

478 Breed of sire and gender effects on chute exit velocity and chute temperament score in beef calves. R. C. Vann*¹ and R. D. Randel², ¹MAFES/Brown Loam Experiment Station-Raymond, ²Texas Agricultural Experiment Station-Overton.

The objectives of this study were to evaluate effects of breed of sire, age of dam and gender on exit velocity (EV, m/s), chute temperament score (CS; 1=calm, no movement to 5=jumping and rearing, highly agitated) and pen temperament score (PS; 1=non-aggressive, not excited by humans to 5=aggressive, runs into fences and at humans if approached) and measure relationships between EV, CS and PS at two times near weaning. Crossbred calves (n=195) were assigned a PS, then calves were weighed on a platform scale and CS was assigned. Calves were then released to a squeeze chute and restrained. After a blood sample was obtained the calf was released and time recorded to travel 1.83 m. Measurement one (T1) occurred 21 d after weaning and the second measurement (T2) 90 days later. Least square means were obtained from PROC MIXED with main effects of sire breed, gender and age of dam. Breed of sire (Angus or Brangus) was not a significant source of variation for EV, CS or PS. Gender was a significant source of variation for EV and PS at T1 and was different for EV at T2 ($P < 0.06$). Heifers had a greater EV at T1 and T2 (1.75 ± 0.10 and 2.48 ± 0.14 m/s, respectively) compared to steers (1.56 ± 0.10 and 2.22 ± 0.15 m/s, respectively). The correlation coefficient (r) between EV at T1 and T2 was 0.68 ($P < 0.001$). The r between EV and CS was 0.26 ($P < 0.002$) at T2. The r between EV and PS were 0.489 ($P < 0.001$) at T1 and 0.487 ($P < 0.001$) at T2. In conclusion, breed of sire was not a significant source of variation in chute exit velocity however, differences existed between steers and heifers. Although the correlation coefficients between velocity and temperament score were significantly different from zero the magnitudes were only moderate. In this case, pen score had a better correlation with velocity than chute score. The exit velocity may be preferred due to the subjective nature of the temperament score.

Key Words: Temperament, Beef Cattle, Weaning

479 Effects of ranch management on performance of newly received feedlot calves. S. M. Holt*, R. H. Pritchard, and T. A. Wittig, *South Dakota State University*.

The effect of ranch management on weaning and relocation stress was investigated using spring born steer calves from a single source. Steers on mature dams (age >4y) were not weaned (NW) until shipped. Steers on young dams (<4y) were previously weaned (PW) 1 mo prior to shipment by the cooperating ranch. The steers were reared on native range prior to weaning. At shipment in late October tympanic temperature (TT) loggers were placed in 13 steers from each management group at shipment. All calves were then transported 580km to a feedlot. After resting (36 h) steers were vaccinated, dewormed and weighed individually (weaning weight (WW)). A cracked corn-grass hay diet (1.69 Mcal/kg NEm and 1.03 Mcal/kg NEg) was fed for 21d. WW was similar ($P > .10$) for PW (266kg) and NW (263kg) groups. Body weight after 21d in the feedlot (291kg vs 293kg) and DMI (6.7kg vs 6.8kg) were similar ($P > .10$) between PW and NW steers, respectively. Average daily gain (1.21 vs 1.44kg) and gain efficiency (181 vs 212g/kg) were higher ($P < .05$) in NW steers. Morbidity and mortality were nil

Ruminant Nutrition: Beef cows and heifers

481 Fat supplementation and reproduction in beef females. R. N. Funston*, *University of Nebraska, Lincoln*.

Inadequate dietary energy intake and poor body condition can negatively affect reproductive function. Supplemental lipids have been used to increase energy density of the diet and may also have direct positive effects on reproduction in beef females. Several fatty acid sources have been studied as they relate to reproductive function. Plant derived oils appear to have the greatest impact on reproduction, common sources include: sunflower, safflower, cottonseed, rice hulls, and soybeans. Animal tallow and calcium salts of fatty acids escape rumen biohydrogenation to a greater extent and are incorporated into adipose tissue and milk. Effects on reproductive function appear to be more variable. Polyunsaturated fatty acids such as those in fishmeal also bypass the rumen but have been documented to affect reproductive processes. Fats have been fed before and after calving, during the breeding season, and during heifer development. Response to fat has been investigated through measuring: body weight and body condition score, age at puberty, postpartum interval, first service conception rates, pregnancy rates, calving

for both PW and NW groups. Time series analysis was used to determine TT differences due to management. NW steers recorded higher TT (0.67°C ; $P < .05$) than PW steers during loading and transportation from the ranch, indicating a greater initial stress associated with NW. After 10h, TT of management groups converged and followed similar diurnal patterns for the remaining 5 d of recording. Diurnal TT patterns begin to mimic those of PW within approximately 1 h of arrival at the feedlot (12h post-weaning), suggesting that recently weaned calves were able to rapidly achieve homeostatic conditions for TT. During the first 4d at the feedlot DMI was lower for NW steers (5.06 vs 2.76kg/d; $P < .05$) and was slightly below maintenance. There were no differences ($P > .05$) in TT associated with this period of negative energy balance. Results indicate that pre-transit weaning, as a part of feedlot transition, did not add sufficient stress to alter TT compared to previously weaned calves.

Key Words: Cattle, Tympanic temperature, Stress

480 Thermoregulation and weight change in Hereford and Senepol steers as affected by forage type and estrogen therapy. R. Browning, Jr.*, S. H. Kebe, M. Byars, E. Lane, and C. Johnson, *Tennessee State University, Nashville*.

Hereford (n = 30; H) and Senepol (n = 26; S) 3-yr-old steers were fed endophytic tall fescue (T) or orchardgrass (O) hay and seed for 8 wk during July and August to assess breed, diet, and estrogen effects on thermal and weight status. Half of the steers in each breed-diet group received s.c. estradiol implants (E) and half were not implanted (N). Implant \times breed \times diet interaction and implant as a main effect did not influence ($p > 0.2$) respiration rates, shade use, or skin temperature. Breed \times diet affected ($p = 0.01$) respiration as SO steers (66 ± 4 breaths/min) had lower rates compared to HO, ST, and HT ($88, 89, 92 \pm 4$ breaths/min, respectively). Breed and diet as main effects affected ($p < 0.05$) shade use and skin temperatures. Shade use was lower for O vs. T steers (47 vs. $60 \pm 3\%$) and lower for S vs. H (20 vs. $87 \pm 3\%$). Skin temperatures were lower for O vs. T (37.55 vs. $37.77 \pm 0.14^{\circ}\text{C}$) and lower for S vs. H steers (37.07 vs. $38.25 \pm 0.13^{\circ}\text{C}$). Implant \times breed \times diet affected weight gain ($p = 0.14$) and the percentage of steers gaining weight ($p = 0.03$). Weight was gained by $100 \pm 13\%$ of SOE, SON, HOE, and HON steers (ADG = 946, 572, 413, and 321 ± 156 g/d, respectively), 86% of STN (230 g/d), 68% of STE (269 g/d), 50% of HTE (-132 g/d), and 1% of HTN (-443 g/d) steer. The remaining steers lost weight. The percentage of HTN steers gaining weight was lower ($p = 0.05$) than all other groups, HTE differed ($p = 0.05$) from all groups except STE, and percentages did not differ among STE, STN, HON, HOE, SON, and SOE steers. Means separation test ranked and grouped ($\alpha = 0.05$) treatments from high to low ADG: [SOE, SON], [SON, HOE, HON, STE, STN], [STN, HTE], [HTE, HTN]. As main effects, weight gain was greater ($p = 0.03$) for E vs. N (375 vs. 169 ± 85 g/d), greater ($p < 0.01$) for S vs. H (505 vs. 39 ± 85 g/d), and greater ($p < 0.01$) for O vs. T steers (567 vs. -23 ± 101 g/d). Forage, breed, and hormone therapy affected weight change in older steers during summer. Thermal status of steers may explain some of the variances in weight gain.

Key Words: Senepol, Tall fescue, Weight gain

interval, mammary gland development, milk yield, milk composition, calving difficulty, and calf birth and weaning weight. Animal response appears to be dependent on body condition score, age (parity), nutrients available in the diet (pasture or range conditions), and type of fat supplemented. To elucidate potential mechanisms of action scientists have investigated: changes in follicular and uterine development, hormonal profiles, brain function, and embryonic development. Feeding supplemental fat has resulted in varied and inconsistent results on reproductive function. Elucidating mechanisms of action of how supplemental fat can influence reproductive function has been a difficult process. The complexity of the reproductive system and makeup of fat supplements are often confounded by management conditions and forage quality both in research and commercial feeding situations. This has contributed to inconsistencies in research findings.

Key Words: Fat supplementation, Beef cattle, Reproduction

482 Microbial crude protein efficiency in nursing calves and gestating cows. M.J. Lamothe, J.C. MacDonald*, T.J. Klopfenstein, D.C. Adams, G.E. Erickson, and J.A. Musgrave, *University of Nebraska - Lincoln; Lincoln, NE.*

Two trials were conducted to determine effects of forage type and degradable intake protein (DIP) source on microbial crude protein (MCP) efficiency in nursing calves and gestating cows. In Trial 1, sixteen cow/calf pairs were assigned randomly to graze upland native range or subirrigated meadow to determine the effects of forage type on calf forage intake, milk consumption, and MCP efficiency from May through September. Calf forage intake and milk consumption were estimated by total fecal collections and weigh-suckle-weigh, respectively. Allantoin and creatinine were used as markers of MCP flow and urinary excretion, respectively. Fluid milk intake decreased linearly ($P < 0.01$) from May to September for calves grazing both forage types. This was accompanied by increases in forage OM intake for each month ($P < 0.05$), and a quadratic increase in MCP flow ($P < 0.05$). There were no changes over time in MCP efficiency which averaged 190g/kg digestible OM. In Trial 2, twenty four gestating cows grazing dormant native range were assigned randomly to one of three treatments to determine the effects of supplemental DIP source on MCP efficiency. Treatments were: 1) non-protein nitrogen (urea); 2) true protein (corn gluten feed); and 3) no supplementation. Forage intake was estimated from fecal output determined with intra-ruminal slow releasing chromium devices. Allantoin and creatinine were used as markers of MCP flow and urinary excretion, respectively. While statistical significance was found, differences in forage intake were likely related to forage availability rather than treatment effects because the control diet was not deficient in DIP (10.5% digestible OM intake). There were no differences in MCP efficiencies among treatments which averaged 85g/kg digestible OM. The MCP efficiencies measured in Trial 2 closely match those predicted by NRC, suggesting allantoin is an accurate marker of MCP flow. MCP efficiencies for calves grazing forage appear to be higher than 130g/kg digestible OM assumed by NRC.

Key Words: Microbial Crude Protein, Cows, Calves

483 Effect of age, pregnancy, and diet on urinary creatinine excretion in heifers and cows. K. M. Whittet*, T. J. Klopfenstein, G. E. Erickson, T. W. Loy, and R. A. McDonald, *University of Nebraska, Lincoln, NE.*

Urinary creatinine has been used as an output marker to predict output of metabolites in urine such as allantoin. Therefore, the use of creatinine as a reference material in nutrient balance studies depends upon a uniform and constant excretion of creatinine. A series of total urine collections were conducted to evaluate the effect of age, pregnancy, and diet on creatinine excretion in heifers and cows. For each collection, urine was collected over a 5-d period and composited by animal within day. Daily samples were analyzed for creatinine then each animal was averaged over the 5 d period. All animals were fed in individual stanchions at 2.0% of BW. To test the effect of age on creatinine excretion, 31 animals (BW range = 98-672 kg) ranging from 5 to 104 months of age were fed a forage diet supplemented with dried distillers grains (DDG). There was no difference in creatinine excretion across all ages (mean = 0.026 g/kg BW; $P=0.34$). Fifteen cows (BW = 572 ± 59 kg) fed a forage diet supplemented with DDG were sampled to determine the effect of pregnancy on creatinine excretion. Pregnancy did not change daily creatinine excretion ($P=0.46$). To determine if diet alters creatinine excretion, 11 heifers (BW = 441 ± 49 kg) were sampled for 2 urine collection periods. In period 1, heifers were fed a forage diet supplemented with DDG. In period 2, heifers were fed a finishing diet (90% concentrate:10% forage). Creatinine excretion was suppressed in heifers on the finishing diet ($P<0.05$) with forage fed heifers excreting 0.002 g/kg BW more creatinine in their urine. Age and pregnancy do not influence changes in creatinine excretion; however, diet may affect creatinine excretion in growing heifers.

Key Words: Creatinine, Age, Pregnancy

484 Methionine improves nitrogen retention of young gestating beef cows consuming low quality forages. R. C. Waterman*, W. D. Bryant, C. A. Loest, and M. K. Petersen, *New Mexico State University.*

Inadequate supply of metabolizable methionine or other limiting amino acids may limit protein accretion in gestating beef cows. Five ruminally cannulated gestating beef cows (490 ± 27 kg) were used in a 5 × 5 Latin square to evaluate the effects of post ruminal D,L-methionine (Met) supplementation on N retention, serum metabolites, and plasma amino acid concentrations during late gestation. Cows were allowed ad libitum access to water, mineralized salt, and experimental diet comprised of 67% wheat straw (1.9% CP and 78.7% NDF, OM basis) and 33% alfalfa (17.0% CP and 43.2% NDF, OM basis). Daily experimental diet was individually fed and refusal weights recorded for N intake determination. Treatments consisted of no urea (NU), urea (U), urea + 5 g/d Met (5MU), urea + 10 g/d Met (10MU), and urea + 15 g/d Met (15MU). Urea was administered into the rumen via rumen cannula once a day at 0600 h in two gelatin capsules to achieve a diet of 6.8% CP as fed. Methionine was infused into the abomasum twice a day at 0600 and 1800 h. Cows were adapted to the diet 30 d prior to the initiation of the experiment. Experimental periods were 14 d; 4 d to allow clearance of previous treatment affects, 4 d for adaptation to treatments, and 6 d for total fecal and urinary collection. Serum and plasma samples were collected every 4 h for 24 h on day 13 of each period for analysis of serum urea nitrogen, glucose, non-esterified fatty acids, and plasma amino acids. Nitrogen retention was improved ($P < 0.05$) with urea and incremental amounts of methionine (32.3, 41.6, 48.1, 48.7, and 51.6 ± 3.4 g/d for NU, U, 5MU, 10MU, and 15MU, respectively). No differences ($P > 0.05$) were identified for serum urea nitrogen, glucose, or non-esterified fatty acids. A quadratic response was determined ($P < 0.05$) for plasma Met (36.9, 30.1, 55.9, 96.6, and 196.3 ± 20.5 μM for NU, U, 5MU, 10MU, and 15MU, respectively). Responses observed in N retention and plasma Met indicates that methionine is a limiting amino acid in low quality forage diets for gestating beef cows.

Key Words: Cattle, Methionine, Supplementation

485 Domperidone administered to heifers can ameliorate deleterious reproductive parameters and weight gain reductions associated with ingesting endophyte-infected fescue. K. L. Jones*, S. S. King¹, K. E. Griswold¹, D. Cazac¹, and D. L. Cross², ¹*Southern Illinois University, Carbondale, IL,* ²*Clemson University, Clemson, SC.*

Fescue toxicosis is a poorly defined, widespread phenomenon affecting ruminant and nonruminant grazing livestock species. Fescue toxicosis results in estimated losses to the beef industry of nearly 800 million dollars annually due to lowered conception rates and depressed body weight gains. The aim of this study was to evaluate luteal and follicular function and weight gains in nonpregnant heifers consuming endophyte-infected (EI) tall fescue. Thirty crossbred heifers (Angus x Holstein or Hereford x Holstein) 18 to 24 months of age and weighing 390 ± 3.5 kg were divided equally amongst three treatment groups; endophyte-free (EF) fescue diet, EI fescue diet or endophyte-infected diet and treated with the dopamine (DA) antagonist, domperidone injected s.c. at 0.44mg/kg BW (EID). Heifers were weighed weekly and data analyzed using ANOVA with LSD post hoc testing. After 28 days on the experimental treatments, heifers fed EI diets had reduced weight gains (20.5 ± 4.0) when compared to heifers fed EF (35.5 ± 6.6) or EID (35.5 ± 3.7; $p<0.05$). The heifers' ovarian structures were monitored via transrectal ultrasound to determine follicle size and day of ovulation. Blood plasma samples were collected daily and analyzed for progesterone (P4) concentration by RIA. Data were analyzed using PROC MIXED with repeated measures followed by least square means post hoc testing. Heifers ingesting EI diets had shorter duration interovulatory intervals (EF=22.5 ± 0.6 d, EI=20.7 ± 0.37 d), and lower mid-cycle P4 concentrations than heifers in the EF or EID treatments ($p<0.05$). These results suggest that domperidone supplementation of heifers eating EI fescue may ameliorate certain symptoms of fescue toxicosis.

Key Words: Fescue, Domperidone, Interovulatory interval