392 GPS/GIS technology in range cattle management. D. M. Anderson,* *USDA-ARS, Jornada Experimental Range, Las Cruces, NM.*

Animal-dominated landscapes are dynamic and not fully understood. Electronics were first employed in the mid-1970s to monitor free-ranging cattle behavior and its effect on forage utilization. By the mid-90s, satellite positioning systems were being used to monitor wildlife and had all but removed human observation from animal tracking. However, not until the end of the 90s did animal-borne satellite receivers catapult range cattle management into the world of microchip technology. This advent eliminated some challenges associated with terrestrial-based systems but added others, not the least of which has been how best to provide sustained power to animal-borne electronics. This question caused a conundrum for researchers deciding how to balance data collection rates with battery power drain because satellite-based systems have the potential to collect data in fractions of a second. To assist in interpreting the vast reservoirs of time-stamped positional data available, researchers began looking to biotic and abiotic information in the vicinity of the animal's geographical location to help explain the animal's behavior. Enter the Geographic Information System (GIS) with its origins in the late 50s and 60s. It provides hardware and software capable of capturing, storing, retrieving, manipulating, analyzing, and displaying geographically referenced data. By combining GIS and Global Positioning System (GPS) satellite data, researchers were given a robust way to accurately associate possible cause and effect relationships. Because of the complexity associated with electronically obtained data, it is mandatory that multifaceted teams be established from the onset not only to keep electronics operational but also to optimize the design, gathering, summarization, analyses, interpretation and application of data. Though electronics have replaced the drudgery and incompleteness of manual data gathering, electronics should never be used in an attempt to replace the art of human observation and discernment that ultimately provides the interpretation and application of field-based management.

Key Words: foraging, range animal ecology, animal tracking

393 Detection of pregnancy in Arizona range cattle using near infrared spectroscopy of feces. D. R. Tolleson* and D. W. Schafer, *University of Arizona, V Bar V Ranch, Rimrock.*

Near infrared spectroscopy (NIRS) of feces has been used to determine pregnancy in cattle but not in the southwestern US. Fecal constituents affected by pregnancy in amounts sufficient to affect near infrared spectra are yet to be identified. Crossbred beef cows (n ~375) were used to evaluate the ability of fecal NIRS to determine pregnancy under commercial ranch conditions in Arizona. All cows were synchronized using the 5-d CO-Synch+CIDR protocol in mid-June of 2011 and then turned out with bulls for 75 d. Fresh fecal samples from individually identified cows were collected off the ground in the pasture on the day of AI, 2 weeks later, and ~monthly thereafter until mid-October. Samples (n = 78) were frozen and later analyzed by NIRS. Pregnancy was determined by rectal palpation in mid-September and used to estimate day of pregnancy for each cow on the date feces were collected. Fecal spectra (1100 to 2500nm) were paired with the corresponding pregnancy values to create a discriminant calibration data set. Validation was accomplished with ~25% of the samples (n = 17) randomly selected and removed from the original 78. Previous research has identified 30 d of gestation as the minimum threshold for detection of pregnancy via fecal NIRS. Successful identification of cows greater than 30 d gestation was 4/5 (80%) and for cows not-pregnant, or pregnant less than 30 d was 8/12 (67%). Discrimination was also attempted for arbitrary groupings (A versus B) of the calibration set. This exercise yielded a validation success rate of 1/5 (20%) for group A and 7/12 (58%) for group B, respectively. The proportion of successful individual identifications for the biological (71%) versus arbitrary (47%) group validation was numerically greater ($X^2 = 1.94$, $P = 0.16$). A comparison between the observed and fecal NIRS predicted percent of the herd pregnant in late June, mid-July, mid-August, and mid-September was 0 versus 2, 34 versus 16, 63 versus 50, and 72 versus 79, respectively ($r^2 = 0.88$, $P = 0.06$). Herd pregnancy status of range beef cows was predicted well enough to inform forward planning for reproductive management.

Key Words: fecal, near infrared spectroscopy, pregnancy

394 Effect of beef heifer development system on ADG, reproduction, and feed efficiency during first pregnancy. A. F. Summers,* T. L. Meyer, S. P. Weber, and R. N. Funston, *University of Nebraska, West Central Research and Extension Center, North Platte.*

A 3-yr study was conducted to determine the effects of heifer development system on ADG, reproductive performance, and subsequent feed efficiency as a pregnant heifer. Crossbred Angus heifers (n = 299) were assigned by initial BW to graze corn residue (CR) or developed in a dry lot (DL). Corn residue heifers grazed native pasture 33 d before grazing CR 74 d. Corn residue heifers were then placed on dormant forage pastures 66 d and then with DL heifers for approximately 40 d for synchronization and AI. Heifers assigned to DL grazed dormant forage for 98 d and then placed in a DL for 112 d. The following winter a subset of pregnant CR and DL heifers (n = 114) were stratified by BW and development treatment, and placed in a Calan Broadbent individual feeding system for 84 d during late gestation. The remaining pregnant heifers were placed on CR. Prebreeding BW was greater ($P = 0.01$) for DL heifers compared with CR heifers (349 vs. 314 ± 9 kg). At pregnancy diagnosis BW remained greater ($P = 0.06$) for DL compared with CR heifers (422 vs. 403 ± 10 kg). Dry lot heifers had greater ($P = 0.01$) overall ADG during development compared with CR heifers. There was no difference ($P \geq 0.41$) in percent cycling (43 vs. 53 ± 15%), AI pregnancy (71 vs. 64 ± 6%), or final pregnancy rates (93 vs. 91 ± 3%) for CR and DL, respectively. However, CR heifers had greater ($P = 0.09$) ADG (0.77 vs. 0.64 ± 0.05 kg/d) from AI to pregnancy diagnosis compared with DL heifers. At the beginning of the second winter, DL heifers had greater ($P = 0.09$) BW compared with CR; however, pre-calving BW was similar ($P = 0.37$). Gestation length, calving date, and calf birth BW were similar ($P \geq 0.28$) between development treatments. During the individual feeding period, DL heifers had greater final BW compared with CR heifers (516 vs. 506 ± 9 kg). Dry matter intake and RFI were similar ($P \geq 0.39$) between treatments. Dry lot heifers had greater ($P \leq 0.05$) ADG (0.80 vs. 0.69 ± 0.14 kg/d) and G:F compared with CR. Heifers developed on CR had reduced BW through early pregnancy; however, reproductive performance was similar to DL developed heifers.

Key Words: beef cattle, feed efficiency, heifer development

395 Use of MTB-100, provided through a mineral mix, in a strategic supplementation plan to alleviate the effects of fescue toxicity when lactating beef cows graze endophyte-infected tall fescue. M. E. Hoar,* D. K. Aaron, D. G. Ely, and M. M. Simpson, *University of Kentucky, Lexington, Ky, United States.*

Sixty-three, 3 to 5 yr-old, Angus crossbred cows and their calves were used in a 3-yr study to evaluate response to strategic supplementation with a nutritional supplement produced from a carbohydrate-based toxin adsorbent (MTB-100, Alltech, Inc., Nicholasville, KY). MTB-100 was mixed with a complete mineral so daily intake was projected to be 0 or 20 g/cow. The experimental period extended from May 5 to Oct 2 and was divided into 3 strategic periods: P1 = May 5 to Jul 5; P2 = Jul 5 to Aug 18; P3 = Aug 18 to Oct 2. Treatments were either 0 or 20 $g \cdot hd^{-1} \cdot d^{-1}$ MTB-100 within a period (Trt 1 = 0, 0, 0; Trt 2 = 20, 0, 20; Trt 3 = 0, 20, 0; Trt 4 = 20, 20, 0; and Trt 5 = 20, 20, 20). In P1, 10 to 14 cow/calf pairs were managed in each of 9, endophyte-infected (>90%) KY 31 tall fescue pastures (re-randomized annually). On Jul 5 each year, pre-designated pairs were allotted to 21 individual, 1.6-ha plots of equivalent pasture and supplemented with either 0 or 20 $g \cdot hd^{-1} \cdot d^{-1}$ MTB-100, depending on treatment, until Oct 4. There was no significant effect of treatment on total cow weight changes from May 5 to Oct 4 (34, 38, 30, 35 and 35 kg for Trt 1, 2, 3, 4 and 5, respectively). Corresponding BCS changes were not significant. Overall, differences ($P < 0.10$) were found for rectal temperature changes. Calf gains for Trt 1 and 5 were 54 and 60 in P1 ($P < 0.10$), 47 and 56 in P2 ($P < 0.05$), and 24 and 22 kg ($P < 0.05$) in P3. Overall, calves receiving no MTB-100 (Trt 1) gained less (125 vs. 138 kg; $P < 0.10$) than calves receiving continual supplementation (Trt 5). Gains of calves receiving strategic supplementation during the 150 d (Trt 2, 3 and 4) were intermediate to gains of calves in Trt 1 and 5. These results show strategically invoked MTB-100™ consumption, through a mineral mix available ad libitum, can increase performance of cows and calves grazing endophyte-infected tall fescue forage.

Key Words: fescue, cow/calf pairs, MTB-100

396 Effects of anti-phospholipase A2 antibody (aPLA2) supplementation on DMI, feed efficiency and blood differentials of steers fed forage and grain-based diets. V. R. G. Mercadante*[1], K. M. Bischoff[1], G. H. L. Marquezini[1], J. D. Arthington[2], N. DiLorenzo[1], and G. C. Lamb[1], *[1]North Florida Research and Education Center, University of Florida, Marianna, [2]Range Cattle Research and Education Center, University of Florida, Ona.*

We determined whether supplementation of anti-phospholipase A2 antibody (aPLA2; BIG BEEF, Aova Technologies, Madison, WI) would alter voluntary DMI, feed efficiency (FE) and blood differentials (BD) due to a change in diet from a forage-based to a grain-based diet. Individual daily DMI was measured on 80 cross-bred steers during a 141 d period using a GrowSafe system (GrowSafe Systems Ltd., Alberta, Canada) at the University of Florida NFREC Feed Efficiency Facility. On d 0, steers were blocked by BW and assigned to receive a basal diet (0.97 Mcal NEg/kg of DM and 16% CP) comprised of 69% concentrate, 31% bermudagrass hay, and a vitamin and mineral supplement containing the following treatments: 1) no additive (CON; n = 20); 2) 30 mg of monensin and 8.8 mg of tylosin per kg of diet DM (MT; n = 20); 3) same as CON, but including aPLA2 at 0.4% of the diet DM (BB0.4%; n = 20); 4) same as CON, but including aPLA2 at 0.2% of the diet DM (BB0.2%; n = 20). On d 60 all steers were transitioned into a 90% concentrate diet (74% cracked corn; 1.32 Mcal NEg/kg of DM, 11.4% CP) over a 21-d "step-up" period while continuing to receive their supplement treatments. On d 0, d 60, d 81 and d 141 BW was recorded. Blood samples were collected on d 60, 63, 65, 67, 70, 72, 74, 77, 79, 81 and 84, and BD was assessed using a hematology cell counter (IDEXX ProCyte Dx Hematology Analyzer, Westbrook, ME). No differences existed for BW on d 0 (212 ± 34 kg), BW on d 141 (388 ± 46 kg), overall ADG (1.24 ± 0.16 kg/d), DMI (8.00 ± 0.94 kg/d), and residual feed intake (RFI). However, steers receiving the CON (0.34 ± 0.15 kg/d) treatment had greater ($P < 0.05$) RFI than the BB0.2% (−0.13 ± 0.15) and BB0.4% (−0.25 ± 0.15 kg/d) treatments, whereas the MT (0.06 ± 0.15 kg/d) treatment was intermediate. During the grain-based diet period, the BB0.2% (−0.12 ± 0.21 kg/d), BB0.4% (0.38 ± 0.21 kg/d), and MT (0.09 ± 0.21) steers tended ($P = 0.07$) to have greater RFI than the CON (−0.39 ± 0.21 kg/d) steers. During the step-up period the CON (7.09 ± 0.23 k/μL) and BB0.2% (7.62 ± 0.23 k/μL) treatments had greater ($P < 0.05$) concentrations of lymphocytes than the MT (6.73 ± 0.23 k/μL) and BB0.4% (6.73 ± 0.23 k/μL) treatments, and tended ($P = 0.06$) to have greater white blood cell counts (12.87 ± 0.42; 13.61 ± 0.42; 12.16 ± 0.42; 12.37 ± 0.42 k/μL for CON, BB0.2%, BB0.4% and MT, respectively;). We conclude that aPLA2 supplementation improved FE of steers fed forage-based diets and tended to reduce blood leukocyte concentrations when exposed to a transition into grain-based diets.

Key Words: feed efficiency, blood differentials, residual feed intake

397 Effects of acclimation to human handling on temperament, physiological responses, and performance of beef steers during feedlot receiving. C. L. Francisco*[1,2], R. F. Cooke[1], R. S. Marques[1], T. Leiva[1], F. Sanches[1], A. Bouck[1], F. N. T. Cooke[1], and D. W. Bohnert[1], *[1]Oregon State University, EOARC, Burns, [2]Universidade Estadual Paulista - FMVZ/DPA, Botucatu, SP, Brazil.*

The objective was to compare temperament, plasma concentrations of cortisol and acute-phase proteins, and performance during feedlot receiving of Angus × Hereford steers acclimated or not to human handling. Sixty steers were initially evaluated, within 30 d after weaning, for BW and temperament score (average chute score and exit velocity score; d −30). On d −28, steers were ranked BW and temperament score, and randomly assigned to receive or not (control) the acclimation treatment. During the acclimation phase (d −28 to 0), steers were maintained in 2 pastures according to treatment, and acclimated steers were exposed to a handling process twice weekly (Tuesdays and Thursdays). The acclimation treatment was applied individually to steers by processing them through a handling facility, whereas control steers remained undisturbed on pasture. On d 0, all steers were loaded into a commercial livestock trailer, transported for 24 h, and returned to the research facility (d 1). Upon arrival, steers were ranked by BW within treatment, and randomly assigned to 20 feedlot pens. Total DMI was evaluated daily from d 1 to d 28, and shrunk BW was collected on d −31, 1, and 29 for ADG calculation. Blood samples were collected on d −29, 0 (before loading), 1 (immediately upon arrival), 4, 7, 10, 14, 21, and 28 for determination of cortisol, ceruloplasmin, and haptoglobin. Steer temperament was assessed again on d 0 and 28. During the acclimation phase (d −28 to 0), no treatment effects were detected ($P = 0.14$) on steer ADG. Acclimated steers had reduced chute score compared with control on d 0 and 28 ($P \leq 0.01$). During feedlot receiving (d 1 to 28), acclimated steers had reduced ADG ($P < 0.01$), DMI ($P = 0.07$), and G:F ($P = 0.03$) compared with control. Acclimated steers had greater plasma cortisol on d 1 ($P = 0.06$), greater haptoglobin on d 4 ($P = 0.04$), and greater ceruloplasmin from d 0 to 10 ($P \leq 0.04$) compared with control. In conclusion, steers exposed to the acclimation process had greater stress-induced cortisol and acute-phase protein responses, resulting in decreased performance during feedlot receiving.

Key Words: steers, handling, feedlot

398 Effects of 24-h transport or 24-h nutrient restriction on acute-phase and performance responses of feeder cattle. R. S. Marques*[1], R. F. Cooke[1], C. L. Francisco[1,2], T. Leiva[1], F. Sanches[1], A. Bouck[1], F. N. T. Cooke[1], and D. W. Bohnert[1], *[1]Oregon State University, EOARC, Burns, [2]Universidade Estadual Paulista - FMVZ/DPA, Botucatu, SP, Brazil.*

The objective was to compare acute-phase and performance responses of weaned beef calves exposed to transport or nutrient restriction. Angus × Hereford steer (n = 30) and heifer (n = 15) calves were balanced by sex and BW, and randomly assigned to 15 pens on d −12 of the experiment. On d 0, pens were randomly assigned to 1 of 3 treatments: 1) transport for 24 h in a livestock trailer (TRANS); 2) no transport, but feed and water deprivation for 24 h (REST); or 3) no transport and full access to feed and water (CON). Treatments were concurrently applied from d 0 to 1. Total DMI was evaluated daily from d 1 to d 28. Full BW was recorded before treatment application and at the end of experiment. Blood samples were collected on d 0, 1, 4, 7, 10, 14, 21, and 28. Mean ADG was greater ($P < 0.01$) in CON vs. TRANS and REST calves, but similar ($P = 0.46$) between TRANS and REST calves. No treatment effects were detected on DMI, but CON had greater G:F vs. TRANS ($P < 0.01$) and REST calves ($P = 0.08$), whereas G:F was similar ($P = 0.21$) between TRANS and REST calves. Plasma cortisol concentrations were greater ($P \leq 0.05$) in REST vs. CON and TRANS calves on d 1, 4, 7, 14, 21, and 28, and tended to be greater ($P = 0.10$) in TRANS vs. CON calves on d 1. Serum NEFA was greater ($P < 0.01$) in REST and TRANS vs. CON calves on d 1, but also greater ($P < 0.01$) in REST vs. TRANS calves on d 1. Plasma ceruloplasmin peaked on d 4 for TRANS and REST calves (day effects; $P < 0.01$) but did not change ($P = 0.58$) for CON calves. Hence, CON calves had reduced mean plasma ceruloplasmin concentration vs. TRANS ($P = 0.07$) and REST ($P = 0.01$) calves. Plasma haptoglobin peaked on d 1 for TRANS and increased from d 1 to 14 in REST calves (day effects; $P < 0.01$) but did not change ($P = 0.65$) for CON calves. Hence, TRANS calves had greater plasma haptoglobin vs. CON and REST calves on d 1 ($P < 0.01$), whereas REST calves had greater ($P \leq 0.05$) plasma haptoglobin vs. TRANS and CON calves on d 7. In conclusion, 24-h transport and 24-h nutrient restriction elicited acute-phase protein reactions, and similarly reduced performance of feeder cattle.

Key Words: cattle, nutrient restriction, transport