to adjust superovulatory regimens for improved response. For example, it might be advisable to extend the time of gonadotropin treatment for individuals with lower follicle counts in order to improve response. Likewise, the gonadotropin dose or duration of treatment might be reduced in individuals with a large number of follicles to avoid overstimulation, which often results in poor embryo quality.

Articles were edited for length and style.



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