 Associations Between the Distance Traveled From Sale Barns to U.S. Commercial Feedlots and Overall Performance, Risk of Respiratory Disease and Cumulative Mortality in Feeder Cattle During 1997 to 2009

(Cernicchiaro, N. et al. 2012. Kansas State University, Manhattan, Kansas)
http://jas.fass.org/content/early/2012/01/13/jas.2011-4599

Most beef cattle are transported at least once during their lives, and this potentially stressful practice may impact subsequent health and performance. The objective of this retrospective study was to determine potential associations between distance traveled during transportation with health and performance parameters in cattle cohorts (n = 14,601) that arrived to 21 U.S. commercial feedlots from 1997 to 2009. Cattle were transported a median of 343 miles from origin to feedlot with a mean of 434 miles.

- The mean cumulative BRD morbidity was 4.9% (median = 1.1%; range: 0 to 100%), whereas the mean cumulative mortality due to all causes was 1.3% (median = 0.8%; range: 0 to 28.7%).
- Heavier weight cattle showed significantly lower incidence risk of BRD morbidity and overall mortality compared to their lighter counterparts traveling the same distances.
- Male cohorts showed significantly higher risks of BRD morbidity and overall mortality across different categories of distance traveled compared to female cohorts.
- Increasing distance traveled affects BRD morbidity similarly for cattle arriving to the feedlot during winter, summer and fall months.
- A significantly higher risk of BRD morbidity in cattle arriving during summer (July through September) months was identified after traveling distance longer than 466 miles compared to cattle arriving during winter months traveling the same distances.

Knowledge of the distance traveled during transportation could allow a more precise prediction of cattle feedlot health and performance.

Effects of Weight Loss During Transit From Sale Barns to Commercial Feedlots on Health and Performance in Feeder Cattle Cohorts Arriving to Feedlots From 2000 to 2008

(Cernicchiaro, N. et al. 2012. Kansas State University, Manhattan, Kansas)
http://jas.fass.org/content/early/2012/01/13/jas.2011-4600

Weight loss during transport, or shrink, is a common occurrence in feeder cattle that results from a physiological, complex process. Operational data from 13 U.S. commercial feedlots (n = 16,590 cattle cohorts) were used to quantify how shrink was associated with bovine respiratory disease (BRD).
morbidity and overall mortality risks, hot carcass weight and average daily gain in feeder cattle cohorts arriving to feedlots during 2000 to 2008.

• The median shrink among the study cohorts was 3.0%, with a mean of 2.4%.
• The mean cumulative BRD morbidity was 10.0% (median = 5.8%; range 0 to 100%), and the mean overall cumulative mortality was 1.3% (median = 0.9%; range: 0 to 25.6%).
• The mean and median number of days on feed of cohorts experiencing initial BRD cases was 143 and 150 d (range = 23 to 288 d).
• The effects of shrink were significantly associated with BRD morbidity, overall mortality, hot carcass weight and average daily gain, and these effects were significantly modified by gender, season and mean arrival weight of the cohort.

Associations Between Weather Conditions During the First 45 Days Following Feedlot Arrival and Daily Respiratory Disease Risks in Autumn-Placed U.S. Feeder Cattle
(Cernicchiaro, N. et al. 2011. Kansas State University, Manhattan, Kansas)
http://jas.fass.org/content/early/2011/12/01/jas.2011-4657.abstract?papetoc

Data on associations between weather conditions and bovine respiratory disease (BRD) morbidity in autumn-placed feedlot cattle are sparse. The goal was to quantify how different weather variables during corresponding lag periods (considering up to seven days prior to the day of disease measure) were associated with daily BRD incidence during the first 45 d of the feeding period, based on a post-hoc analysis of existing feedlot operational data. Our study population included 1,904 cohorts of feeder cattle (representing 288,388 total cattle) that arrived to nine U.S. commercial feedlots during September to November in 2005 to 2007.

• There were 24,947 total cases of initial respiratory disease (animals diagnosed by the feedlots with BRD and subsequently treated with an antimicrobial).
• The mean number of BRD cases during the study period (the first 45 d after arrival) was 0.3 cases/day/cohort (range = 0 to 53.0), and cumulative BRD incidence risks ranged from 0 to 36% within cattle cohorts.
• Results indicate that several weather factors (maximum wind speed, mean wind chill temperature and temperature change in different lag periods) were significantly associated with increased daily BRD incidence, but their effects depended on several cattle demographic factors (month of arrival, BRD risk code, weight class and cohort size).
• In addition, month and year of arrival, gender of the cohort, days on feed, cohort's mean weight at entry, predicted BRD risk designation of the cohort (high or low risk), cohort size and the interactions between BRD risk code and arrival year were significantly associated with daily BRD incidence.

Our results demonstrate the weather conditions that are significantly associated with BRD risk in populations of feedlot cattle. Defining these conditions for specific cattle populations may enable cattle health managers to predict and potentially manage these effects more effectively; further, estimates of effects may contribute to the development of quantitative predictive models for this important disease syndrome.

Factors Controlling Puberty in Beef Heifers
(Fricke, P. M., and R. A. Cushman. 2011. University of Wisconsin and Meat Animal Research Center, Clay Center, Nebraska)
http://jas.fass.org/content/early/2011/12/28/jas.2011-5007

The objective of the symposium was to provide new insights and perspectives from recent research findings on puberty in beef heifers. To that end, the 2011 physiology and endocrinology symposium program was organized to review recent research findings in beef cattle puberty with a broad overview of areas affecting puberty including management, genetics, nutrition and hormonal manipulation of the estrous cycle. Here are a few of the high points.

• Significant costs are associated with development and management of replacement beef heifers; therefore, management strategies that maximize the number of replacement heifers attaining puberty before their first breeding season are vital for the efficiency of cow-calf operations.
• Data demonstrating that fertility in replacement beef heifers was not compromised by delaying the majority of weight gain until the last third of the developmental period before the onset of the breeding season.
• Body weight at the onset of the breeding season and weight at puberty were not compromised compared with heifers on a constant rate of gain during the developmental period.
• Furthermore, persistence of estrous cycles after establishment of puberty are affected by dietary energy restriction and repletion but may be activated gradually in response to dietary manipulation unrelated to many metabolite changes.
• It was speculated that simple tests for DNA variants among animals (i.e., SNP) may replace low-accuracy predictions for expensive or slowly heritable measures of puberty and fertility based on performance and pedigree. Although several SNP from the BovineSNP50 assay have tentatively been associated with reproductive traits, including age at puberty, antral follicle count, and pregnancy observed on different sets of heifers, sample sizes are too small and SNP density is too sparse to definitively determine genomic regions containing causal variants affecting reproductive success. In looking toward the future, larger samples and denser SNP chips will increase power to detect real associations with SNP having more consistent linkage disequilibrium with underlying quantitative trait loci.
• Traditionally, research has shown that puberty in heifers occurs at a genetically predetermined size (around 60 to 65% of their expected mature body weight) and that high pregnancy rates can occur only when heifers reach their target weight. Although these traditional intensive heifer development systems may maximize pregnancy rates, they do not necessarily optimize profit or sustainability.
• By contrast, altering rate and timing of gain can result in compensatory growth periods, providing an opportunity to decrease feed costs, a significant cost associated with beef heifer development.
• Feeding replacement heifers to traditional target weights increased development costs without improving reproduction or subsequent calf production relative to development systems in which heifers were developed to lower target weights ranging from 50 to 57% of mature body weight.
• The use of reproductive tract scores to determine pubertal status has shown that peripubertal and pubertal heifers have an increased pregnancy success to synchronization protocols compared with heifers that were prepubertal.
• Understanding the hormonal changes that occur during the estrous cycle has allowed for the development of estrous synchronization protocols that result in increased control of follicular growth, regression of luteal tissue and ovulation.

**Integrating Bermudagrass Into Tall Fescue-Based Pasture Systems for Stocker Cattle**


The daily body weight gain of stocker steers grazing tall fescue-based pastures typically declines during summer. To avoid these declines, in part to mitigate the effects of tall fescue toxicosis, it is commonly advised to move cattle to warm-season forage during this period. A three-year (2006, 2007 and 2008) grazing study was conducted to evaluate the effect of replacing 25% of the area of a tall fescue/clover (81% endophyte-infected) pasture system with “Ozark” Bermudagrass overseeded with clover (Trifolium spp.) to provide summer grazing for stocker steers. The tall fescue plus Bermudagrass treatment was compared to a grazing system in which tall fescue/clover pastures were the only type of forage available for grazing. Our objective was to determine if replacement of 25% of the land area in a fescue system with Bermudagrass would increase annual beef production compared with a system based solely on tall fescue. The study was conducted at the Southwest Research and Education Center of the University of Missouri near Mt. Vernon. Each treatment was rotationally stocked with five steers (547 pounds) on 3.8 acres. Fertilizer applications were applied at rates recommended for each respective forage species.

• Total forage production, body weight gain per acre and season-long average daily gain of steers was greater for tall fescue plus Bermudagrass than for tall fescue/clover in 2006, but none of these measures differed in 2007 or 2008.
• In vitro true digestibility of pastures was greater for tall fescue/clover (84.4%, SEM = 0.64%) compared with tall fescue plus Bermudagrass (80.6%, SEM = 0.79%), even in summer.

The decrease in vitro true digestibility of the Bermudagrass pastures likely negated any benefit that animals in tall fescue plus Bermudagrass had in avoiding the ergot-like alkaloids associated with endophyte-infected tall fescue. Renovating 25% of the pasture system to Bermudagrass provided some benefit to the system in years when summertime precipitation was limited (2006) but provided no value in wetter years (2007 and 2008). Although renovating endophyte-infected tall fescue pastures to a warm-season forage is a widely used practice to mitigate tall fescue toxicosis, the benefits of this practice are limited if forage quality of the warm-season component is poor.

**Effects of Prepartum and Postpartum Bolus Injections of Trace Minerals on Performance of Beef Cows and Calves Grazing Native Range**

(Mundell, L. R. 2012. PAS 28:82-88)

Our objective was to evaluate the effects of pre- and postpartum bolus injections of a trace mineral solution on reproductive performance, body weight change and body condition score change of beef cows and on growth of suckling calves. Mature beef cows (n = 460; initial body weight = 1096 lbs; initial body condition score 5.4) managed in two locations were assigned randomly to one of two treatments: 1) supplemental s.c.
trace-mineral injection containing 15 mg/mL Cu, 5 mg/mL Se, 10 mg/mL Mn and 60 mg/mL Zn or 2 s.c. injection of physiological saline. Injections were administered to cows (1 mL/200 lbs of body weight) 105 days before the first projected calving date and again 30 days before fixed-time AI. Calves received the same treatment as their dams and were injected (1 mL/100 lbs of body weight) at birth and again at 71 days of age. Cows grazed native pastures for the duration of the study; trace-mineral supplements and white salt were available to all cattle ad libitum before and during the study. Ovulation was synchronized using a 5-d CO-Synch + CIDR protocol, and cows were inseminated 72 hours after CIDR removal. Cows were exposed to fertile bulls for natural-service breeding 10 d after AI for 50 days. Conception to AI and final pregnancy rate were assessed 36 d after AI via ultrasound and 120 d after AI via rectal palpation, respectively.

- Change in body weight and body condition score from initiation of the study to calving and from AI to weaning did not differ between trace-mineral injection and saline cows.

Two summer experiments were conducted with 28 (body weight = 642 lbs; Exp. 1) and 48 (body weight = 617 lbs; Exp. 2) steers to determine the effect of supplementing dried distillers grains plus solubles (DDGS) on growth when grazing subirrigated Sandhills meadow. In Exp. 1, there were two treatments: nonsupplemented or 0.6% of body weight (4.0 lbs) dried distillers grains plus solubles supplementation daily. In Exp. 2, there were three treatments: 0, 0.6 (3.7 lbs) or 1.2% of body weight (7.4 lbs) dried distillers grains plus solubles supplementation daily. In both experiments, steers were individually supplemented for the duration of the study (Exp. 1 = 92 d; Exp. 2 = 91 d). Both experiments were analyzed as completely randomized designs with individual steer as the experimental unit.

- In Exp. 1, ending body weight and average daily gain were not different.
- Conversely, trace-mineral injection cows had greater body condition score increase than did saline cows between calving and AI.
- Calf body weight at birth, average daily gain and age-adjusted weaning body weight did not differ between treatments.
- Proportion of cows with estrous cycles 17 and 8 days before fixed-time AI was similar between treatments.
- In contrast, conception to fixed-time AI was greater for cows receiving trace-mineral injection (60.2%) than for cows receiving saline (51.2%).
- Final pregnancy rate did not differ between treatments and averaged 92%; however, calving distribution by trace-mineral injection-treated cows was more favorable (i.e., calving was generally earlier) than calving distribution of saline-treated cows.

Under the conditions of this study, pre- and postpartum trace-mineral injections improved conception to fixed-time AI and subsequent calving distribution of beef cows.

The Effects of Supplementing Dried Distillers Grains to Steers Grazing Cool-Season Meadow

(Griffin, W.A., 2012. PAS 28: 56-63)

In Exp. 2, average daily gain and ending body weight increased linearly with increased level of dried distillers grains plus solubles supplementation.

In Exp. 1, feedlot performance was not affected by previous supplementation.

However, in Exp. 2, supplementing dried distillers grains plus solubles to steers grazing subirrigated Sandhills meadow increased carcass weight with increasing level of dried distillers grains plus solubles supplementation.

In Exp. 2, supplementing dried distillers grains plus solubles during summer grazing did not affect quality grade or yield grade.

Results from Exp. 2 indicate that supplementing dried distillers grains plus solubles at levels greater than 0.6% of body weight during summer meadow grazing increases average daily gain, with body weight maintained through finishing.

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