abstracts

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SYMPOSIA AND ORAL SESSIONS

Graduate Student Competition I

1 Effect of implants and nutrient restriction prior to feeding on carcass quality. J. Robinette*, P. Beck, B. Barham, S. Gadberry, and J. Apple, *University of Arkansas, Fayetteville.*

The objective of this study was to determine the relationship between implant status and energy balance prefinishing and their effects on performance and carcass quality. Spring-born calves (n=120, BW=230 ± 5.9 kg) were finished as calves (CALF-FED, n=4 groups) or placed on growing program for ADG of 0.45 kg/d (RSTR, n=4 groups) or 0.91 kg/d (UNRSTR, n=4 groups) before finishing on steam-flaked corn-based diet. Cattle in the CALF-FED treatment were grown in dry-lot to promote ADG of 1.1 kg/d for 90-d prior to finishing at a commercial feedyard. Cattle in UNRSTR treatment were placed on wheat pastures for 120-d prior to finishing with the goal of 0.91 kg/d. Cattle in the RSTR treatments were fed hay and supplement to support ADG of 0.45 kg/d for 60-d before being placed on wheat pasture for 60-d. One-half of each backgrounding group received moderate potency hormonal implants (Synovex S or H, depending on gender) before finishing. Yearling cattle (UNRSTR and RSTR) were shipped to the finishing yard on April 22. At arrival to the feedyard all calves were implanted with a moderate potency implant and were reimplanted following 100-d (CALF-FED) or 81-d on feed (UNRSTR and RSTR). Animal performance and carcass characteristics data were analyzed as a split plot design using the mixed procedure of SAS. Treatment least-squares means were separated using predicted differences. Implantation before finishing increased ($P \leq 0.02$) prefinishing ADG and initial finishing BW but did not affect ($P \geq 0.15$) finishing ADG, harvest BW, or HCW. Harvest BW and HCW of UNRSTR was greater than ($P \leq 0.02$) CALF-FED and RSTR, which did not differ ($P = 0.22$). Finishing ADG of CALF-FED was 0.22 kg less ($P < 0.01$) than both UNRSTR and RSTR, which did not differ ($P = 0.70$). Prefinishing implants of RSTR reduced ($P \leq 0.05$) marbling score and percentage USDA Choice compared with CALF-FED with or without backgrounding implant and RSTR without backgrounding implant, but did not differ ($P = 0.15$) from UNRSTR. Implantation during a period of nutrient restriction prefinishing can have lasting impacts on carcass quality.

Key Words: carcass quality, implants, beef cattle

2 The accuracy of ultrasound measurements taken prior to slaughter to measure carcass traits in beef cattle. C. H. Hughes*[1], F. R. B. Ribeiro[1], J. A. Carter[1], L. O. Tedeschi[2], G. E. Carstens[2], R. K. Miller[2], S. B. Smith[2], R. D. Rhoades[3], and B. M. Bourg[2], [1]*Texas A&M University*, *Commerce*, [2]*Texas A&M University*, *College Station*, [3]*Texas A&M University*, *Kingsville*.

The objective of this study was to determine the adequacy of real-time ultrasound (RTU) to measure carcass traits prior to slaughter in 228 head of beef cattle over 5 studies. Studies 1-5 consisted of 118 Santa Gertrudis steers, 16 Angus bulls and 16 Angus heifers, 18 Angus cross steers, 36 crossbred steers, and 24 Angus steers, respectively. There were 17 animals that were not included in the ribeye area analyses due to poor image quality, and 16 were Santa Gertrudis steers and 1 Angus heifer. The RTU measurements were taken 7 days prior to slaughter and consisted of 12-13th rib backfat (uBF, mean= 0.93 cm), 12-13th *longissimus dorsi* muscle area (uREA, mean= 76.9 cm^2), and percentage of i.m. fat (uIMF, mean= 3.35%). Intramuscular fat was converted to ultrasound marbling score (uMARB). Carcass data included HCW (mean= 313 kg), 12-13th rib backfat (cBF, mean= 1.04 cm), 12-13th *longissimus dorsi* muscle area (cREA, mean= 74.1 cm^2), and marbling score (cMARB, mean = 4.96). Marbling scores were converted to a numeric cMARB (Slight^{00} = 4, and Small^{00} = 5). Data were analyzed using the PROC MEANS and PROC CORR procedure of SAS and accuracy results determined by the Model Evaluation System software. Results show that uBF, uREA, and uMARB were highly correlated to cBF, cREA, and cMARB (0.85, 0.67, and 0.64, respectively). Carcass BF and cMARB were under predicted by uBF and uMARB (0.10 cm, and 0.37 marbling units, respectively). However cREA was over predicted by uREA. The large number of images rejected due to poor quality could be related to the breed of those steers. Given that *Bos indicus* animals tend to scan a little darker than *Bos taurus*, there is a higher occurrence of rejected images. These results show that RTU can accurately measure carcass traits in beef cattle. More research is needed in order to explain the differences in accuracy between *Bos indicus* and *Bos taurus* cattle.

Key Words: ultrasound, accuracy, carcass

3 The relationship of body condition score and subcutaneous and internal fat measurements by real-time ultrasound in crossbred beef cows. K. N. Gates*[1], F. R. B. Ribeiro[1], J. A. Carter[1], C. A. Hughes[1], S. Stewart[1], and R. G. Tait, Jr.[2], [1]*Texas A&M University*, *Commerce*, [2]*Iowa State University*, *Ames*.

The objective of this study was to identify the relationship of body condition score (BCS) and real-time ultrasound (RTU) fat measurements in crossbred beef cows (n = 48). BCS is a commonly used method of evaluating total body energy reserves in cattle. Additionally, poor condition prior to breeding, during late gestation, and during early lactation have negative effects on reproductive performance of cows. RTU is a non-invasive technique to measure body composition in live animals and can be used to accurately determine back fat in live animals. In this study, the cows were scanned prior to the start of the breeding season by an Ultrasound Guidelines Council field-certified technician using an Aloka 500V real-time ultrasound machine with a 17-cm, 3.5 MHz transducer. RTU traits measured were 12-13th rib fat thickness (uBF, mean =0.33 cm), rump fat thickness (uRUMPFT, mean = 0.43 cm), and ultrasound kidney fat depth (uKFd, mean = 17.1 cm). Total internal fat (IFAT, mean = 25.2 kg) was calculated based on previously published equations and also an average of the subcutaneous fat level was calculated by averaging uBF and uRUMPFT (ComboFat, mean = 0.38 cm). Data were analyzed using the PROC REG and PROC GLM procedures of SAS. BCS was highly correlated ($P < 0.05$) to uKFd, uRUMPFT, uBF, and IFAT (0.55, 0.46, 0.47, 0.60, respectively). Prediction equations showed that BCS, BW and hip height were good predictors of ComboFat ($R^2 = 0.38$) and IFAT ($R^2 = 0.39$). These results agree with previous studies indicating that there is a good relationship between BCS and RTU fat measurements in beef cows. Adjustments for different breeds might be needed in order to improve the accuracy of the model. More data will be added to this study in order to increase the number of observations and improve the accuracy of using BCS to estimate fat levels.

Key Words: body condition, cattle, ultrasound

4 Effects of genotype and fescue cultivar on steer gain and carcass traits. A. M. Webb*[1], M. L. Looper[2], M. A. Sales[1], C. R. Krehbiel[3], D. L. VanOverbeke[3], S. Reiter[1], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA/ARS, DBSFRC*, *Bonneville, AR*, [3]*Oklahoma State University*, *Stillwater*.

The aim of this study was to determine the effects of fescue cultivar (Toxic vs. Non-toxic), and genotype of single nucleotide polymorphisms (SNPs) in prolactin (C1286T) and cytochrome P450 (C994G) genes on steer gains and carcass traits. During a two-year grazing study, steers (n = 103) grazed stockpiled tall fescue. Cultivars of tall fescue were toxic (KY-31) or non-toxic (HM4 or MaxQ). Steers grazed from December to April (~162 days), followed by finishing (~142 days) until harvest. At harvest, the following traits were recorded: hot carcass weight (HCW; kg), rib fat thickness (RF; cm), longissimus muscle area (REA; cm^2), kidney pelvic heart fat (KPH; %), and USDA yield grade (YG) were determined. Stocker average daily gain (SADG) was not affected ($P > 0.36$) by C1286T; however, fescue cultivar and C994G did affect ($P < 0.05$) SADG. Steers grazing stockpiled non-toxic fescue gained more ($P < 0.05$) than steers grazing stockpiled toxic fescue (0.49 vs. 0.36 kg/d, respectively). Feedlot average daily gain (FADG) was not affected ($P > 0.13$) by fescue cultivar, C1286T or C994G. The HCW was heavier ($P < 0.1$) for steers that grazed non-toxic when compared to toxic fescue (361 vs. 348 kg, respectively). Furthermore, steers with the CT genotype had heavier ($P < 0.08$) HCW than steers with CC or TT genotypes (367 vs. 352 and 345 kg, respectively). The RF, REA and YG were not affected by fescue cultivar, C1286T, or C994G. Steers that had grazed toxic tall fescue had more ($P < 0.1$) KPH fat than steers that grazed non-toxic fescue (2.3 vs. 2.0%, respectively). Prolactin and cytochrome P450 genotypes did not have an interactive affect with tall fescue cultivars on steer gain or carcass traits.

Key Words: prolactin, cytochrome P450, tall fescue

5 A comparison of ruminal and large intestinal microbial population of residual feed intake-indexed Brahman bulls under grazing conditions. L. M. Wiley*[1], L. O. Tedeschi[1], T. D. A. Forbes[2], F. M. Rouquette, Jr.[3], R. D. Randel[3], F. R. B. Ribeiro[4], and S. E. Dowd[5], [1]*Texas A&M University*, *College Station*, [2]*Texas Agrilife Research*, *Uvalde*, [3]*Texas Agrilife Research*, *Overton*, [4]*Texas A&M University*, *Commerce*, [5]*Medical Biofilm Research Institute and Research and Testing Laboratory*, *Lubbock, TX*.

The objective of this study was to compare the ruminal and large intestinal microbial population of Brahman bulls grazing Coastal bermudagrass ([*Cynodon dactylon* (L.) Pers]) for 60 d at two stocking rates (SR). Previously, a residual feed intake (RFI) trial identified the bulls as efficient (LRFI) or inefficient (HRFI). They were randomly assigned to either 2 high SR (HSR) or 2 low SR (LSR) pastures. The gastrointestinal tract (GIT) was removed and refrigerated for 24 h. The contents of the rumen (RUM) and the large intestine (LI) were each thoroughly mixed and 2 samples (400 ml) per compartment were collected and frozen. Ruminal microbial populations were profiled using the 16 rDNA bacterial tag-encoded FLX amplicon pyrosequencing technique. Bacterial populations were identified at the genus level and reported as a % of the total DNA. Each genus was organized according to substrate affinities for cellulose, hemicellulose, pectin, starch, protein, and lipids. The statistical analysis was conducted as a split-plot design in a 2 x 2 x 2 factorial arrangement (GIT x RFI x SR) with pastures within SR as random effects. RUM had more ($P < 0.001$) cellulolytic bacteria than LI (3.3 x 0.61%; respectively). Hemicellulolytic bacteria in the RUM were greater than in the LI (14.9 x 0.76%, respectively), but a 3-way interaction was observed ($P = 0.04$): LSR-LRFI bulls had the greatest ruminal % (18.8%). RUM had more pectinolytic bacteria than LI (15.1 x 2.54%, respectively), but a 2-way interaction ($P = 0.0234$) between SR and RFI existed: LSR-LRFI was not different ($P > 0.05$) from the HSR-HRFI bulls (12.3 and 8.84%; respectively), but they had greater % values than LSR-HRFI and HSR-LRFI bulls (7.2 and 6.96%; respectively). RUM also had more ($P = 0.003$) lipolytic bacteria than the LI (0.78 x 0.09%; respectively). The starch-degrading bacteria in the GIT tended to differ ($P = 0.07$) and there were no % differences in the proteolytic bacteria between RFI groups. Our results indicate that efficient bulls might have a greater % of structural carbohydrate-degrading bacteria when forage availability is not limiting.

Key Words: bacteria, cattle, fermentation

6 Effects of residual feed intake classification on feed efficiency, ultrasound and feeding behavior traits in Angus based composite steers. J. C. Bailey*, G. E. Carstens, J. T. Walter, A. N. Hafla, E. D. Mendes, and L. O. Tedeschi, *Texas A&M University*, *College Station*.

Objectives of this study were to evaluate the effects of residual feed intake (RFI) classification on performance, efficiency, ultrasound and feeding behavior traits in growing steers. Individual DMI, ultrasound and feed behavior traits were measured in Angus-based composite steers (N = 508; initial BW = 310 ± 56 kg) fed a high-grain diet (ME = 3.08 Mcal/kg DM) for 70 days using a GrowSafe feed intake system during 3 consecutive years. RFI was computed as the residual between actual and expected DMI calculated from linear regression of DMI on

ADG and mid-test $BW^{.75}$, and steers classified into low (< -0.5 SD, n = 148), medium (± 0.5 SD, n = 206), and high (> 0.5 SD, n = 154) RFI phenotype groups. Initial BW (310.1 ± 56.1 kg) and ADG (1.68 ± .25 kg/d) were similar ($P > 0.30$), but DMI (9.62, 10.42, 11.39± 1.32 kg/d), and F:G (5.95, 6.21, 6.95 ± 1.35 kg/d) were lower ($P < 0.0001$) for low RFI steers compared to high RFI steers. Low RFI steers had less ($P < 0.0001$) final back fat thickness (0.658 cm) than steers with medium and high RFI (0.717 and 0.766 ± .23 cm, respectively). Low and medium RFI groups had lower ($P < 0.05$) intramuscular fat percentage (3.06 and 3.12 ± 0.7%) than high RFI steers (3.13%). Final ribeye area was not affected by RFI group ($P > 0.20$). RFI steers in the low RFI group spent less time ($P < 0.05$) at the feed bunk (68.9, 77.4, 75.8 ± 35.4 min/d) and visited the bunk less frequently ($P < 0.0001$) than medium and high RFI steers (53.1, 55.4, 60.5 ± 17.8 events/d). Meal frequency did not differ between RFI groups, however meal duration (69.7, 82.7, 90.9 ± 32.4 min/d), and the bunk visit per meal ratio (10.6, 10.8, 11.9 ± 3.7 events/meal) were lower ($P < 0.005$) for low RFI steers compared to high RFI steers. These results suggest that steers with low RFI consumed 18.4% less feed, had 9.9% shorter daily bunk visits and 30.5% shorter daily meals than steers with high RFI.

Key Words: residual feed intake, feeding behavior

7 Effects of spray-dried porcine plasma (SDPP) administered as an oral gavage on pre-weaning growth performance in piglets. L. M. Wittish* and M. J. Estienne, *Virginia Polytechnic Institute and State University, Blacksburg.*

Dietary inclusion of SDPP increases feed intake and growth in nursery pigs, with the most dramatic effects observed during the first week post-weaning. We hypothesized that consumption of SDPP by suckling pigs may also enhance performance and increase BW at weaning. The objective of the experiment was to determine the effects of administering an oral gavage of SDPP on pre-weaning growth performance of piglets. Health and welfare status in SDPP-gavaged pigs was also assessed by analyses of blood chemistry and hematology. A total of 80 pigs were randomly placed into two groups based on BW and gender. The pigs from these groups were then randomly assigned to two treatment groups, each containing 40 barrows and 40 gilts. Treatment group one received SDPP (0.375 g/mL) and treatment group two received water as a control. Pigs received 25 mL of their assigned gavage 2x/d for five d prior to weaning. Body weights were recorded on d 1 of treatment and at weaning (30 to 33 d of age). At weaning, blood samples were obtained via jugular veni-puncture, and rectal temperatures were recorded. Blood samples were analyzed to obtain blood chemistry and hematology results. The initial BW and litter were significant sources of variation for the weaning BW and the BW gain during lactation ($P < 0.05$). Litter was a significant effect for rectal temperature and several blood chemistry measurements: glucose, urea nitrogen, creatinine, phosphorus, total protein, albumin, and chloride ($P < 0.05$). Significant effects of initial BW were detected for glucose, albumin, sodium, and creatine kinase ($P < 0.05$). There was no significant effect of treatment on any measurement. In summary, litter of origin plays a role in the development of suckling pigs and weight gain during lactation. Oral gavage of SDPP does not seem to have a significant effect on weight gain during the last five d prior to weaning.

Key Words: growth, pig, spray-dried porcine plasma

8 Effect of timing of BRD vaccination on performance of stocker cattle during receiving. K. Poe*, P. Beck, D. Hubbell, T. Hess, and J. Richeson, *University of Arkansas*, *Fayetteville*.

Stress of newly received stocker calves compromises immune function reducing vaccination response and animal performance. The objective of this study was to evaluate the effect of timing of bovine respiratory disease (BRD) vaccination on the performance of stocker cattle. Treatments consisted of 1) Control - no vaccine with multivalent BRD MLV until d 42 2) AMLV - initial vaccination of a multivalent BRD MLV on d 0 and d 14 booster, or 3) DMLV - delayed vaccination of a multivalent BRD MLV until d 14 with booster on d 28. Crossbred bull and steer calves were received in two blocks during both the fall and spring, each block was weighed (Fall, n = 184, initial BW 211 ± 2.6 kg; Spring, n = 186, initial BW = 213 ± 5.4 kg), processed routinely with the only difference being timing of BRD MLV, and randomly assigned to treatments based on gender on d 0. Calves exhibiting visual symptoms of respiratory illness were removed and treated following a pre-determined antibiotic protocol when their temperatures were ≥ 40˚C, then returned to their respective pens. Calf BW was recorded full on d 14, 28, and 42. Calf BW, ADG, and morbidity data were analyzed using the mixed procedure of SAS as a RCBD by season because of significant season by treatment interactions ($P \leq 0.02$). Contrasts (control vs vaccinated and AMLV vs DMLV) were used to separate treatment least-squares means. Daily gain was greater for DMLV than AMLV from d 14 to 28 (1.13 ± 0.44 vs. 0.74 ±0.44; $P < 0.01$) in the fall and ADG of DMLV were greater than AMLV from d 28 to 42 (0.70 ± 0.18 vs. 0.27 ± 0.18; $P < 0.01$) in the spring. In the fall, AMLV calves had a greater ADG from d 28 to 42 (0.78 ± 0.22 vs. 0.40 ± 0.22; $P < 0.01$). During the spring, morbidity rates for BRD were considerably lower than fall calves, but did not differ ($P \geq 0.26$) due to treatment. Days to first treatment, percent mortality, and pasture ADG did not differ ($P \geq 0.14$). Delaying vaccination by 14-d may increase ADG of high risk newly received stocker calves by reducing stress but had no affect on morbidity.

Key Words: receiving cattle, vaccination, health

Teaching and Undergraduate Education

9 Cattle handling demonstrations for undergraduate students. W. Owsley* and C. Bratcher, *Auburn University*, *Auburn, AL*.

The number of Animal Science students with an animal background has declined steadily for the past 20 years. Including hands-on demonstrations in the classroom is difficult, and laboratories often provide a limited amount of time for direct student involvement. The Auburn University Block and Bridle Club is often asked to help with cattle sales. The sales provide an excellent learning opportunity for the students, and often provide funding for the club as well. It is at times difficult to find enough students with experience to help with the sales. In the fall of 2009, any member interested in working cattle sales, regardless of experience, were required to attend a cattle working demonstration. After an over-view of basic handling concepts and techniques, students were divided into groups and assigned a pen of cattle to sort by number, move through a working alley into a sale ring, and return to holding pens. Each group had at least one student with experience working cattle. The

groups selected a leader, who then assigned duties to the remainder of the team. Of the 30 to 40 students expected, 65 were in attendance. The demand was so great that another session was held for an additional 35 students. The program was repeated in the fall of 2010, with similar results. The demonstrations get students involved with livestock early in their education, as most participant are freshmen and sophomores. More experienced students get an opportunity to provide leadership and share their experience. Based on student requests, demonstrations are now conducted for other species.

Key Words: cattle, handling, students

Undergraduate Student Competition

10 Forage characteristics and beef cattle production from continuously stocked triticale, wheat and ryegrass pasture.

L. A. Smith*, S. P. Schmidt, W. F. Owsley, and R. B. Muntifering, *Auburn University*, *Auburn, AL*.

Among the small grains, triticale (T, *Triticale secale*) is a lesser utilized but promising winter forage that combines the high yield potential of wheat (W, *Triticum aestivum*) with the disease and cold tolerance of rye (*Secale cereale*), and research is needed to determine its value for winter grazing relative to more commonly utilized small grains and other winter-annual forages such as ryegrass (R, *Lolium multiflorum*). In the present experiment, six 1.42-ha pastures were tilled in early November 2009, and seed was drilled into prepared beds at rates of 126 (T), 140 (W) and 22 (R) kg/ha (2 replicates/ treatment). Pastures were stocked initially with 3 yearling Angus × Simmental test steers (339 ± 31 kg initial BW) each on January 12 (R and W) and January 26, 2010 (T) when forage DM availability had reached approximately 1,000 kg/ha. Forages were managed with put-and-take steers to maintain DM availability at approximately 2,000 kg/ha. Steers were weighed and forages were sampled periodically throughout and at the end of the experiment, and grazing was discontinued after 112 d on May 5 when forage availability and quality could no longer support acceptable steer gains. Data were analyzed as a completely randomized design by the PROC GLM procedure of SAS. Test-steer ADG was greater ($P < 0.05$) for R (1.80 kg/d) and W (1.80 kg/d) than T (1.54 kg/d). Forage concentrations of NDF, ADF and ADL did not differ among treatments, but concentration of CP was greater ($P < 0.05$) for T (18.6%) than W (14.5%) and R (14.2%). Forage DM availability did not differ among treatments (mean = 1,771 kg/ha), but grazing-days/ha were greater ($P < 0.05$) for W (319) and R (305) than T (228) as a result of earlier onset of grazing and more sustained productivity during the month of April. Variability in ADG could not be attributed to variability in forage quality characteristics, but a relatively small portion ($r^2 = 0.15$; $P < 0.05$) could be explained on the basis of variability in forage DM availability. Results are interpreted to mean that W and R were superior to T for winter grazing under the particular conditions of this experiment.

Key Words: beef cattle, ryegrass, small-grain forage

11 Effects of grazing stockpiled endophyte-infected tall fescue pastures on growth and physiological indices of dairy heifers.

R. Henry*[1], J. Huff[l], S. Reiter[1], W. Coblentz[2], M. Looper[3], and C. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA-ARS*, *Marshfield, WI*, [3]*USDA-ARS*, *Booneville, AR*.

Tall fescue (*Lolium arundinaceum* [Schreb.] S. J. Darbyshire) is a cool-season grass grown on over 20 million acres of pasture land and hayfields in the Midwestern and Southeastern United States. A grazing trial was conducted to determine the effects of stockpiled tall fescue on the physiological and growth indices of dairy heifers. Our study utilized two cultivars of tall fescue, Kentucky 31 (KY31; wild-type endophyte-infected; 4 paddocks) and HiMag 4 (HiMag; non-toxic endophyte-infected; 4 paddocks). Both cultivars were fertilized with ammonium nitrate (34-0-0) in September and allowed to grow in the fall before the start of the grazing trial in December. Crossbred dairy heifers (Holstein x Jersey; n = 32) were stratified by weight and randomly allotted to forage on December 6. All heifers were given a daily corn-based grain supplement (~0.8% BW) and ad libitum access to water. Forage availability and protein content varied during the trial, but were not limiting. Forage fiber content (NDF and ADF percent) increased, and forage protein content decreased in both cultivars during the trial. Tall fescue cultivar did not affect ($P > 0.2$) heifer body weights; however, heifers grazing HiMag had faster ($P = 0.06$) ADG during the first 28 d than heifers grazing KY31 (1.1 vs. 0.9 kg). Blood characteristics were not affected ($P > 0.17$) by tall fescue cultivar. White blood cells were elevated ($P < 0.01$) at d 28 and 56; while, red blood cell numbers increased ($P < 0.01$) at each 28 d interval. Serum metabolite and enzyme activities showed inconsistent variation over the duration of the trial. The results of this trial indicate that stockpiled tall fescue can be used to develop dairy heifers without detrimental effects on growth or blood cell profiles.

Key Words: Holstein, blood cells, tall fescue

12 Variability in nutritive value of distillers' grains.

M. L. Drewery*[1], J. E. Sawyer[1], N. M. Kenney[1], M. S. Cabaniss[1], W. E. Pinchak[2], and T. A. Wickersham[1], [1]*Texas A&M University*, *College Station*, [2]*Texas AgriLife Research*, *Vernon, TX*.

Use of distillers' grains as a livestock feed has grown as supplies have increased. However, distillers' grains are not a homogeneous ingredient, and this variability has the potential to impact livestock performance and profitability. Therefore, the objective of this experiment was to quantify variation in nutritive value of distillers' grains between and within ethanol plants. Wet distillers' grains from 25 ethanol plants were sampled on each of 3 separate days. Samples were dried at 55°C in a forced-air oven for 96h, ground to pass a 1-mm screen, and analyzed for DM, OM, NDF, ADF, CP, EE, and digestibility. In-vitro true digestibility was determined using a Daisy incubator and ruminal fluid. Means and standard deviations for each nutrient were DM (43.9 ± 10.1%), OM (94.5 ± 1.71%), NDF (29.1 ± 5.5%), ADF (11.5 ± 2.4%), CP (27.4 ± 2.5%), EE (10.4 ± 2.0%), and digestibility (90.0 ± 2.7%). Ranges for each nutrient were 31.0 - 79.9% (DM), 89.7 - 98.1% (OM), 14.5 - 47.6% (NDF), 7.8 - 19.6% (ADF), 24.0 - 35.6% (CP), 6.5 - 15.9% (EE), and 76.4 - 93.6% (digestibility). Nutrient concentrations differed among ethanol plants ($P < 0.01$). Nutrient values were more variable among locations than within location. Standard deviation within location averaged ± 1.66% (DM), ± 0.883% (OM), ± 1.53% (NDF), ± 0.847% (ADF), ± 0.73% (CP), ± 0.56% (EE), and ± 1.48% (digestibility). These results suggest nutrient value of distillers' grains varies between locations and within location. Accordingly, it is recommended nutritionists determine the range in nutritive value and formulate diets with consideration to this range and variability. Ethanol plants have the potential to add value to co-products if processes to reduce variability are employed.

Key Words: distillers grains, digestibility, nutritive value

13 Effects of pre-weaning traits on BVDV type I immunoglobulin response to vaccination in beef calves. W. J. Downum*, A. H. Brown, Jr., J. G. Powell, E. B. Kegley, Z. B. Johnson, D. B. Galloway, J. A. Hornsby, and B. R. Lindsey, *University of Arkansas, Division of Agriculture*, *Fayetteville*.

Objectives were to determine effects of chute behavior score, chute exit velocity, sex, vaccination date, weaning weight, and pre-weaning ADG, calf age, and age of dam at weaning on Ig response to BVDV vaccination in crossbred beef calves. Calves (n = 64) were allotted to one of two treatments (TRT1, n=32; TRT2, n=32). At 60 d of age (d 0) and at weaning, calves in TRT1 were vaccinated against BVDV (Pyramid 5). Calves in TRT2 were vaccinated against BVDV at 21d prior to and again at weaning. Serum from half of the calves in each group (TRT1, n=16; TRT2, n=16) was harvested for determination of Ig response from jugular blood samples taken on d 0, d 21, d 126 (21 d prior to weaning), and d 147 (at weaning). Serum was sent to Iowa State University Veterinary Diagnostic Laboratory for determination of Ig response using viral neutralization. Chute behavior scores (CS) were: 1 calm extremely docile, 2 restless shifting, 3 continuous movement, 4 continuous violent struggle, 5 berserk frenzy. Chute exit speed was the time required for a calf to traverse 1.8 m after release from the chute. Chute exit velocity (CEV) was calculated as velocity = distance (m) / time (s). Prior to analysis BVDV type I titers were transformed to log base 2 (log2). Data were analyzed using mixed model procedures. Fixed effects were treatment, sex and date. Random effect was calf. Mean log2 of BVDV Type I titers were different ($P < 0.0001$) for TRT1 compared to TRT2 (7.5±0.36 and 5.1±0.36, respectively). Mean log2 of BVDV Type I titers were higher on d 147 ($P < 0.0001$) compared to d 126, d 21 and d 0 (8.3±0.39, 5.1±0.40, 5.9±0.39 and 5.7±0.39, respectively). A treatment x date interaction ($P < 0.0001$) was also identified for the mean log2 of BVDV Type I titers. Mean log2 of BVDV Type I titers were not affected ($P > 0.05$) by sex, CEV, CS, weaning weight, and pre-weaning ADG. This study indicated that vaccinating beef calves against BVDV was effective in triggering an Ig response.

Key Words: beef cattle, immunoglobulin, BVDV titer

14 Identification of QTL for two measures of feed efficiency in Nellore-Angus F_2 steers. J. D. Luck*, T. S. Amen, D. G. Riley, A. D. Herring, P. K. Riggs, J. E. Sawyer, J. O. Sanders, and C. A. Gill, *Texas A&M University, Department of Animal Science*, *College Station*.

The objective of this study was to map QTL for feed efficiency in crossbred steers. Steers (n = 231) were from 10 full-sibling embryo transfer Nellore-Angus F_2 families raised in 9 contemporary groups in central Texas. Steers were fed in a Calan gate system beginning at 11 to 13 mo of age for 129 to 152 d. Residual feed intake (RFI) was calculated within contemporary group. A second measure of feed efficiency termed model predicted residual consumption (MPRC) used the NRC (2000) beef cattle model to predict expected daily feed intake, which was subtracted from observed DMI to yield MPRC. Residuals from analyses of variance with fixed factors of sire and family nested within sire as independent variables for RFI and MPRC were used for QTL mapping. Steers were genotyped using the BovSNP50 assay (Illumina Inc., San Diego, CA). Resultant genotypes were filtered to remove SNP with <90% call rate, minor allele frequency <0.05, or which deviated from Hardy-Weinberg equilibrium proportions ($P < 0.0001$). For the remaining 34,980 SNP, single marker associations and interval analyses were performed using PLINK and GridQTL software, respectively. Significance levels were established by permutation. Suggestive QTL ($P < 0.05$ chromosome-wise) or clusters of significant SNP ($P < 0.005$) were identified on BTA 3, 11, 14, and 21 for RFI and on BTA 9, 10, 11 and 21 for MPRC. Future work will involve characterization of candidate genes in these regions.

Key Words: *Bos indicus*, feed efficiency, SNP

15 Effects of clarified Noni juice or Noni pulp on the shelf life and color stability of ground beef patties. C. R. Ahrens*, J. W. S. Yancey, J. K. Apple, T. M. Johnson, C. A. Keys, R. J. Stackhouse, and N. A. Browne, *University of Arkansas, Division of Agriculture, Department of Animal Science*, *Fayetteville*.

The Noni plant (*Morinda citrofolia*) has been known to have antioxidant and antimicrobial properties, and natural antioxidants, such as Noni, have been shown to improve color stability and increase shelf life in ground beef. Therefore, the objective of this study was to determine the effects of two different Noni products, clarified Noni juice or Noni pulp, on the shelf life and color stability of ground beef patties. Ground beef (85% lean) from a commercial processor was mixed with clarified Noni juice or pulp at 0, 2.5, or 5%, ground through a 9.5-mm plate, and formed into 113-g patties. Pairs of patties were packaged on foam trays with overwrap and placed in a simulated retail display for instrumental and visual color for 5 d. Thiobarbituric acid reactive substances (TBARS) were assayed on samples from 0, 3, and 5 d of display to determine autoxidation. After 2 d of display, discoloration scores increased ($P < 0.05$) with display duration, but all Noni treatments had similar scores ($P > 0.05$) to control for d 1 through 4. On d 5 of display, the Noni pulp-treated patties had less ($P < 0.05$) discoloration than controls. Worst-point color scores increased ($P < 0.05$) with display day, but Noni treatment did not affect scores ($P > 0.05$). Redness (a*) also decreased ($P < 0.05$) with duration in display, the patties treated with Noni pulp were redder ($P < 0.05$) than those treated with Noni clarified juice on d 5. Noni treatment had no effect ($P > 0.05$) on instrumental lightness or yellowness (L* and b*, respectively), which decreased ($P < 0.05$) with display duration. Autoxidation measures (TBARS) in patties from all Noni treatments were superior ($P < 0.05$) to control patties at d 3 and 5 of display. Furthermore, TBARS values for control patties increased ($P < 0.05$) with display, indicating that they were more oxidized, wheras the TBARS values for the 2.5% juice, the 5% Noni pulp, and the 5% juice patties did not increase ($P > 0.05$) with display. Although there was little effect of Noni clarified juice or pulp on color stability, this product may still have potential as a natural antioxidant in ground beef.

16 The effect of adipocyte determination and differentiation factor-1 (ADD1) on fresh pork quality. M. L. Penick*[1], T. J. Wistuba[1], S. J. Moeller[2], H. N. Zerby[2], and R. S. Emnett-Miculinich[1], [1]*Morehead State University*, *Morehead, KY*, [2]*The Ohio State University*, *Columbus*.

Consumers and many segments of the pork industry continue to demand improvements in the quality of fresh pork products. Previous research has determined that carcass and meat quality traits may be improved with the help of marker assisted selection. The objective of this study is to determine the effect of a promising candidate gene, Adipocyte determination and differentiation factor-1 (ADD1), on meat quality and carcass traits. ADD1 is a transcription factor believed to play a role in lipid biosynthesis in humans and has been found to be involved in the over-expression of certain genes in obese mice. For this project, 200 Berkshire and Landrace sired pigs, that were highly characterized for both carcass and meat quality characteristics, were genotyped using PCR-RFLP procedures. A statistical analysis was completed using the PROC MIXED procedure in SAS (SAS Inst., Inc. Cary, NC). Results show that the ADD1 marker was informative in both the Berkshire and

Landrace populations. ADD1 allele-2 was found at a higher frequency (0.8) in the Berkshire population as compared to the Landrace population (0.5). ADD1 genotype-22 pigs were significantly ($P < 0.05$) fatter, had greater intramuscular fat % ($P < 0.01$) and marbling scores ($P < 0.01$) when compared to ADD1 genotype-11 pigs. ADD1 genotype-11 and 12 pigs had significantly larger loin muscle area ($P < 0.01$) compared to the 22-genotypes. ADD1 genotype groups did not differ significantly ($P > 0.05$) for ultimate pH, Minolta reflectance, Warner-Bratzler shear force, purge loss, color score, firmness and cooking loss. Results indicate that ADD1 may have potential for use in marker assisted selection for the improvement of quality attributes associated with marbling in fresh pork. Further characterization of the effects of ADD1 in a larger population is ongoing.

Key Words: meat quality, genetics, swine

17 Effects of on-arrival versus delayed vaccination with or without metaphylaxis on performance and health of stocker cattle. K. M. Newsom*[1], A. J. Cain[1], J. F. Roberts[1], C. S. Darroch[1], and C. R. Bailey[2], [1]*University of Tennessee*, *Martin*, [2]*Stephen F. Austin State University*, *Nacogdoches, TX*.

The objective of this study was to compare the effectiveness of timing of vaccination and metaphylaxis on stocker cattle growth performance and health. Seventy crossbred stocker cattle obtained from a regional sale barn, weighing 278±1.8 kg were assigned to one of four treatments with cattle BW equalized among treatments. Treatments consisted of vaccination with a multivalent modified live BRD vaccine upon arrival, or delayed vaccination (14d) with or without metaphylaxis (Ceftiofur Crystalline Free Acid). Metaphylaxis involved injection of a broad spectrum antibiotic on day 0. Serum samples (4 ml) were collected from the ventral coccygeal vein, and BW and rectal temperatures recorded on days 0, 7, 14, 21, 28, 35, 42 and on day shipped. Serum samples were analyzed for BVD PI, IBR, BVD, and BRSV. All cattle were processed using routine procedures, with the exception of the initial vaccination and metaphylaxis. Data were analyzed in a 2x2 factorial arrangement using a CRD. IBR titers (d 14-35) were elevated ($P < 0.0002$) in cattle vaccinated upon arrival compared to the delayed vaccination group. BVD titers were also higher ($P < 0.0002$) in cattle vaccinated upon arrival compared to the delayed vaccination group. Delayed vaccination had no effect on body weight gains of cattle. There were no significant interactions between timing of vaccination and metaphylaxis. Metaphylaxis resulted in cattle with heavier ($P < 0.02$) final body weights averaging 343.3±3.8 kg compared to untreated cattle which averaged 328.9±3.9 kg. The increased BW of cattle that received metaphylaxis was a result of increased ADG ($P < 0.009$) throughout the study period, that averaged 0.7±0.04 kg/d and 0.5±.04 kg/d for cattle with or without metaphylaxis, respectively. This study indicates that metaphylaxis upon arrival is more critical than timing of vaccination in comingled stocker cattle with an unknown medical history.

Key Words: cattle, delayed vaccination, metaphylaxis

18 Utilizing tropical forage legumes to supplement young goats fed a basal diet of sudangrass hay. T. E. Lutz*, F. N. Mhlanga, S. G. Fox, M. A. Nicodemus, and E. Pierce, *Abilene Christian University*, *Abilene, TX*.

Legumes provide a rich source of protein which helps in animal production, while also being helpful to the soil because of their ability to fix nitrogen. The objective of this study was to compare feed intakes and growth rates of goats supplemented with one of four tropical forage legumes. Thirty Boer kids about three months old and averaging 22.0 kg were used in this study. Animals were randomly allocated to one of five diets. The five dietary treatments were sudangrass hay fed alone (control) or sudangrass hay supplemented with lablab, cowpea red river (CPRR), cowpea iron and clay (CPIC), or mungbean. Sudangrass and forage legume supplement were fed at a ratio of 60% (grass) to 40% (legume). A split plot design was used with diet as the main plot, two pens per diet as the experimental units and three goats per pen as samples. The Generalized Linear Models procedure in SAS was used for data analysis. The crude protein (CP) content of legumes ranged from 19.4% to 22.1%. Neutral detergent fiber tended to be highest for CPRR (41.0%) than for CPIC(34.2%), lablab (30.1%) and mungbean(35.7%). Total daily intakes were highest for legume supplemented groups than for the control group ($P < 0.05$). The average daily intake per pen for animals fed legumes was 328.23g higher than for animals receiving sudangrass hay alone ($P < 0.05$). Legume intake was highest for lablab as compared to other legumes ($P < 0.05$). The daily intakes of sudangrass hay tended to be higher for animals receiving either CPRR or CPIC. No significant variation was observed for average daily gain ($P < 0.05$). The results showed that lablab had the highest acceptability. However, intakes of sudangrass hay were improved by supplementing with either cowpea red river or cowpea iron and clay.

Key Words: cowpea, mungbean, lablab

19 Evaluating the combined effects of RADEX and TASCO-14 on utilization of poor quality roughages by small ruminants. A. Simon*[1], F. N. Mhlanga[1], R. H. Anderson[2], J. Cosby[1], and E. Pierce[1], [1]*Abilene Christian University, Abilene, TX,* [2]*Andersons Consulting & Training Service Inc, Weatherford, TX.*

Utilization of poor quality roughages by ruminants can be improved by supplementing with low levels of RADEX, a patented formate salt. It has also been shown that TASCO-14, an extract from the brown seaweed *Ascophyllum nodosum* has beneficiary effects on livestock growth and production due to its antioxidant capacity. The objective of this study was to determine the combined effects of RADEX and TASCO-14 on intake, and performance of meat goats fed a basal diet of sudangrass (*Sorghum bicolor*) hay (CP% = 6.67%, ADF = 37.53%, NDF = 57.60%). Twenty four Boer kids of mixed sex, and averaging 19.4 kg were used in a 42-day feeding trial. The animals were randomly allocated to one of four dietary treatments of sudangrass hay (SH), sudangrass hay plus RADEX (SHR), sudangrass hay plus TASCO-14 (SHT) or sudangrass hay plus both RADEX and TASCO-14 (SHRT). The RADEX and TASCO-14 were included in a supplement that was fed at 15% of total daily intake. The supplement fed to the control group did not contain either RADEX or TASCO-14. Animals receiving SH showed significant weight losses (-13g/d) compared to those on SHR, SHT or SHRT ($P<0.05$). Although the average daily gain was highest for SHRT (13.65g/d), compared to SHR (7.32g/d) and SHT (6.73g/d), the least square estimates did not vary significantly ($P> 0.05$). Voluntary daily feed intakes for sudangrass hay were lowest for SH ($P<0.05$) but did not vary significantly for SHR, SHT and SHRT ($P>0.05$), The least square means for total daily intakes of hay per animal were 297.36g, 319.82, 335.64g and 321g for SH, SHR, SHT and SHRT, respectively. The results demonstrate the effectiveness of RADEX and TASCO-14 in enhancing intake of poor quality roughages by small ruminants. The results also show that RADEX and TASCO -14 can be combined to maintain weight or to prevent weight loss in goats fed poor quality grasses.

Key Words: TASCO-14, RADEX, small ruminants

Graduate Student Competition II

20 Effects of forage and breed type on grazing behavior and temperament of beef heifers. A. R. Boyer*[1], M. L. Looper[2,1], K. P. Coffey[1], and C. F. Rosenkrans, Jr[1], [1]*University of Arkansas, Fayetteville,* [2]*Dale Bumpers Small Farms Research Center, Booneville, AR.*

Objectives were to determine performance and grazing behavior of pregnant Brangus (BR; n = 64; BW = 402 ± 31 kg) and Gelbvieh x Angus (GA; n = 64; BW = 410 ± 39 kg) heifers consuming either toxic endophyte-infected (EI) or one of two types of non-toxic novel endophyte-infected tall fescue varieties (MQ = MaxQ™ or HM = HiMag) during 2 yr. On d 0 of grazing, heifers were weighed, blocked by breed, and assigned to graze replicated pastures of either EI, MQ, or HM fescue. Heifers were weighed on d 28, 56 and 99 (yr 1) and d 56 and 111 (yr 2) of grazing. Grazing behavior was monitored at 1300 to 1500 h (n = 13 observations/yr in June and July). Heifers were recorded as 1) grazing 2) in the shade 3) lying without grazing or 4) standing without grazing and sun versus shade preference was recorded. Exit velocity (EV; rate at which heifers exited the squeeze chute and traversed 1.8 m) was recorded on 3 dates during yr 2. Heifer BW was affected ($P < 0.05$) by a forage type x time interaction. A forage type x breed interaction influenced ($P < 0.01$) BW; GA heifers grazing non-toxic fescue were heavier (469 ± 3.2 kg) than other heifers grazing EI or non-toxic fescue (mean BW = 442 ± 4.4 kg). Forage type affected heifer grazing behavior ($P < 0.001$) with 81% of non-toxic heifers observed grazing compared with 19% of EI heifers. Breed type influenced ($P < 0.04$) sun vs. shade preference of heifers; more GA heifers preferred shade than BR heifers. Forage type affected ($P < 0.0001$) sun vs. shade preference with 68% of EI heifers observed in the shade compared with 46% of non-toxic heifers. Breed influenced EV with BR heifers faster than GA heifers (0.52 ± 0.04 m/s vs. 0.74 ± 0.04 m/s; $P < 0.0001$; respectively). Time affected EV ($P < 0.02$) from d 56 (0.54 ± 0.05 m/s) to d 111 (0.73 ± 0.05 m/s), with no difference occurring from d 0 (0.61 ± 0.05 m/s) to d 56. Pregnant heifers grazing HM or MQ fescue performed better than EI heifers which may be attributed to increased time grazing non-toxic fescue pastures as opposed to more shade time for EI heifers. Behavioral changes due to type of forage consumed may impact efficiency and production in cattle.

Key Words: behavior, fescue, heifer

21 Performance of stocker steers grazing native warm-season grasses during the summer in Tennessee. W. M. Backus*, J. C. Waller, P. D. Keyser, G. E. Bates, C. A. Harper, M. G. Welborn, and B. T. Campbell, *University of Tennessee*, *Knoxville*.

Early season (ES) and full season (FS) grazing strategies were used to evaluate performance of stocker steers grazing native warm-season grasses (NWSG) in 2010. Steers grazed ES from May 7 to June 28 and FS from May 7 to August 30 at Ames Plantation Research and Education Center (REC) near Grand Junction, Highland Rim REC near Springfield and the REC at Greeneville, near Greeneville, in which Angus and Angus cross steers (269 ± 12kg) were used in a nested completely randomized design with location nested within treatment. The three forage treatments were: 1) Switchgrass (Panicum virgatum); 2) a combination of big bluestem (Andropogon gerardii Vitman) and indiangrass (Sorghastrum nutans); and 3) eastern gamagrass (Tripsacum dactyloides). Stands of switchgrass (SG), big bluestem and indiangrass (BB/IG) and eastern gamagrass (EG) were 2 yr old (28%) or 3 yr old. Before and after grazing NWSG pastures all steers were fed a high fiber filler diet for 4 d with individual BW taken in the early AM each d and the average BW for the last 2 d was used for initial and final BW for the grazing period. Intake of the filler diet on a DM basis was 2% BW. Four steers (testers) were allotted to 1.2-ha paddocks with three replications per treatment. Additional steers were used in a put-and-take manner to keep forage in a vegetative state. Steers had free choice access to pasture, water, mineral, and shade. Steers grazing FS were weighed on 28-d intervals to monitor performance. Data were analyzed using the MIXED procedure of SAS. Least square means for ADG of ES steers grazing BB/IG differed from SG and EG ($P < 0.05$) with ADG of 1.19, 1.00 and 0.77 kg/d for BB/IG, SG and EG, respectively. Least square means for ADG of FS steers grazing BB/IG, SG and EG differed ($P < 0.05$) with ADG of 1.00, 0.75 and 0.51 kg/d for BB/IG, SG and EG, respectively. The results of these two trials demonstrate the ability of NWSG to provide suitable summer forage to support adequate gain for stocker steers.

Key Words: native warm-season grasses, grazing, steers

22 Effects of cow weight at weaning on forage intake, milk yield, and calf weaning weight. G. L. Mourer*, C. P. McMurphy, A. J. Sexten, and D. L. Lalman, *Oklahoma State University*, *Stillwater*.

Angus sired spring calving cows (n = 36) were used to evaluate the effect of mature size on forage intake during early lactation (29 ± 10 d in milk), milk yield and calf weaning weight. Two blocks of 18 cows each were selected for large and moderate mature size groups based on their BW at weaning the previous year adjusted to 5 yr of age and BCS 5. Cows were individually fed and had ad libitum access to prairie hay and a protein supplement. Cows were adapted to pens and diets for 10 d followed by a 5 d collection period. Apparent diet digestibility and milk yield was determined. The mixed procedure of SAS was used with cow size treatment as a fixed effect and block as a random effect. Large cows had greater adjusted BW (535 vs. 468 kg; $P < 0.01$), hip height (134 vs. 130 cm; $P < 0.01$), and BCS (5.52 vs. 5.0; $P < 0.01$) at trial initiation (April 18) compared to moderate cows. However, moderate cows had greater ($P = 0.04$) milk yield than large cows. There was a tendency for large cows to consume more ($P = 0.11$) forage (12.8 kg) than moderate cows (11.8 kg). Forage consumption was not different among the mature size groups when forage intake was expressed as a percent of BW or as a percent of metabolic BW. Apparent DM digestibility tended to be greater ($P = 0.07$) in large (56%) compared to moderate (53%) cows. Large cows had increased ($P = 0.01$) digestible DMI (7.27 kg/d) compared to the moderate cows (6.3 kg/d). However, there were no differences between large and moderate cows when digestible DMI was expressed as a percent of BW or metabolic BW. There were no differences in calf BW at weaning between groups, although there was a tendency for moderate cows to wean a higher ($P = 0.15$) percent of their BW (42%) compared to the large cows (38%). When cow size classifications were determined using kg of BW adjusted to equal age and BCS at weaning, large cows were fatter, produced less milk, consumed similar amounts of forage and were less efficient converting consumed forage to milk production compared to moderate size cows.

Key Words: mature cow weight, milk yield, forage intake

23 Influence of fescue and heat shock protein haplotype on heifer growth. J. D. Patterson*[1], M. L. Looper[2], B. C. Williamson[1], M. A. Sales[1], R. J. Page[1], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA/ARS DBSFRC*, *Booneville, AR*.

Toxic tall fescue suppresses heifer growth which is related to reproduction. Heat shock protein (Hsp) haplotypes were related to fertility and reproduction. Thirty-six Angus (1/4 to 3/8 Brahman) heifers were weighed and assigned to replicated pastures of toxic endophyte-infected tall fescue (E+) or novel non-toxic endophyte-infected tall fescue (novel) for 190 d. Data were collected at weaning (7-8 mo), yearling (10-11 mo), and prebreeding (13-14 mo), and included body weight (BW), hip height (HH), hip width (HW), pelvic height (PH), pelvic width (PW), pelvic area (PA) and exit velocity (EV; s/m). Heifers were haplotyped based on Hsp70 promoter and coding sequences. Heifers received a controlled internal drug-releasing device (CIDR) for 7 d prior to the 60 d breeding season, and were injected with prostaglandin $F_2\alpha$ at removal of CIDR. Estrous behavior was monitored by radiotelemetry during the first 30 d of the breeding season. Antral follicle count (AFC) was determined via ultrasound at yearling and prebreeding. Overall ADG tended ($P = 0.08$) to be greater for heifers grazing novel (0.6 ± 0.1 kg/d) than E+ heifers (0.4 ± 0.1 kg/d). Hip width increased (day effect; ($P < 0.001$) over time. Novel heifers (36.6 ± 0.25cm) had larger ($P < 0.05$) HW compared with E+ heifers (35.8 ± 0.25cm). Similarly, PH tended ($P < 0.06$) to be greater in novel heifers (14.0 ± 0.2cm) than E+ heifers (13.5 ± 0.2cm); consequently, PA tended ($P < 0.06$) to be larger in novel heifers (156.5 ± 3.1cm^2) than E+ heifers (148.8 ± 3.4cm^2). Heifers grazing E+ (0.6 ± 0.1 sec/m) tended ($P < 0.08$) to exit the chute faster than novel heifers (0.8 ± 0.1 sec/m). There were no interactions between ($P > 0.12$) between haplotypes and fescue or haplotypes and day. The day of scan affected ($P < 0.007$) AFC (9.0, 13.6, and 10.2; d75, d85, and d183, respectively). Fescue cultivar affected ($P < 0.002$) AFC (8.4 vs. 13.5; novel and E+). Haplotypes of Hsp promoter ($P < 0.08$) and Hsp coding sequences affected ($P < 0.003$) AFC. Toxic tall fescue decreases heifer growth; however, AFC were higher in heifers grazing E+, suggesting that AFC may not be useful as a predictor of heifer fertility.

Key Words: fescue, heifer, Hsp

24 Concentration effects of ergot alkaloids on cytochrome P450 using the Promega P450-glo assay. N. S. Ezell*[1], A. Moubarak[1], C. Rosenkrans, Jr.[1], and M. L. Looper[2], [1]*University of Arkansas*, *Fayetteville,*, [2]*USDA-ARS*, *Boonville, AR*.

Ergot alkaloids are found in endophyte infected fescue and inhibit cytochrome P450 3A4 (CYP3A4) enzymes. Consumption of ergot alkaloids is detrimental to growth and reproductive traits in livestock. The objective of this study was to evaluate effects of commercially available ergot alkaloid concentrations on cytochrome P450. Effects of ergotamine (ET), dihydroergotamine (DHET), ergonovine (EN), ergocryptine (EC), ergocornine (ER), and pergolide (EP) were tested on human CYP3A4 using the P450-glo assay (Promega V4800 and V8802). The CYP3A4 enzyme activity is reported by luminescence. Drugs were dissolved in methanol (MeOH) and then diluted in 25 mM ammonium carbonate buffer. Final MeOH concentration was 2.5% in the P450-glo assay. Alkaloid concentrations ranged from 0 to 450 µM. As concentrations of ET, DHET, EC, and ER increased, P450 activity decreased ($P > 0.05$). The response to EN and EP was bimodal, with no concentration effect ($P > 0.10$) on enzyme activity. A curve was fit to the data of each alkaloid, and an LD50 was calculated for ET (18µM), DHET (352µM), and EC (173µM). Inhibition by EN, ER, and EP was not significant ($P > 0.10$); therefore, LD50 could not be calculated. This study demonstrated that commercially available ergot alkaloids inhibited recombinant P450 in a similar manner to those reported previously using liver microsomal testing. Future research will determine the usefulness of this assay for determining the potential toxicity of tall fescue samples.

Key Words: ergot alkaloid, cytochrome P450, concentration

25 Effects of bale feeder design and processing on hay waste, intake, and performance of beef cattle. A. J. Sexten*[1], C. P. McMurphy[1], G. L. Mourer[1], C. J. Richards[1], C. Jones[1], R. Huhnke[1], T. J. Kraus[2], and D. L. Lalman[1], [1]*Oklahoma State University*, *Stillwater*, [2]*John Deere*, *Ottumwa, IA*.

Effects of hay processing and hay feeder design on hay waste, intake, and performance of beef cattle were evaluated. Experiment one used 64 crossbred gestating cows in a 4 × 4 Latin square design with two levels of hay processing and feeder designs. Hay processing included 1) no processing or long stemmed [L] and 2) hay pre-cut to 15.5 ± .64 cm during baling [PC]. Feeder designs included 1) conventional ring feeders [RING] and 2) commercially manufactured bale cones inserted into conventional ring feeders [CONE]. Cows (n = 16) were kept in a 2.5 ha paddock equipped with an automatic water system and 7.6 m × 12.2 m concrete pad. Cows were adapted to each treatment combination for 10 d, followed by two 4 d collection periods. Pads were cleaned and fresh hay was provided on d 11 (0 h). Hay waste was collected at 24 and 48 h. Hay remaining inside the feeders (orts) was collected, sampled and weighed at 48 h. This process was repeated from 49 through 96 h. Feeding L hay produced less waste compared to PC hay (8.3 vs. 13.0% respectively, $P < 0.05$) and CONE compared to RING (6.7 vs. 14.5% respectively, $P < 0.05$). In experiment two 48 heifer (254 ± 1.4 kg) and 48 steer (267 ± 0.4 kg) herd mates were weaned, weighed, blocked by gender and randomly allotted to 1 of 8 pens to evaluate effects of hay processing on 45 d post weaning performance. Hay was provided and restocked when an estimated 15% of the original bale remained. Treatment had no effect on calf ADG ($P = 0.55$). In experiment three 48 fall calving cow/calf pairs were randomly allotted to one of four paddocks to evaluate effects of hay processing on hay waste and intake using a modified cone bale feeder. Cows were adapted for 10 d, followed by four consecutive 48 h collection periods similar to Experiment 1. Feeding L hay yielded less waste than PC (4.9 vs. 12.9% respectively, $P = 0.03$). In conclusion, hay waste increased while DMI and animal performance was not affected when hay was pre-cut, stored, and fed in the form of large round bales.

Key Words: beef cattle, hay waste, hay processing

26 Relationships among single nucleotide polymorphisms in the cytochrome P450 gene and the enhancer region of the prolactin gene, molecular breeding values, and steer performance. B. C. Williamson*[1], M. L. Looper[2], J. D. Patterson[1], M. A. Sales[1], K. P. Coffey[1], M. Ata[1], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA/ARS,DBSFRC*, *Booneville, AR*.

Forty-eight Gelbvieh x Angus steers (265 ± 40 kg) were utilized to determine relationships among single nucleotide polymorphisms (SNP), molecular breeding values (MBV) and steer performance. Body weight (BW), hip height (HH), hip width (HW), and exit velocity (EV; rate at which steers exited the squeeze chute and traversed 1.8 m) of steers were recorded at d 0, 93 and 154 of grazing tall fescue. Tissue samples were collected for genomic profiling (Igenity, Merial Limited, Duluth, GA). Blood samples were collected for identification of SNPs in the cytochrome P450 3A28 gene (cytosine to guanine transversion at base 994; c994g) and the enhancer region of the prolactin gene (cytosine to thymine transition at base 1286; c1286t). Relationships between MBV and phenotypic traits were determined by Pearson correlations and ANOVA with c994g or c1286t as main affect. Steers that were heterozygous at SNP c1286t had a higher ($P < 0.05$) docility MBV (more docile) than steers that were homozygous CC or TT. At d 0 and 154, BW was correlated ($P < 0.05$) with MBV for ADG (r = 0.31 and 0.32 for d 0 and 154, respectively). Body weight at d 93 tended ($P =$

0.06) to be correlated with MBV for ADG (r = 0.28). At d 0 and 154, HW was correlated ($P < 0.05$) with MBV for ADG (r = 0.33 and 0.32 for d 0 and 154, respectively). Day 93 EV was correlated ($P < 0.04$) with MBV for ADG (r = 0.32). An inverse correlation between EV and MBV for LM area on d 0 ($P < 0.01$; r = -0.48) and d 154 ($P < 0.03$; r = -0.03) was observed; on d 93, EV and MBV for LM area tended to be inversely correlated. Exit velocity tended ($P = 0.09$) to be negatively correlated with MBV for carcass tenderness (r = -0.26); HH at d 154 was correlated ($P < 0.05$; r = 0.30) with MBV for carcass tenderness. Molecular breeding values were correlated with several measurable traits that can be obtained on-farm. Identification of animals with specific SNP genotypes in combination with collection of body measurements may aid in more accurate selection practices to increase profitability of beef production.

Key Words: bovine, molecular breeding values, single nucleotide polymorphisms

27 Determining effects of two deworming protocols on fecal egg counts and growth performance in beef calves. S. A. O'Berg*, J. G. Powell, K. P. Coffey, C. A. Tucker, M. P. Rowe, and J. L. Reynolds, *University of Arkansas*, *Fayetteville*.

Gastrointestinal nematodes have a major negative impact on beef cattle performance. However, according to USDA NAHMS data, nearly 40% of cow-calf operations do not treat their unweaned calves with an anthelmintic, and over 40% of stocker cattle operations do not treat with an anthelmintic. This study was undertaken to assess the impact of treating calves at pre-weaning, weaning, and post-weaning compared to treating only at weaning and to a negative control. Eighty-seven beef calves (BW=138.12 kg ± 2.93) carrying natural nematode infections were utilized in a single experiment. Calves were randomly allocated to treatment groups and carried through pre-weaning and post-weaning phases. The three treatment groups included: calves injected with 1% moxidectin at 85 d prior to weaning (d 0), at weaning (d 85), and mid-point through the stocker phase (d 169; TRT1); calves injected at d 85 (TRT2); and a negative control (CON). Fecal egg counts (FEC) were determined using a single centrifugation technique with a magnesium sulfate solution. Statistical analysis was performed using PROC GLM in SAS. Average BW and FEC were not statistically different ($P \geq 0.23$) between groups on d 0. Average FEC were lower ($P < 0.05$) for treated calves on d 14 and tended ($P = 0.07$) to be lower on d 85 compared to untreated calves. Higher ($P < 0.05$) ADG was exhibited by calves treated prior to weaning from d 0 to 85 compared to untreated calves. During the post-weaning phase, FEC were lower ($P < 0.05$) for TRT1 and TRT2 compared to CON on d 99 and 169. Average FEC were lower ($P < 0.001$) for TRT1 compared to TRT2 and CON on d 183. Post-weaning ADG was higher ($P < 0.05$) from d 85 to 197 for TRT1 and TRT2 compared to CON. Calves in TRT2 made up gain deficits from the pre-weaning phase, and had total ADG similar to those of calves in TRT1. Overall, FEC were reduced with treatment during both the pre-weaning and post-weaning phases. Treatment also improved ADG in beef calves, indicating that routine use of effective anthelmintics would be beneficial to cow-calf operators.

Key Words: moxidectin, nematodes, cattle

Ruminant Animal Production I

28 SS-ASAS Emerging Scholar Award: Dietary and genetic effects on cellular copper homeostasis in cattle. R. S. Fry*, M. S. Ashwell, and J. W. Spears, *North Carolina State University*, *Raleigh*.

Copper (Cu) is required for an array of physiological processes and is essential for proper fetal development. In ruminants, Cu deficiency is a problem that manifest due to low dietary Cu intake or when the diet provides high levels of Cu antagonists, such as iron (Fe). Genetics also contributes to the incidence of Cu deficiency, as Simmental cattle have been shown to be more susceptible to Cu deficiency than Angus. Numerous transport and chaperone proteins have been identified in rodents that serve to regulate Cu homeostasis. However, regulation of these proteins has not been studied in ruminants. The purpose of this research was to identify Cu regulatory proteins in the bovine, provide an understanding of cellular changes that occur in a state of Cu deficiency, and elucidate possible genetic differences in Cu metabolism as well as cellular interactions between Cu and Fe. In experiment 1, Angus calves (n = 14) were born to cows fed one of the following dietary treatments: 1) Cu-adequate (+Cu; 10 mg supplemental Cu/kg DM) or 2) Cu-deficient (-Cu). Calves received their respective dam's dietary treatment for 310 d following weaning. Plasma Cu, ceruloplasmin (Cp), and liver Cu were lower ($P < 0.001$) in –Cu vs. +Cu calves. As determined by quantitative Real-time PCR, hepatic expression of cytochrome c oxidase assembly protein 17 (Cox17), a mitochondrial Cu chaperone, was reduced ($P = 0.002$) in –Cu vs. +Cu calves. In experiment 2, pregnant multiparous cows (n = 8, Angus; n = 8, Simmental) were randomly assigned within breed to a corn silage-based diet formulated to be either adequate (+Cu) or deficient (–Cu) in Cu resulting in a 2 × 2 factorial design. At harvest on day 112 or 113, all cows were approximately 8 mo into gestation and duodenal scrapings, liver, and fetal liver samples were obtained for mineral analysis and mRNA analysis, while placentomes were collected for mineral analysis only. Copper concentrations in plasma, liver, placentome, and fetal liver were lower ($P < 0.05$) in –Cu dams as well as in Simmental dams when compared to their counterparts. Plasma Cu and liver Cu in dams were affected ($P < 0.05$) by a Cu × breed interaction in which plasma Cu and liver Cu were lower ($P < 0.01$) in –Cu Simmentals vs. –Cu Angus, but were not different when +Cu diets were fed. Dietary Cu did not affect expression of Cu transporters and chaperones in duodenum or liver. Duodenal mRNA expression of copper transporter 1 (Ctr1), the major Cu import protein, was 4 fold lower ($P = 0.04$) in Simmental vs. Angus regardless of dietary Cu. Furthermore, mRNA expression of the enterocyte Cu exporter, Atp7a, tended ($P = 0.09$) to be lower in Simmental vs. Angus regardless of Cu treatment. In fetal liver, genetics did not affect expression of Cu transporters and chaperones, but several were affected by Cu. Relative expression of fetal liver antioxidant 1 (Atox1; secretory Cu chaperone), Cox17, and Cu metabolism MURR1 domain 1 (Commd1; putative transporter involved in fetomaternal circulation) were higher ($P < 0.05$) in –Cu vs. +Cu fetuses. In experiment 3, Holstein bull calves (n = 14) were fed a control diet, adequate in Fe (50 mg Fe/kg DM) or the control diet supplemented with 750 mg Fe/kg diet (high Fe diet). On days 57 and 58 of the study, calves were euthanized and tissues were collected for mineral analysis and mRNA analysis of Cu transporters and chaperones. At the conclusion of the study, plasma Cp was higher ($P = 0.05$) in high Fe vs. control calves and liver Cu tended ($P = 0.10$) to be lower in high Fe vs. controls. Duodenal Cu was not affected

by treatment, nor was mRNA expression of duodenal and liver Ctr1. However, hepatic mRNA expression of Atp7b, a protein responsible for biliary Cu excretion and Cp synthesis, was 2 fold higher (P = 0.01) in high Fe vs. controls. Results from experiment 1 demonstrated that long-term Cu deficiency reduces mRNA expression of a Cu chaperone involved in incorporating Cu into the terminal oxidase in the electron transport chain. Experiment 2 results suggest that lower expression of duodenal Cu transporters in Simmentals likely explains why they are more susceptible to Cu deficiency than Angus. Results from this experiment also demonstrate that marginal Cu deficiency during pregnancy, as well as breed affects Cu concentrations in fetal tissues. Up-regulation of Cu regulated genes in the fetus and not the dam suggests the fetus responds more robustly to Cu deficiency. Results from experiment 3 suggests that high dietary Fe antagonizes Cu metabolism by increasing Cu efflux from the liver rather than decreasing absorption as expression of Ctr1 was not affected in the duodenum. Collectively these data enhance our understanding of how Cu deficiency, genetics, and high dietary Fe affect Cu homeostasis in cattle.

Key Words: cattle, copper, iron

29 Variability in mineral composition of distillers' grains. M. L. Drewery*[1], J. E. Sawyer[1], N. M. Kenney[1], M. S. Cabaniss[1], W. E. Pinchak[2], and T. A. Wickersham[1], [1]*Texas A&M University*, *College Station*, [2]*Texas AgriLife Research*, *Vernon, TX*.

Distillers' grains are a readily available source of nutrients for the livestock feeding industry. Variability in processes between ethanol plants and batches within a specific plant translate into variability in nutrient concentrations, specifically mineral composition, which can impact livestock performance. This variability introduces risk to feeding distillers' grains resulting in reduced value ($/ton) and decreased utilization. Therefore, the objective of this project was to quantify variability in mineral composition of distillers' grains between and within ethanol plants. Wet distillers' grains from 25 ethanol plants were collected on 3 separate days. Samples were dried at 55°C in a forced-air oven for 96h, ground to pass a 1-mm screen, and analyzed for mineral composition. Mineral composition differed ($P < 0.01$) among locations for every mineral analyzed. Calcium and phosphorus concentrations averaged 0.04 ± 0.02% and 0.79 ± 0.21%, respectively, across locations and ranged from 0.01 - 0.09% for calcium and 0.32 - 1.41% for phosphorus. Sulfur concentration averaged 0.62 ± 0.13 for all locations and ranged from 0.35 - 0.86%. Potassium concentration averaged 1.03 ± 0.34% with a range of 0.28 - 1.62% for all locations. Zinc and copper averaged 54.55 ± 14.21 and 4.92 ± 1.02 ppm, respectively, across locations with ranges from 24.1 - 86.2 ppm for zinc and 3.5 - 8.8 ppm for copper. Standard deviation within location averaged ± 0.01, 0.03, 0.03 and 0.04% for calcium, phosphorus, sulfur, and potassium, respectively. Standard deviation within location for zinc and copper averaged 3.19 and 0.28 ppm, accordingly. These results suggest distillers' grains mineral composition differed between locations and consideration of the variability between and within location is warranted when formulating diets.

Key Words: distillers' grains, mineral composition, sulfur

30 Effect of daily or alternate day distillers grains supplementation with or without Rumensin on performance of growing heifers. P. Beck*[1], J. Butterbaugh[2], B. Rudolph[2], J. Smith[1], and B. Stuart[1], [1]*University of Arkansas Division of Agriculture, Little Rock*, [2]*Furst-McNess Co., Freeport, IL.*

The objective of this study was to determine how feeding low levels of dried distillers grains plus solubles (DDGS) affects performance of growing heifers when fed with or without ionophore either daily or on alternate days. On 28 May 2010, 80 beef heifers were implanted with Component TEG (VetLife, Overland Park, KS) and allocated into groups of 4 by BW; groups were randomly allotted to 20 mixed crabgrass-bermudagrass pastures and assigned to 5 supplementation treatments (n = 4 pastures/treatment). Treatments were control – no supplemental feed except free choice mineral; daily supplementation with DDGS at 1.02 kg/calf including a mineral premix; Daily DDGS + Rumensin (monensin sodium, Elanco, Greenfield, IN) of1.02 kg/calf including a mineral premix supplying 160 mg monensin/calf daily; alternate day DDGS to supply 2.04 kg/calf including the mineral premix offered on alternate days; alternate day DDGS + Rumensin to supply 2.04 kg/calf including a mineral premix and 320 mg monensin/calf on alternate days. Heifers were weighed following a 16-h removal of feed and water at the initiation and termination of the study. Interim BW was collected full because of concerns with heat stress. Because of drought, round bales of moderate quality (8% CP and 52% TDN) warm-season grass hay was offered from 15 July to the end of the study on 1 October. Effect of supplementation was analyzed with the mixed procedure of SAS using pasture within treatment in the random statement. Contrasts were used to separate the effects of control vs supplement, medicated vs non-medicated, and daily vs alternate-day supplementation. Supplementation increased ($P < 0.01$) final BW by 33 kg but there were no effects ($P \geq 0.72$) of Rumensin addition or feeding management. Supplementation increased ($P < 0.01$) daily BW gain from 0.29 kg/d to 0.50 kg/d, but there were no effects ($P \geq 0.68$) of Rumensin or feeding management. Rumensin addition to the supplement numerically ($P = 0.68$) increased daily BW gain by 6% which corresponds with observations in previous research with cattle on similar low planes of nutrition.

Key Words: distillers grains, growing cattle, supplementation

31 Intake control agents for self-fed distillers' grains. J. D. Sugg*[1], T. A. Wickersham[1], W. E. Pinchak[3], S. A. Clement[2], and J. E. Sawyer[1,2], [1]*Texas A&M University, College Station*, [2]*Texas Agrilife Reasearch, McGreagor, TX*, [3]*Texas Agrilife Research, Vernon, TX.*

Fifty-nine heifers (191 ± 53.1 kg) received one of 12 treatments to control intake of self-fed dried distillers' grains (DDG); DDG only (CON), or CON plus salt (10% SA), urea (1% UR), limestone (1.68% LI), calcium propionate (3% CA), limestone and urea (1.68% and 1%; LI + UR) alone or in combination with monensin (MO, 187.5 mg/kg supplement). Heifers had free access to chopped hay. Base DDG intake was recorded for 4 d. Treatments were applied in 3, 14-d periods. Control agent inclusion (other than MO) was doubled to achieve 1X, 2X, or 4X initial rates in periods 1, 2, and 3. Period and rate were confounded to minimize aversion. Data were analyzed within period. Intake slope and variance within period were used to evaluate intake stability. Baseline intake of DDG was constant (slope = 0; $P > 0.97$). Intake of CON was 3.52, 4.43, 5.50, and 5.18 kg for base and periods 1, 2, and 3, respectively. At lowest agent inclusion rates, heifers fed CA consumed more DDG (4.74 ± 0.30 kg /d), those fed SA + MO consumed less (2.2 ± 0.10 kg/d) than other treatments ($P = 0.02$). Intake change over time differed among treatments ($P < 0.01$). Intake increased over time for SA, LI, LI + MO, CA, CA + MO, LI + UR, LI + UR + MO, and CON. Intake SD was similar ($P > 0.10$) among treatments. Agents at 2X initial rate affected intake ($P < 0.01$). Animals fed LI + MO ate the most DDG (5.74 ± 0.54 kg/d); those fed SA ate the least (1.65 ± 0.63 kg/d). Intake increased within period for UR ($P < 0.05$) but not for other treatments. Treatment SD for intake differed ($P < 0.02$); the most variation existed in MO (1.23

± 0.19) and least in SA + MO (0.52 ± 0.19). At 4X initial rate, treatment intake differed ($P < 0.01$). Heifers fed LI consumed most (5.39 ± 0.59 kg/d); animals fed SA + MO consumed least (0.42 ± 0.61kg/d). Neither SD ($P > 0.62$) nor slope ($P > 0.29$) differed among treatments; though intakes tended to marginally decline. Effective agents exist to control DDG intake; unregulated intake may be up to 2.8% BW.

Key Words: supplement, limiter, monensin

32 Dried distiller grains fed to calves on bahiagrass and bermudagrass pastures before weaning. G. M. Hill*[1], K. C. Halbig[1], A. N. Franklin[1], and V. A. Corriher[2], [1]*University of Georgia*, *Tifton*, [2]*Texas AgriLife Ext. Ctr.*, *Overton, TX*.

Winter and early spring-born beef calves may respond to supplemental feeding prior to weaning as cow milk production and pasture quality decline. Experiments were conducted to determine effects of calf supplemental feed (SF) on cattle performance. Exp.1. In 2009 and 2010, Brangus and Angus X Polled Hereford cows (n=68 each yr; initial BW 585.7±59.1 kg) with winter-born calves (initial BW 224.75±31.4 kg) were assigned to calf SF treatments beginning July 7, 2009 for 73 d, and July 13, 2010 for 70 d. Treatments on six Tifton 9 bahiagrass pastures (38.9% DM, 8.32% CP in September, 2010), were: Pasture only (Control; C); dried distillers grains with solubles (DDG; DMI: 2009, 0.57kg/d; 2010, 0.80 kg/d), or a free-choice conventional mixed feed (CMF; 24.6% corn, 25% soyhulls, 49.5% corn gluten feed, 0.9% vitamin-mineral-Rumensin mixture). The DM, CP, NDF, and EE (% of DM) of SF, respectively, were: DDG, 88.2, 24.8, 33.7, 12.2; CMF, 89.6, 15.8, 36.6, 3.1. The 2-yr mean cow ADG (kg), calf ADG (kg), increase in calf ADG above C (%), and SF intake (DMI, kg/d), respectively for C, DDG and CMF, were: C, 0.009,0.72, 0.0, 0.0; DDG, 0.005, 0.85, 17.4, 0.69; CMF, 0.064,1.03, 42.3, 2.89; (cow ADG $P < 0.71$, SE 0.061; calf ADG $P < 0.01$, SE 0.026). Exp.2. Sixty Angus and Polled Hereford cows (initial BW 626.1±71.3 kg) with winter-born calves (initial BW 181.3±23.9 kg) were assigned to the same supplement treatments as in Exp. 1 for 91 d beginning June 10, 2010. Cows and calves grazed six Coastal bermudagrass pastures (44.4%DM, 12.5% CP in September, 2010). The cow ADG (kg), calf ADG (kg), increase in calf ADG above C (%), and calf SF intake (DMI, kg/d), respectively, for C, DDG and CMF, were: C, -0.23, 0.70, 0.0, 0.0; DDG, -0.06, 0.72, 3.8, 0.80; CMF, -0.11, 1.11, 59.2, 3.45; (cow ADG $P < 0.16$, SE 0.06; calf ADG $P < 0.01$, SE 0.05). Calves fed SF before weaning had increased performance, and CMF calves had the greatest increase in ADG. The response to limit-fed DDG was variable, with increased calf ADG on bahiagrass pastures, but not on Coastal pastures.

Key Words: calf, gain, forage

33 Performance of beef calves provided molasses-based creep supplements. J. D. Arthington*, *University of Florida-IFAS, Range Cattle Research and Education Center, Ona.*

Two experiments were conducted with the objective to evaluate performance and economic measures of creep feeding sugarcane molasses-based supplements to pre-weaned calves. The experiments were repeated over 2 consecutive years beginning in April and ending at weaning (average = 111 d). In Exp. 1, treatments were applied to 8 pastures with 17 Braford cow and calf pairs/pasture. Treatments were: 1) no creep, 2) molasses+urea, and 3) molasses+urea+0.22% rumen bypass sulfur-containing amino acids (Alimet; Novus International, St. Louis, MO). In Exp. 2, treatments were applied to 12 pastures with 4 and 3 Brangus cow and calf pairs/pasture in Yr. 1 and 2, respectively. Treatments were: 1) no creep, 2) molasses+urea, and 3) molasses+cottonseed meal creep. Average CP concentrations of DM were 20.0 and 16.4% for molasses+urea and molasses+cottonseed meal, respectively. Cow and calf BW and cow body condition (BCS) was recorded at the start and end of creep supplementation. Creep intake was calculated by weighing each 90 gallon tub on 14-day intervals. There was annual variation ($P < 0.01$) in creep supplement intake in the Exp. 1, with almost twice as much supplement consumed in Yr. 2 vs. 1 (0.09 vs. 0.23 kg/d). In Yr. 2, calves provided creep supplements with Alimet consumed almost 1/3 less supplement than calves provided supplements without Alimet. There were no treatment or treatment x year interactions for supplement intake in Exp. 2 (average intake = 0.47 kg/d). In Exp. 1, creep supplementation resulted in 0.063 kg/d of added gain compared to calves receiving no creep supplement. The ADG of calves consuming supplements containing Alimet was 5.1% less ($P = 0.03$) than calves consuming supplements without Alimet. Although supplement intake was greater ($P < 0.05$) in Exp. 1 vs. 2, there was no effect on calf ADG ($P = 0.55$). There was no impact of creep supplement on change in cow BW or BCS ($P > 0.50$). The 4-yr average cost of gain (feed inputs only) was $1.17/kg of added gain. In 2 of the 4 study years, the cost of added gain exceeded the per kg value of the calves we sold.

Key Words: beef, calves, creep feeding

Graduate Student Competition III

34 Heart rate and physical activity in growing Bonsmara heifers with divergent residual feed intake fed in confinement or on pasture. A. N. Hafla*[1], G. E. Carstens[1], T. D. A. Forbes[2], J. C. Bailey[1], and E. A. Dany[1], [1]*Texas A&M University*, *College Station*, [2]*Texas AgriLIfe Research*, *Uvalde, TX*.

The objective of this study was to determine if inter-animal variation in heart rate (HR) and physical activity (PA) were associated with differences in residual feed intake (RFI) in growing heifers. Bonsmara heifers (N = 53, initial BW 275 ± 24.6) were fed a high-roughage diet (2.07 Mcal/kg DM, 13.1 g CP/kg DM) and individual DMI and BW measured for 70 d while confined to pens equipped with Calan-gate feeders. RFI was calculated as the residual from the linear regression of DMI on mid-test BW $^{0.75}$ and ADG. Heifers with divergent RFI (6 low and 7 high RFI animals) were selected for HR and PA measurements using Polar transmitters and monitors and IceRobtics activity monitors, respectively. HR and PA were measured for 3 48-h periods while confined to pens. Following the 70-d confinement test period, heifers were transported to Uvalde TX and grazed on irrigated annual ryegrass pasture for 56 d, and HR and PA measured for 6 consecutive 24-h periods. Performance traits, HR, and PA were analyzed using the mixed procedure of SAS with RFI as a fixed effect. Differences were separated by LS means. Heifers with divergent RFI had similar ADG (1.18 ± 0.12 kg/d), but heifers with low RFI consumed 20% less ($P < 0.001$) DMI compared to high RFI animals during the confinement period. During the 56-d grazing period, ADG was similar (0.91 ± 0.04 kg/d) among RFI groups. Average 24-h HR was greater for heifers with high RFI during confinement (92.8 vs. 90.7 ± 0.78, $P = 0.04$) and grazing

(77.7 vs. 74.7 ± 0.35, $P < 0.0001$) compared to heifers with low RFI. Physical activity, as measured by motion index (92.4 ± 8.5 and 620.1 ± 45.8, respectively) and steps/h (43.3 ± 3.2 and 191.3 ± 12.9, respectively) was not affected by RFI group in confinement or on pasture. Likewise, min/h spent standing (27.8 ± 1.5 and 30.5 ± 1.6, respectively) was not affected by RFI group in either environment. Results from this study suggest that inter-animal variation in HR is related to phenotypic differences in RFI in confinement and on pasture; however physical activity did not contribute to variation in RFI in growing heifers.

Key Words: residual feed intake, heart rate, physical activity

35 The relationship of cow size and calf birth weight to calf weaning weight in a commercial Brangus cow/calf operation. C. D. Dobbs*[1], M. A. Brown[2], and D. L. Lalman[1], *[1]Oklahoma State University, Stillwater, [2]USDA ARS Grazinglands Research Laboratory, El Reno, OK.*

Profitability and sustainability of cow/calf operations are dependent on cow efficiency. Annual forage consumption is a logical input component included in cow efficiency models and large cows generally consume more forage annually than small cows. The ratio of additional kg of calf weaning BW to each 100 kg additional mature cow BW could be used as one practical indicator of the efficacy of increasing cow size for the purpose of increasing ranch profitability. While many factors affecting efficiency are either difficult to measure or low in heritability, mature BW is highly heritable and can easily be obtained at the time of weaning. A total of 1111 calves out of Brangus dams and Angus, Bonsmara, Brangus, Charolais, Gelbvieh, Hereford, Maine Anjou, Red Poll and Romosinuano sires were sampled over an 8 year period at the USDA Grazinglands Research Laboratory in El Reno, Oklahoma. Cows grazed abundant native rangeland and were supplemented with hay during inclement winter weather and were provided a protein supplement during winter. Calves were weaned at 202 ± 23 d. Means ± SD for cow age, adjusted cow BW at weaning, cow BCS at weaning, calf birth weight and adjusted calf weight at weaning were 4.84 ± 2.05 yr, 620 ± 67 kg, 5.22 ± .80, 42.6 ± 6.7 kg, 250 ± 33 kg, respectively. The mixed procedure of SAS was used with cow sire breed, cow dam breed, calf sire breed and sex of calf declared as fixed effects and year of birth as a random effect. Cow weight at weaning was adjusted to a constant BCS (5.0) and age (5.0 yr) prior to analysis. An increase in cow BW of 100 kg tended to increase calf weaning BW by 2.34 kg ($P = 0.07$). Additionally, for every 1 kg increase in calf birth weight, calf weaning BW increased by 2.07 kg ($P < 0.05$). The minimal increase in calf weaning BW associated with increasing cow size on this commercial operation suggests that larger cows may be less efficient. However, the relationship of mature cow BW to calf weaning BW may differ in divergent environments and therefore should be determined on an individual ranch basis.

Key Words: mature size, cow efficiency, weaning weight

36 Glycerol inhibition of ruminal lipolysis *in vitro*. H. Edwards*[1], R. Anderson[2], R. Miller[1], T. M. Taylor[1], M. Hardin[1], S. Smith[1], N. Krueger[2], and D. Nisbet[2], *[1]Texas A&M University, College Station, [2]United States Department of Agriculture/Agricultural Research Service, Southern Plains Agricultural Research Center, Food & Feed Safety Research Unit, College Station, TX.*

Hydrolysis of dietary lipids to free fatty acids (FFA) is a prerequisite for ruminal biohydrogenation, a bacterially mediated process that rapidly saturates FFA, thus limiting the absorption and assimilation of unsaturated fatty acids into ruminant-produced foods. Research has shown that supplemental glycerol inhibits rumen lipolysis by 60 to 80%. We investigated the effects of two levels of glycerol on lipase activity during culture (in triplicate) of freshly collected ruminal microbes (1.0 mL) in an anaerobic medium containing minerals, vitamins, yeast extract, trypticase, 0.2% glucose and 1% olive oil as lipid substrate. Medium (5 mL) was distributed to glass tubes containing a bed of glass beads, added as a solid support matrix, and cultured at 39ºC. Free fatty acids were measured colorimetrically from tubes sampled at 0 and 48 h. Rates were analyzed for main effects of glycerol and level of glycerol using a general analysis of variance. Results revealed that when in the presence of 6 and 20% glycerol, rates of FFA production (nmol/mL per h) were decreased ($P < 0.05$) 80 and 86%, respectively, compared to rates from control cultures incubated without glycerol (12.4±1.0; mean±SE). When fluid fractions (1.0 mL) from these initial cultures were transferred and incubated similarly in fresh medium, little lipase activity was retained, indicating that most lipase-producing bacteria were attached to the untransferred bead fraction. *Anaerovibrio lipolyticus* is thought to be a main contributor to rumen lipolysis and could be considered the organism most affected by glycerol. When grown in broth medium lacking glass beads, *A. lipolyticus* achieved a more rapid ($P < 0.05$) maximum specific growth rate with glycerol than olive oil (each at 5%) as energy substrate (0.068±0.01 vs 0.007±0.01, respectively). Additionally, glycerol-grown cultures of *A. lipolyticus* achieved maximum optical density by 24 h, whereas cultures grown with olive oil did not achieve maximum optical density until after 98 h. Results confirm the lipase-inhibitory activity of supplemental glycerol and suggest the inhibition may be due to its preferential use an energy substrate by *A. lipolyticus*.

Key Words: rumen, lipid, metabolism

37 Identification of key proteins associated with fat accretion in broiler chickens using a proteomics approach. G. Kelley*, A. Stewart, X. Wang, F. Chen, and S. Nahashon, *Tennessee State University, Nashville*.

Fat accretion in poultry directly influences the efficiency of feed utilization and consumer acceptability of poultry and poultry products. Losses estimated at about US$250-300 million are incurred by consumers and processors annually in pollution control, and in extraction and disposal of excess carcass fat. Understanding underlying mechanisms of excessive fat deposition in poultry will provide avenues for improving carcass quality and minimize production cost. Little is known about the proteome of the adipose tissue of chickens. We hypothesized that chicken adipocity is highly influenced by factors beyond the genome. Therefore, the aim of this study was to employ a proteomics approach to identify proteins that may be associated with fat accretion in broiler chickens. One hundred and twenty 1-day-old broiler chicks were randomly assigned to floor pens covered with pine wood shavings and fed standard broiler diets for 8 weeks. The diets comprised 3,200 Kcal ME/kg diet and 23% crude protein (CP) at hatch-3 weeks of age (WOA) and 3,275 Kcal ME/kg diet and 20% CP at 4-8 WOA. Feed and water were provided at free choice and body weights were measured weekly. At 8 WOA, experimental birds were sacrificed and adipose tissue from the abdominal and visceral areas was collected, weighed and snap frozen in liquid nitrogen prior to storage at -80 ºC until used. Adipose proteome from the birds with the highest and lowest abdominal fat percentage (8 birds each) was assayed using two-dimensional differential gel electrophoresis (2D-DIGE) followed by in-gel digestion and matrix assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry. A total of 132 spots were found to be differentially expressed between the extreme birds ($P < 0.05$). Several of the proteins are unique and some are involved in metabolic pathways that are associated with fat accretion. Among 50 differentially expressed spots that

were analyzed with mass spectrometry were vimentin, apolipoprotein, aspartate aminotransferase and anexin.

Key Words: broiler chickens, adipose tissue proteome, differentially expressed genes

38 Evaluation of optimum calcium and phosphorus requirement for Pearl Grey guinea fowl laying hens. L. Glover*, G. Kelley, T. Boatswain, J. Tyus, and S. Nahashon, *Tennessee State University, Department of Agricultural Sciences, Nashville.*

The demand for guinea fowl as alternative poultry has been steadily increasing worldwide. However, their production performance lags that of other commercial avian species partly because there is insufficient knowledge of their nutrient requirements. Dietary calcium and phosphorus requirement for optimum egg production performance of Pearl Grey guinea fowl (PGGF) laying hens was evaluated. In a 2 x 3 factorial arrangement of dietary treatments, 240 PGGF laying hens (22 week old) were fed diets containing either 0.35% or 0.4% available phosphorus each in combination with either 2.75, 3.25 or 3.75% calcium. The diets which were fed for six 28-day periods were isocaloric and isonitrogenous (2,800 kcal ME/kg of diet and 16% crude protein, respectively). The diets were replicated four times and both feed and water were provided at free choice. The birds were reared on a 16 hour lighting regimen and were observed for feed consumption (FC), hen-day egg production (HEP), egg weight (EW), egg mass (EM), feed conversion ratio (FCR), egg specific gravity (SG), and Haugh units (HU) over the six 28-day laying periods. There were no significant differences ($P > 0.05$) in HEP, EW, EM, and FC of birds fed the 2.75, 3.25 and 3.75% calcium diets, as well as diets containing either 0.35% or 0.40% available phosphorus. However, guinea fowl hens fed diets containing either 3.25 or 3.75% calcium and either 0.35 or 0.40% available phosphorus had superior egg shell quality. Therefore, PGGF laying hens utilized more efficiently diets containing 3.25 to 3.75% calcium and 0.35 to 0.40% available phosphorus.

Key Words: Pearl Grey guinea fowl, calcium, phosphorus, egg production

39 Evidence for the expression of a genetically diverse glucose-dependent insulinotropic polypeptide (GIP) gene in the avian hypothalamus. J. Tyus*, N. Bonner, and S. Nahashon, *Tennessee State University, Department of Agricultural Sciences, Nashville.*

Genetic control of the mechanisms regulating energy homeostasis in birds continues to received considerable attention. Among the molecules thought to be important in this regulation is the glucose-dependent insulinotropic polypeptide (GIP). In response to feed intake, GIP stimulates pancreatic secretion of insulin, increasing uptake of blood glucose by the liver. Also, GIP has been implicated in the gut-brain axis regulation of feeding behavior. Previous reports suggested that GIP was expressed exclusively in the enteroendocrine K cells of the intestine. However, recent studies have shown GIP mRNA and protein expression in the brain of mammals. Here, we provide new evidence for the expression of a genetically diverse GIP gene in the neuronal satiety center of an adult avian. A 1,000-clone cDNA library was constructed from enriched mRNA isolated from the guinea fowl (GF) hypothalamus and screened via PCR and restriction digestion. From this, a 349 nucleotide base GIP gene fragment, showing 89% similarity with its Gallus ortholog, was identified and sequenced. Nucleotide-amino acid (AA) translation of the +1 frame-shifted ORF yielded a 76 AA peptide sequence showing 79% homology with the carboxy terminus of the Gallus form. Multiple sequence alignment of the GIP of GF against human, rat, mouse, swine, bovine and chicken GIP ortholog sequences (UniProt database) revealed two regions of high conservation (>90%). The AA sequence motifs of GIP of GF were identified and further analyzed for functional site prediction using the Eukaryotic Linear Motif resource. The most pronounced conserved region detected was a 24 AA motif containing an N-glycosylation site, a glycosaminoglycan attachment site, and a proprotein convertase cleavage site. Across species, regions of low (<60%) conservation exhibited higher variability in the avian-mammalian contrast, suggesting an evolutionary divergence in the GIP lineage. The potential for hypothalamic GIP secretion in birds is quite remarkable as it may provide further insight on hypothalamic regulation of appetite and nutrient utilization in poultry.

Key Words: avian hypothalamus, satiety, gene expression

40 Developing a low-cost, sustainable feeding system using sweet potato forage for growing rabbits. R. Flores*, S. D. Lukefahr, G. Schuster, K. C. McCuistion, and T. Verma, *Texas A&M University*, *Kingsville*.

Our experimental objective was to develop a low-cost, feeding system using sweet potato (SP) leaves with stems as forage for rabbits to aid small-scale, low-income rural farmers. Two experiments were conducted over a 35-d period during the summer months of 2009 and 2010 in subtropical south Texas. In Exp. 1, 36 weanling crossbred rabbits from 6 litters were randomly allocated to either a control group (commercial pellets) or one of three SP varieties: White Triumph (WT) Centennial (Cen) or Georgia Jet (GJ). Forage-fed groups received one-half of the mean quantity of commercial pellets consumed by controls on the previous d, plus 35 g of crimped oats per head/d. In Exp. 2, 54 weanling rabbits from 15 litters were randomly allocated to 3 diet treatments to either a positive control group (commercial pellets), a combination group of Cen SP forage with one-half of commercial pellets consumed by controls on the previous d, or a negative control group of Cen SP forage plus 35 g of crimped oats per head/d. In Exp. 1 there were 3 pens, whereas in Exp. 2 there were 6 pens per diet treatment. Each pen contained three rabbits. SP forage was wilted for 24 h to increase DM intake, which was offered to animals *ad libitum*. Individual growth and carcass traits were analyzed according to a statistical model that consisted of the effects of litter as a random block, fixed diet, random pen within diet (experimental error source for diet), and random within-pen error. Diet influenced ($P < 0.001$) ADG and final BW, but only in Exp. 2 with positive controls being superior to forage-fed groups. Calculated forage intake per animal/pen was lower for WT than Cen or GJ ($P < 0.05$) in Exp. 1, whereas in Exp. 2 was lower ($P < 0.05$) for combination vs. negative controls (means of 17.5 and 26.5±0.13 g/d). Dressing percentage means were similar among diet treatments in both experiments. In conclusion, further research is needed to increase DM forage intake to potentially improve growth and feeding performance.

Key Words: rabbits, forages, sustainability

41 The effects of ergot alkaloids on bovine sperm motility. R. J. Page*[1], R. W. Rorie[1], T. D. Lester[1], C. L. Williams[1], M. L. Looper[2], J. D. Patterson[1], M. P. Rowe[1], and C. F. Rosenkrans[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA-ARS*, *Booneville, AR*.

Toxic tall fescue grass has been associated with reduced reproductive rates in cattle. This study was conducted to determine the direct effects of the ergot alkaloids [ergonovine (EN), ergotamine (ET), and dihydroergotamine (DHET)] on motility of bovine spermatozoa. Spermatozoa were collected from mature bulls (n = 6). Following collection spermatozoa were washed once and resuspended in modified sperm medium

(mSPTL). The experimental design was a randomized complete block, with bull serving as the block. Treatments were structured as a 3x5 factorial with three alkaloids (EN, ET, DHET) and five concentrations of each drug (0 µM, 33 µM, 66 µM, 100 µM, 200 µM). Spermatozoa were incubated in 1 mL of mSPTL with treatment at 39 C. Sperm motility was evaluated at 0 h, 4 h, and 8 h using CASA (Hamiliton Thorne IVOS). Initial sperm motility was (69 ± 1.7%) and declined to (35 ± 2.6%) at 6 h. Percentage of motile spermatozoa was affected ($P = 0.015$) by a three way interaction between time, concentration, and alkaloid. Sperm motility decreased ($P < 0.01$) over time and with increasing concentrations of alkaloids with the exception of EN. Percentages of progressively motile and rapidly motile spermatozoa decreased ($P < 0.01$) in a two way interaction between alkaloid and concentration. Overall sperm motility was decreased by ET and DHET; furthermore, the qualities of motility as represented by progressive and rapid spermatozoa were decreased by those alkaloids. These data verify that ergot alkaloids commonly found in toxic tall fescue are detrimental to bovine spermatozoa.

Key Words: sperm motility, ergot alkaloids, fescue

42 The effect of plant-tannins on mature fat cells regulation in goats. F. Xie*[1], R. A. Katchko[1], B. Fielder-Dierking[1], M. A. Ramires[1], E. A. Benavides[1], R. L. Stanko[1,2], and M. R. Garcia[1], [1]*Texas A&M University*, *Kingsville*, [2]*Texas AgriLife Research Station*, *Beeville, TX*.

The demand for consumption of goat meat is increasing in the United States; therefore, mass production of this species may be imminent in the near future. Hence, it is important to characterize the effects of different feeds and/or feed constituents on carcass components. Goats favor the consumption of broad-leafed plants, which contain various quantities of polyphenolic compounds called tannins. There are two types of tannins: hydrolyzable tannins (HTs) and condensed tannins (CTs), the former of which can be toxic to ruminants. Tannins have been reported to alter the formation of mature fat cells, which suggests that these plant compounds play a role in fat metabolism and/or regulation. Therefore, it is hypothesized that plant tannins, both HT and CT, influence fat cell metabolism. Subcutaneous adipose tissue was collected from mature, crossbred (Spanish x Boer) wethers (n=6) from the tail-head. Tissue was enzymatically digested to isolate fat cells for culture. Approximately 3×10^6 fat cells were cultured in media with/without an HT source of tannin or a CT source of tannins (1mg, 100ug, 10ug, 1ug, or 0) and incubated at 37°C in an atmosphere of 5% CO_2 and 95% air for 2 or 18 h to compare enzymatic function vs. gene expression and translational regulation. Upon termination of the cell culture, media was aspirated and analyzed for glycerol content using colorimetric assay. The cells were placed in denaturing solution and analyzed for fat cell gene expression using real-time RT-PCR. The effect of treatment on fat cell metabolism was analyzed using the PROC MIXED procedure of SAS. Leptin gene expression increased ($P < 0.05$) in both HT and CT 2 h treated cells. A more robust response occurred in HT 18 h treated cells. Glycerol content dose-dependently increased ($P < 0.03$); however, glycerol concentrations were highest in 18 h HT treated cells. Collectively, the evidence supports the supposition that plant tannins influence fat cell metabolism.

Key Words: tannins, fat, leptin

43 Leptin influences normal formation of the corpus luteum in the caprine species. M. A. Ramirez*[1], F. Xie[1], E. A. Benavides[1], R. A. Katchko[1], L. Ayala[1], D. H. Keisler[3], R. L. Stanko[1,2], and M. R. Garcia[1], [1]*Texas A&M University*, *Kingsville*, [2]*Texas A&M University, AgriLife Research Station*, *Beeville*, [3]*University of Missouri*, *Columbia*.

Previous evidence suggests that leptin may be involved in CL development. Therefore, it is hypothesized that blocking the action of ovarian leptin will disrupt luteal development in the caprine ovary. Nine cycling, unilateral ovariectomized crossbred does of similar age were randomly allocated to one of the three treatment groups: Control (C; saline vehicle; n=2), rabbit anti-leptin antibody (AL; n=5), and rabbit immunoglobulin G (IgG; n=2). Females were observed 2x daily for estrus over 2 consecutive cycles to establish normal cyclicity. On day 10 of the 3rd estrous cycle, does received a single injection of PGF2 α to regress the CL and permit growth and subsequent ovulation of the dominant follicle (s). Forty-eight hrs following injection, osmotic pumps containing 1 of 3 treatments were surgical inserted in apposition to the ovarian vascular plexus. After 14 days, the osmotic pump and ovary were removed. Gross morphology of CL tissue was recorded, divided and either snap frozen in liquid nitrogen or paraffin embedded for gene expression analysis and microscopic evaluation, respectively. Blood was collected daily until pump removal for serum analysis of progesterone and leptin. Effect of treatment on gross CL morphology was analyzed using the Chi Square procedure of SAS. Gene expression and serum hormones were analyzed using the MIXED procedure of SAS. Infusion of AL increased the frequency ($P < 0.05$) of abnormal luteal formation compared to C and IgG treatment groups. Leptin and the angiogenic hormone, FGF-2, tended ($P \leq 0.07$) to be greater in the AL and IgG groups compared to C. No difference was detected in serum progesterone or leptin between treatment groups; however, the ratio of large:small luteal cells was greater ($P < 0.05$) in the AL group compared to C and IgG. Collectively, the evidence supports the supposition that leptin appears to be involved in normal luteal development in the caprine ovary.

Key Words: goat, CL, leptin

44 Relationship of Angus x Charolais cow measurements prepartum with subsequent calf performance. A. Davis*[1], M. L. Looper[2], T. P. Neidecker[3], B. C. Williamson[1], D. L. Kreider[1], and C. F. Rosenkrans[1], [1]*University of Arkansas, Department of Animal Science, Fayetteville,* [2]*USDA-ARS, Dale Bumpers Small Farms Research Center, Booneville, AR,* [3]*Neidecker Farms, Van Buren, AR.*

Angus x Charolais cows (n = 79; mean age = 5.4 ± 2.8 y) and their Angus-sired calves (n = 79) were used to examine relationships between pre-calving variables in cows and post-calving variables measured in their calves. We hypothesize that measurements of cow energy status and physical body measurements prior to calving are associated with subsequent calf performance variables. At 150 d pre-partum (mean calving date = 31 Jan), body weight (BW), body condition score (BCS), and cow hip height (CHH) were recorded. Intramuscular fat percentage (IMF) and rump fat (RF) were also measured via ultrasonography from cows. A blood plasma sample was collected from each cow and concentrations of fatty acids (NEFA) and glucose (GLU) were determined. Post-calving variables collected on calves included birth weight (BrthWt), weaning weight (WW), calf hip height (CalfHH), and adjusted weaning weight (AdjWW). The relationship between pre-calving variables in cows and post-calving variables in calves was determined by canonical correlation analysis. Significant Pearson correlation coefficients ($P \leq 0.05$) were found between BW and BrthWt (r = 0.37), BW and WW (r = 0.34), BW and CalfHH (r = 0.30), CHH and AdjWW (r = 0.33), and NEFA and WW (r = 0.21). Tendencies ($P = 0.07$) were also observed between CHH and WW (r = 0.20) and IMF and AdjWW (-0.20). Four canonical variable pairs were produced; however, only the first canonical pair was significant (r = 0.58, $P = 0.04$). The V1 variable in cows was correlated with BW, CHH, IMF, NEFA, RF, GLU, and BCS (r = 0.89, 0.58, 0.31, 0.30, 0.20, 0.07, and 0.03, respectively). The corresponding W1 vari-

able in calves was correlated with AdjWW, BrthWt, WW, and CalfHH (0.99, 0.73, 0.68, and 0.50, respectively). Data suggest that a linear combination of prepartum variables in the cow that are a combination of linear body measures and measures of energy status (metabolic and ultrasound measures of fatness) maybe predictive of a combination of post-calving traits related to growth performance.

Key Words: beef cows, calf, performance

Small Ruminant Production I: Parasite Control

45 Small ruminant integrated parasite management and FAMACHA© training in the United States. N. C. Whitley*[1], M. A. Perdue[2], S. Schoenian[3], R. M. Kaplan[4], B. Storey[4], T. H. Terrill[5], J. M. Burke[6], S. Mobini[5], and J. E. Miller[7], [1]*North Carolina A&T State University*, *Greensboro*, [2]*University of Maryland, Eastern Shore*, *Princess Anne*, [3]*University of Maryland Extension*, *Keedysville*, [4]*University of Georgia*, *Athens*, [5]*Fort Valley State University*, *Fort Valley, GA*, [6]*ARS USDA DBSFRC*, *Booneville, AR*, [7]*Louisiana State University*, *Baton Rouge*.

The objective was to determine the impact of integrated parasite management (IPM) training conducted in the US from 2003-2008 on sheep and goat producers′ ability to control gastrointestinal parasites on their farms. Surveys (and internet link) were mailed or e-mailed to over 2000 producers who had previously attended IPM training (including FAMACHA©) across the US. A total of 729 surveys were returned, primarily from the Southern (42%), and Midwestern (39%) US. Respondents (95%) felt that the training made a difference in their ability to control or monitor parasitism and 72% noted fewer parasite problems after training. The FAMACHA© eyelid color chart was used to make worming decisions by 87% of producers, with 57% scoring animals once or twice a month, 6% three or more times a month and 37% irregularly. Only 5% of respondents dewormed their animals more often after training, 21% dewormed the same amount and 74% dewormed less often. The majority (75%) of producers saved money in the first year after training, citing reasons such as fewer drug treatments (84%), fewer animal deaths (43%), and better animal performance (29%) and others. The most popular practices respondents adopted after training included incorporating rotational grazing (77%) and genetic selection (53%), using grain supplementation on pasture to improve nutrition (44%) and increasing height of plants grazed (41%). Other practices included multi-species grazing (36%), deworming around the time of parturition (36%), reducing stocking rates (28%), fecal egg counting (25%), switching to oral dosing (28%), and weighing animals before dosing (23%). Of those responding to the survey, the majority (65%) had less than 50 animals, 9% had 50-75 animals, and 26% had greater than 75 animals. Overall, producers in the United States have clearly benefited from IPM/FAMACHA© training.

Key Words: impact, goats, parasite control

46 Evaluation of sericea lespedeza grazed as a summer forage and natural gastrointestinal parasite control for goats. J-M. Luginbuhl*[1], H. M. Glennon[1], J. E. Miller[2], and T. H. Terrill[3], [1]*North Carolina State University, Raleigh,* [2]*Louisiana State University, Baton Rouge,* [3]*Fort Valley State University, Fort Valley, GA*.

A grazing trial was conducted to evaluate the effect of sericea lespedeza (*Lespedeza cuneata*, SL) as a summer forage on natural gastrointestinal nematode infection in goats. Seventy-two (45 testers and 27 grazers) recently-weaned > 7/8 Boer and 3/4 Boer x 1/4 Kiko cross kids (BW 18.5 kg) were stratified by fecal egg counts (FEC) and sorted into 9 groups in a RCBD with 3 replicates. Goats were then strip-grazed on either SL or pearlmillet (*Pennisetum americanum*, PM), or had free choice access to SL and PM (SLPM). Fecal samples for FEC, blood samples for packed cell volume (PCV) and FAMACHA scores were taken at d 0 and then every 7 d for 56 d. From d 35 to d 56, kids were housed together off pasture, given ad libitum access to fescue hay and fed concentrate at 1.5% BW. FEC of kids grazing SL and SLPM decreased within 7 d (SL: 1688 to 178; SLPM: 1525 to 493) and stayed low from d 7 through 35 (avg: SL, 218; SLPM, 503; $P < 0.06$). FEC of PM kids increased from 2010 to 3052 within 7 d of grazing, averaged 3033 from d 7 to 35 and differed from SL ($P < 0.01$) and SLPM ($P < 0.02$). While off pasture, FEC differed on d 42 between SL (415) and SLPM (1479; $P < 0.01$) or PM (1754; $P < 0.01$). FAMACHA scores (avg 3.0) differed between SL and PM on d 21($P < 0.01$), 28 ($P < 0.04$) and 35 ($P < 0.01$), and between SLPM and PM on d 21 ($P < 0.04$) and 28 ($P < 0.02$). PCV values (avg 27.2) were higher on d 14, 21, and 28 for SL than PM ($P < 0.01$). PCV of SLPM kids differed from PM on d 21 and 28 ($P < 0.05$), and from SL on day 21 ($P < 0.03$) and 56 ($P < 0.01$). While grazing, 9 PM, 3 SL and 2 SLPM goats were dewormed, and 1 SL and 1 SLPM when housed off pasture. Kids daily gains were highest for SLPM (122 g/d), intermediate for SL (98 g/d) and lowest for PM (64 g/d), and differed between SLPM and PM ($P < 0.5$). Goats having free-choice access to SL and PM had similar FEC patterns than goats grazed only on SL.

Key Words: gastrointestinal nematodes, *Sericea lespedeza*, goats

47 Effect of feeding sericea lespedeza leaf meal on establishment of gastrointestinal nematode larvae in goats. D. S. Kommuru*[1], T. H. Terrill[1], B. R. Joshi[1], A. Mechineni[1], S. Gujja[1], J. E. Miller[2], J. A. Mosjidis[3], and J. M. Burke[4], [1]*Fort Valley State University*, *Fort Valley, GA*, [2]*Louisiana State University*, *Baton Rouge*, [3]*Auburn University*, *Auburn, AL*, [4]*USDA/ARS/DBSFRC*, *Booneville, AR*.

Feeding sun-dried sericea lespedeza (SL, *Lespedeza cuneata*), a high-condensed tannin (CT) legume, to goats affects abomasal gastrointestinal nematodes (GIN), but the mechanism of action is unclear. The CT may affect the parasite at different stages of its development (mature or immature), but the relative strength of each effect is currently unknown. To determine effects of dietary SL on establishing GIN, intact male goat kids (9-mo-old, n=10) were dewormed and randomly allocated into two groups of five each. Half of the animals were fed a diet of SL leaf meal, and the other half ground bermudagrass (BG, *Cynodon dactylon*) hay (both diets approximately 14% crude protein). All the goats were given 5000 larvae (L3) of *Haemonchus contortus* a week after initiation of feeding and then adult GIN harvested on d 28 post-infection to determine effects on worm establishment. Feeding SL reduced ($P < 0.05$) establishment of *H. contortus* and total GIN, with a greater effect on female than male worm numbers. The SL- and BG-fed goats had 78 and 101 mature *H. contortus*, and 92 and 141 total GIN, respectively. There was no difference in percentage immature and mature worms in the two treatment groups. Dried sericea lespedeza has potential as a natural dewormer in goats.

Key Words: *Sericea lespedeza*, goats, *Haemonchus contortus*

48 Influence of condensed tannins from sericea lespedeza on fecal shedding of antibiotic resistance-selected *Escherichia coli* O157:H7 in rams. M. L. Looper*[1], T. S. Edrington[2], J. M. Burke[1], J. E. Miller[3], J. A. Mosjidis[4], T. H. Terrill[5], K. J. Genovese[2], T. R. Callaway[2], B. C. Williamson[6], and C. F. Rosenkrans, Jr.[6], [1]*USDA-ARS*, *Booneville, AR*, [2]*USDA-ARS*, *College Station, TX*, [3]*Louisiana State University*, *Baton Rouge*, [4]*Auburn University*, *Auburn, AL*, [5]*Fort Valley State University*, *Fort Valley, GA*, [6]*University of Arkansas*, *Fayetteville*.

Objectives were to determine effects of short-term feeding of condensed tannins (CT) from sericea lespedeza on fecal shedding and intestinal concentrations of *Escherichia coli* O157:H7 in experimentally inoculated rams. Sixteen Katahdin rams (mean BW = 41 ± 5 kg) were individually fed either ground sericea lespedeza [SL; *Lespedeza cuneata* (Dum-Cours) G. Don; n = 8], a high-CT legume; or bermudagrass hay [BG; *Cynodon dactyon* (L.) Pers.; n = 8], at 88% of daily intake with a corn/SBM supplement (12% of intake; 16% CP) for 10 d. Rams were experimentally inoculated with two strains (933 and 2336) of antibiotic resistance-selected *E. coli* O157:H7 on d 5 of the feeding treatment, and fecal shedding of inoculated pathogens was monitored daily on d 6 to 10. On d 10, rams were euthanized, and tissues and contents were sampled from the rumen, ileum, cecum, colon, and rectum for quantitative enumeration of *E. coli* O157:H7. Fecal shedding of *E. coli* O157:H7 was greater ($P < 0.001$) for strain 2336 [3.8 cfu ($\log_{10}$)/g of feces] than strain 933 [2.7 cfu ($\log_{10}$)/g of feces] during the experiment. Rams consuming SL diets shed fewer [$P < 0.05$; 3.7 cfu ($\log_{10}$)/g] *E. coli* O157:H7 on d 6 (one d after inoculation) of the feeding treatment compared with rams fed BG diets [5.4 cfu ($\log_{10}$)/g]; fecal shedding was similar ($P > 0.10$) between treatment diets on d 7 to 10. Occurrence of strain 933 *E. coli* O157:H7 in the contents of the cecum, colon, and rectum of rams fed SL diets was greater ($P < 0.05$) than rams fed BG diets. Rams consuming SL diets had increased ($P < 0.05$) incidence of *E. coli* O157:H7 (strain 933) in enriched ileal (63 vs 0% positive for SL and BG diets, respectively) and colon (88 vs 13% positive for SL and BG diets, respectively) tissues. Short-term feeding of SL diets reduced fecal shedding *E. coli* O157:H7 in experimentally inoculated rams the day after inoculation; however, occurrence of *E. coli* O157:H7 was increased in luminal contents and tissue samples of rams consuming SL. Diets high in condensed tannins may decrease fecal shedding of bacterial pathogens from ruminants.

Key Words: condensed tannins, *Escherichia coli*, *Sericea lespedeza*

49 Comparison of copper oxide wire particles, copper sulfate and anthelmintic treatment for controlling gastrointestinal nematode infection in lambs. J. E. Miller*[1], J. M. Burke[2], J. Garza[1], S. Callahan[1], and T. H. Terrill[3], [1]*Louisiana State University, Baton Rouge,* [2]*USDA ARS, Booneville, AR,* [3]*Fort Valley State University, Fort Valley, GA.*

Gastrointestinal nematode infection is a serious constraint to sustainable small ruminant production in the southeastern US. *Haemonchus contortus* is the primary pathogen which can cause severe anemia and even death. Copper oxide wire particles (COWP) have been shown to control *H. contortus* infection. The use of copper sulfate (CuSO4) has also been promoted for control. A recent study incorporating CuSO4 in a feed supplement was not effective. This study was conducted to evaluate the efficacy of COWP (2 g/hd), CuSO4 (1% solution drench, 5 ml/3.2 kg), anthelmintic [ANTH, levamisole (8 mg/kg) + albendazole (10 mg/kg)] and a combination of COWP and ANTH. Thirty-three (9 Katahdin and 24 crossbred, Gulf Coast Native x Suffolk) lambs were randomly allocated to the 4 treatment groups plus a control group (CONT). Each group had 7 lambs except the ANTH and COWP/ANTH groups had 6. Fecal egg count (FEC) was conducted on day 0, 7 and 14 after treatment. FEC was log transformed and a repeated measures ANOVA over time was conducted. Means were adjusted for the variables in the model. There was no significant difference between groups ($P > 0.05$) on day 0. There was a significant interaction for treatment ($P = 0.0043$), day ($P < 0.0001$) and treatment x day ($P = 0.0170$). There was no interaction for breed ($P = 0.0992$). On days 7 and 14, there was no difference ($P > 0.05$) between CONT, ANTH and $CuSO_4$ groups, and COWP and COWP/ANTH groups were significantly ($P < 0.05$) lower than the CONT group. Results indicate that COWP alone or with ANTH were effective in reducing infection, but ANTH alone and $CuSO_4$ were not effective. Copper treatment in the form of COWP appears to be preferable to $CuSO_4$ for controlling infection in lambs. Also, the worm population appears to be resistant to the combination of levamisole and albendazole.

Key Words: nematodes, sheep, control

50 The efficacy of Rabon (tetrachlorvinphos) as a treatment for trichostrongylosis in small ruminants. J. Garza*[1], J. Bunagan[2], V. Kelly[3], and J. Miller[1], [1]*Louisiana State University,* [2]*University of Texas, Pan American,* [3]*Oklahoma State University, Stillwater.*

Gastrointestinal nematodes are a leading cause of economic losses in small ruminant production. The advent of the development of resistance to traditional anthelmintics by gastrointestinal nematodes warrants the development and use of alternative methods of control. One possible method is Rabon, a chemical pesticide used to prevent the development of flies in cattle feces. The purpose of this study is to evaluate the helmithicidal potential of Rabon on trichostrongyle nematodes of small ruminants by determining the ability of Rabon to reduce larval and adult trichostrongyle counts both in vitro and in vivo. To assess in vitro larvicial ability, increasing concentrations of Rabon (17.5µg, 35µg, 70µg, 140µg, 210µg, and 1000µg) were added to fecal cultures of nine Katahdin lambs and the trichostrongyle eggs present were allowed to develop to the L3 stage and were counted. To assess in vivo helminthicidal activity, ten Katahdin lambs were administered rabon at the recommended dosage (70µg) via mineral mix and blood and fecal samples were obtained tri-weekly for fecal egg count (EPG), packed cell volume (PCV), and larval cultures. ANOVA was used for comparisons of larval counts in the in vitro study while a repeated measures ANOVA was used for comparisons of larval counts, EPG, and PCV over time in the in vivo study. The data from the in vitro study showed an overall significant difference between treatment groups with all but the lowest concentrations (17.5µg, 35µg) having significantly reduced larval counts when compared to control ($P < 0.001$). The in vivo study showed no difference in EPG, PCV and larval counts statistically between treatment and control groups over time indicating no effect on adult worms. This suggests that while Rabon does have significant trichostrongyle larvicidal activity at higher concentrations in vitro, at the concentration allowed for use in cattle in vivo, it is not an effective alternative method of control.

Key Words: trichostrongylosis, alternative methods of control, tetrachlorvinphos

51 Influence of season of lambing on gastrointestinal nematode infection of lambs. J. M. Burke*[1] and J. E. Miller[2], [1]*USDA, ARS, Booneville, AR,* [2]*Louisiana State University, Baton Rouge.*

Gastrointestinal nematodes (GIN) are a major constraint to sheep production, especially during the summer when the conditions for *Haemonchus contortus* are ideal. GIN infection is minimal during the winter, but there is little known about differences in GIN control between fall born

and winter born lambs. The objective was to examine GIN infection and BW gains of lambs born in Oct or Jan. Katahdin ewes lambed in Jan (W) or Oct (F) of 2008 and 2009 (W08, W09, F08, F09). Lambs were weaned at ~120 d of age and supplemented when forage quality was low. BW, fecal egg count (FEC) and packed cell volume (PCV) were determined between 90 and 210 d of age. Lambs were dewormed if FAMACHA score was > 3 or if scours or low body condition were detected. Data were analyzed using mixed models with a repeated statement for d of age and season was the main effect. GLM were used to analyze dewormings/lamb and ADG. There were 19 single (S) and 79 multiple (M) born lambs in W08, 12 S and 68 M in W09, 10 S and 19 M in F08, and 14 S and 13 M born lambs in F09. ADG between birth and 120 d of age was greater in 2008 (W, 210 ± 6; F, 194 ± 6 g/d) than 2009 (W, 191 ± 5; F, 149 ± 6 g/d) and lowest in F09 lambs (season × year, $P < 0.02$). After lambs were weaned, ADG was greater in F than W lambs (167 ± 4 > 58 ± 3 g/d) likely because of higher quality of forage at that time. FEC were higher in F than W lambs at 90 d of age, similar at 120 d of age, then decreased in F lambs until 180 d of age. Then, the warmer spring weather led to a slight increase in FEC in F lambs, while the drier summer weather in W lambs led to a decrease in FEC between 180 and 210 d of age (season × age, $P < 0.001$). The PCV changed little over time in F lambs and dropped to a low at 150 d of age in W lambs (season × age, $P < 0.001$). The lower PCV in W lambs led to a greater incidence of deworming. There were more W (08, 0.90 ± 0.09; 09, 0.75 ± 0.09 dewormings/lamb) than F (08, 0.07 ± 0.14; 09, 0.67 ± 0.15 dewormings/lamb) lambs dewormed, and more F lambs dewormed in 2009 (season × year, $P < 003$) because of presence of scours. GIN control was more manageable in F than W lambs.

Key Words: lambs, gastrointestinal nematodes, pasture

52 Testing efficacy of anthelmintic combinations in goats. S. Hart*[1], L. Dawson[2], and Z. Wang[1], *[1]Langston University, E (Kika) de la Garza American Institute for Goat Research, Langston, OK, [2]Oklahoma State University, Boren College of Veterinary Medicine, Stillwater.*

Gastrointestinal nematodes have developed a high level of resistance to most commercially available anthelmintics. The purpose of this study was to compare the relative efficacy of anthelmintic combinations as compared to one anthelmintic alone. The study was done in late June using a group of Boer x Spanish does which were in late pregnancy or had recently kidded. Does were given their treatments, fecal samples taken then and 7 days later. Drugs used included albendazole (20 mg/kg BW), levamisole (12 mg/kg BW) or moxidectin (.8 mg/kg BW) and 2 or 3 way combinations at the same dose, administered simultaneously. Treatments were 1) albendazole; 2) levamisole; 3) moxidectin; 4) albendazole-levamisole combination; 5) albendazole-moxidectin combination; 6) levamisole-moxidectin combination ; 7) albendazole-levamisole-moxidectin combination; 8) copper oxide wire capsules (2.0 g); 9) control. Each treatment was administered to 12 animals at random. Fecal egg counts were determined by a modified McMaster procedure and fecal egg count reduction (FECR) calculated. All animals with an initial fecal egg count of less than 250 eggs per gram (EPG) were deleted from the data leaving an average of 8.6 animals per treatment. Data were analyzed by the SAS npar1way procedure. Initial fecal egg counts ranged from 250 to 13,500 EPG with a median of 2,550 EPG. Median FECR for treatments were 76, 39, 74, 85, 98, 98, 99, 28, and 14% for TRT 1,2,3,4,5,6,7,8, and 9 respectively. Treatments 2 and 8 were not significantly different from control ($P > 0.10$). Significant anthelmintic resistance was present since FECR for each anthelmintic alone was less than 95%. Moxidectin and albendazole were significantly more effective than levamisole ($P < 0.06$). Levamisole combinations with moxidectin were more effective than levamisole alone ($P < 0.01$). All anthelmintic combinations except for the albendazole and levamisole combination were highly effective. Anthelmintic combinations provide increased efficacy over one anthelmintic and may be a useful tool where there is significant anthelmintic resistance.

Key Words: anthelmintic, goat, gastrointestinal nematodes

53 Efficacy of garlic juice, copper oxide wire particles, and anthelmintics to control gastrointestinal nematodes in goats. A. D. Courter*[1], M. K. Neary[1], T. K. Hutchens[2], K. Andries[3], J. E. Miller[4], L. M. Pezzanite[1], J. E. Tower[1], and M. E. Einstein[1], *[1]Purdue University, West Lafayette, IN, [2]University of Kentucky, Lexington, [3]Kentucky State University, Frankfort, [4]Louisiana State University, Baton Rouge.*

Resistance of gastrointestinal nematodes (GIN) to anthelmintics and a need for nonchemical control of GIN necessitates investigation of alternative control methods. This study examined the efficacy of garlic juice (99.5% pure) (G), copper oxide wire particles (COWP), levamisole (L), moxidectin (M), a combination treatment of COWP and G (CG), and an untreated control (C) for GIN control in lactating Boer x Kiko does. Treatments were administered at d 0 and the G treatment was repeated every 7 d throughout the 28 d study. Mixed model procedures for repeated measures were used to evaluate the effect of treatment and date of sampling on fecal egg counts (FEC), percent packed cell volume (PCV), and FAMACHA score (1 = normal; 5 = severely anemic). Larval cultures from fecal samples at d 0 contained *H. contortus*, but *Telodorsagia* and *Trichostrongylus* were the predominant parasites. There was an interaction ($P < 0.05$) between treatment and sampling d for FAMACHA but not for FEC or PCV. There was no ($P > 0.05$) difference in FEC or PCV of does due to GIN control treatment. The PCV was greater ($P < 0.05$) at d 0 (31.2 ± 0.7%) when compared to d 7 (29.1 ± 0.7%), d 14 (28.7 ± 1.1%), and d 21 (28.8 ± 0.8%). The PCV at d 28 (23.5 ± 0.9%) was lower ($P < 0.001$) than all other sampling d. The FEC did not differ ($P > 0.05$) at d 0 (756 ± 414 eggs/g), d 7 (1349 ± 448 eggs/g), and d 14 (1782 ± 436 eggs/g). The FEC at d 21 (2259 ± 464 eggs/g) was trending ($P = 0.08$) higher as compared to d 0. The FEC at d 28 (3935 ± 449 eggs/g) was greater ($P < 0.05$) than FEC at all other sampling d. At d 28 *H. contortus* larvae was present at levels below 1% and the lack of efficacy of all GIN control treatments should be viewed against the predominant *Telodorsagia* and *Trichostrongylus* populations.

Key Words: goat, parasitism, garlic, copper wire, anthelmintic

54 Sunn hemp with chicory or pearl millet to minimize gastrointestinal nematode infection in weaned goats. J. M. Burke*[1], J. A. Mosjidis[2], J. E. Miller[3], P. Casey[4], and T. H. Terrill[5], *[1]USDA, ARS, Booneville, AR, [2]Auburn University, Auburn, AL, [3]Louisiana State University, Baton Rouge, [4]Heifer International, Perryville, AR, [5]Fort Valley State University, Fort Valley, GA.*

Predominantly grass forage systems are typically used throughout the southeastern U.S., but are inadequate for nutritional needs of growing goats, and encourage problems with gastrointestinal nematodes (GIN). Browse predominant forages would be preferable, but are not always available. Selection of high quality protein forages is desirable by goats. The objectives of this experiment were to examine tolerance to GIN and growth of kids grazing mixed forage systems. Weaned Spanish kids (136 ± 1.6 d of age) of mixed gender were randomly assigned to graze a mix of 1) sunn hemp (*Crotalaria juncea* L.) and chicory (*Cichorium intybus* L.; SC), 2) sunn hemp and pearl millet (*Pennisetum glaucum*;

SP), or 3) chicory and pearl millet (CP; n = 15/treatment). The sunn hemp grown was the experimental population AU SelPBU adapted to temperate climates. The chicory cultivar used was an equal mix of Puna and Oasis and the pearl millet cultivar was Tifleaf 3. Kids were dewormed if FAMACHA score = 4 (1 g copper oxide wire particles; COWP) or 5 (moxidectin). A pooled fecal sample was collected and initially *Haemonchus contortus* was the predominant GIN (63%). Fecal egg counts (FEC) and blood packed cell volume (PCV) were determined every 14 d between D 0 (first day of grazing treatment) and 84, and BW every 28 d. Data were analyzed using the mixed models procedure of SAS with a repeated statement for date; forage treatment and interactions were included in the model. FEC were log transformed. The mean number of dewormings was 0.53, 0.47, and 0.93 ± 0.22 for SC, SP, and CP groups, respectively ($P = 0.28$). FEC were similar among forage groups ($P = 0.58$) and ranged from 3469 eggs/g on D 0 to 5867 eggs/g on D 84. PCV tended to be greater in the SC group compared to others on D 70 and 84 (forage × day, $P = 0.06$). BW was similar among forage groups and ranged from 17.3 to 22.1 ± 0.5 kg between D0 and 84 ($P = 0.71$). In summary, compared with previous experiments in which kids grazed grass pastures, GIN control was good initially, likely associated with good forage quality, but declined by D 84.

Breeding and Genetics

55 Genetic parameter estimates for weaning chute behavior score as an indicator trait for temperament in purebred Angus calves. A. H. Brown, Jr.*[1], Z. B. Johnson[1], S. W. Coleman[2], M. A. Elzo[3], F. A. Thrift[4], S. M. DeRouen[5], D. E. Franke[5], W. E. Wyatt[5], R. C. Vann[6], G. R. Hansen[7], and D. G. Riley[8], [1]*University of Arkansas, Division of Agriculture*, *Fayetteville*, [2]*USDA/ARS*, *Brooksville, FL*, [3]*University of Florida*, *Marianna*, [4]*University of Kentucky*, *Lexington*, [5]*Lousiana State University Agcenter, Homer, Baton Rouge, Iberia*, *Baton Rouge*, [6]*Mississippi State University*, *Raymond*, [7]*North Carolina State University*, *Plymouth*, [8]*Texas A&M Agrilife*, *College Station*.

Chute behavior scores (CS) were obtained at weaning in 2003 through 2008 to estimate heritability for temperament and genetic correlations with ADG and weaning weight in purebred Angus calves (n = 1749). Data were collected under objective 3 of Southern Regional Research Project S1013, with the following states contributing data: AR, FL, KY, LA, and MS. At each location CS were determined by trained personnel. Temperament differences were described using the following CS system: 1 calm, stands still, non-nervous; 2 slightly nervous, restless; 3 restless, shaking chute, down on foreknees; 4 vigorously shaking chute, back and forward movement; and 5 berserk frenzy. Progeny of Bon View New Design 878 provided genetic ties across locations. Heritability and genetic correlations were estimated using an animal model with only direct additive effects and MTDFREML. Number in the $A^{-1} = 3373$. Fixed effects of contemporary group (n = 39) were generated as birth year, location, and sex of calf. Age of dam and age at measurement were included as covariates for single trait analysis, and age at measurement was included as a covariate in the two-trait analysis. Mean CS, mean age of dam, and mean weaning weight were 1.88, 3.60 yrs, and 226 kg, respectively. Coefficient of heritability for weaning temperament was 0.19 ± 0.05. Genetic correlations of weaning CS with pre-weaning ADG and weaning weight were 0.07 ± 0.14 and 0.02 ± 0.14 ($P > 0.05$). These results suggest that calf temperament at weaning is moderately heritable and could be used in cattle selection programs. Additional research is needed to determine genetic association of CS with pre-weaning growth.

Key Words: temperament, weaning, Angus calves

56 QTL mapping for overall temperament at weaning in Nellore-Angus cattle using Bayesian inference. L. L. Hulsman*[1], S. O. Peters[2], J. O. Sanders[1], A. D. Herring[1], C. A. Gill[1], and D. G. Riley[1], [1]*Texas A&M University, Department of Animal Science, College Station,* [2]*New Mexico State University, Department of Animal and Range Sciences, Las Cruces, NM.*

Temperament in cattle influences carcass traits and ease of handling, thus having an understanding of the genetic contribution is vital. The objective was to conduct QTL discovery using genomic, Bayesian-based analyses of weaning overall temperament score for crossbred cattle. Calves (n = 698) were from 10 full-sib embryo transfer Nellore-Angus F_2 families and 4 half-sib families sired by the same bulls in central Texas. Averages from a panel of 4 evaluators were used for subjective assessment of overall temperament where 1 indicated docile and 9 indicated extremely nervous, aggressive, or wild. All calves were genotyped using the BovineSNP50 assay (Illumina Inc., San Diego, CA). SNP were removed with call rates < 0.9, minor allele frequency < 0.05, and Hardy-Weinberg Equilibrium proportions rejected at $P < 0.05$. Association analyses were conducted with 34,980 markers and temperament scores using GenSel BayesC procedures. Effects of SNP were treated as random in a mixture model with an inclusion fraction $(1 - \pi)$ of 0.001. Fixed effects for analysis were birth-year-season and sex. The estimate of heritability was 0.29. Inclusion of a SNP in 1% of the models generated in different chains (model frequency (MF) ≥ 0.01) was assumed indicative of QTL association. Associations across all 30 chromosomes were found (779 SNP). Fifty SNP on 16 chromosomes had MF ≥ 0.03. Positions identified on BTA 4, 9, 25, and 26 confirmed temperament QTL reported on CattleQTLdb (Release 12). Family and dam breed were added as fixed effects to the original model and analyzed. This resulted in 167 SNP with MF ≥ 0.01, 47 SNP with MF ≥ 0.03, and estimate of heritability of 0.20. These two analyses had 91 SNP in common with MF ≥ 0.01 and 6 with MF ≥ 0.03. Future work includes Bayesian-based analyses to predict breeding values for temperament in target populations of this herd.

Key Words: Bayesian inference, temperament, QTL

57 Factors affecting birth weight in Bolivian purebred Nelore cattle. E. L. Oxford*[1], A. H. Brown, Jr.[1], J. A. Pereira[2], J. H. Landivar[3], C. F. Rosenkrans, Jr.[1], and B. R. Kutz[1], [1]*University of Arkansas, Division of Agriculture, Fayetteville,* [2]*University Gabriel Rene Moreno, Santa Cruz, Bolivia,* [3]*Asociacion Boliviana de Criadores de Cebu Bolivian Association of Cebu Breders (ASOCEBU), Santa Cruz, Bolivia.*

Effects of year of birth (YOB), age of dam (AOD), season of birth (SOB), sex of calf (SOC) and geographic regions of production (GRP) near Santa Cruz (1 = Norte, 2 = Ests, 3 = Sur) on birth weight (BRW, n = 8,946) recorded from 1992 through 2006 of the ASOCEBU were studied. Calves were conceived by AI and sires were selected based on breeding objectives of individual breeders. Calves from embryo transfer were not included in these data. Birth weights of calves managed only on improved forage production systems were included. Observations

for parity 1 through 8 were 5345, 2002, 956, 417, 163, 51, 10, and 2, respectively. Data were analyzed in a random effects model that included the fixed effects of SOC, YOB, parity, AOD, SOB, and GRP and 2 and 3-way interactions. Parity was not consistent with AOD and included as a covariate. Dam identification within SOC was included as a random effect. Year of birth, AOD, and parity were important sources ($P < 0.001$) of variation in BRW. There was an important ($P < 0.0001$) SOC x GRP interaction for BRW. Bulls in GRP 1 had greater ($P < 0.05$) mean BRW (34.7±0.21 kg) when compared to bulls in GRP 2 and 3 (33.84±0.22 and 33.79 ±0.30 kg, respectively). Mean BRW of heifers did not differ ($P > 0.05$) among the three GRP (32.30±0.21 vs. 32.25±0.22 vs. 32.26±0.32 kg). Mean BRW were similar ($P > 0.05$) for AOD 5, 6, 7, and 11 (33.54±0.11, 33.76±0.16, 33.68±0.21, and 33.28±0.88 kg, respectively). Calves representing AOD 2 and 8 were similar ($P > 0.05$) for mean BRW (32.82±0.30 and 32.83±0.39 kg) and smaller ($P < 0.05$) than mean BRW of all other AOD. These data suggest that AOD effects for BRW should be considered in the Bolivian Nelore cattle selection program.

Key Words: birth weight, Nelore cattle, age of dam

58 Heterosis for calving and weaning rates in Brahman-Hereford cows. L. Boenig*, D. G. Riley, J. O. Sanders, and J. A. Sawyer, *Texas A&M University*, *College Station*.

Calving (CR) and weaning rates (WR) were evaluated from 1994 to 2009 in Brahman (B) and Hereford (H) straightbred and crossbred cows (n = 1,742). The objective of these analyses was to estimate heterosis for F1 and F_2 females for CR and WR. Breed groups included B, H, F_1 Hereford-sired (HB) and Brahman-sired (BH) cows (n = 113 purebreds, 103 F_1, 75 F_2). Second generation breed groups included cows sired by HB and out of HB dams (F_2HB) and BH dams (HBBH); and cows sired by BH and out of HB dams (BHHB) and BH dams (F_2BH). Mixed models for CR and WR included cow breed and cow age as fixed effects; year and cow within cow breed were random effects. Cow age was modeled as three groups: cows less than 5 yr, cows from 5 through 9 yr of age, and cows over 9 yr.The interaction of dam breed and cow age was significant for CR and WR. Calving rates for cows less than 5 yr ranged from 0.45 ± 0.09 in F_2BH to 0.88 ± 0.09 in HB. Calving rates for cows from 5 to 9 yr ranged from 0.75 ± 0.07 in B to 0.92 ± 0.09 in HBBH. Calving rates for cows older than 9 yr ranged from 0.72 ± 0.09 in B to 0.85 ± 0.17 in F_2 BH and 0.85 ± 0.08 in HB. Weaning rates for cows less than 5 yr ranged from 0.40 ± 0.09 in F_2BH to 0.83 ± 0.09 in HB. Weaning rates for cows aged 5 to 9 yr ranged from 0.71 ± 0.12 in F_2 BH to 0.89 ± 0.08 in HB. Weaning rates for cows older than 9 yr ranged from 0.69 ± 0.16 in F2HB to 0.83 ± 0.09 in H and 0.83 ± 0.11 in HBBH. Estimates of heterosis for calving and weaning rate in F_1 cows were 0.16 ± 0.03 and 0.13 ± 0.03, respectively ($P < 0.01$). Estimates of heterosis for CR and WR in F_2 cows were 0.06 ± 0.04 ($P = 0.14$) and 0.05 ± 0.05 ($P = 0.3$) respectively. Calving and weaning rates of F_1 cows were 0.1 ± 0.04 ($P = 0.02$) and 0.08 ± 0.05 ($P = 0.09$) respectively. Calving and weaning rates were 0.13 ± 0.07 ($P = 0.08$) and 0.14 ± 0.09 ($P = 0.09$) respectively. Results did not provide strong evidence that F_2 heterosis for these traits is less than that predicted by the dominance model. Sire breed group differences (HB vs BH) for these traits in F_2 cows may merit further investigation.

Key Words: heterosis, reproduction, Brahman

59 Evaluation of F1 cows by Brahman, Boran, and Tuli bulls for reproductive, maternal and longevity traits. C. T. Muntean*, J. O. Sanders, A. D. Herring, and D. G. Riley, *Texas A&M University*, *College Station*.

Birth (BWT) (n=1,335) and weaning weight (WWT) (n=1,246), calf crop born (CCB) (n=1,504), and weaned (CCW) (n=1,500), cow palpation weight (CW) (n=1,662) and cow body condition score (BCS) (n=1,666) were evaluated from 1994 to 2010 in 143 F1 females sired by Brahman (B), Boran (Bo), and Tuli (T) bulls and out of Angus and Hereford cows. Mouth scores (MS) (n=253) were assigned to remaining cows from 2004 to 2009, except 2008. CCB, CCW, CW, and BCS were evaluated with a model that included sire of dam breed, dam of dam breed, and calf's birth year/age of dam (YRAGE) as fixed effects, and cow and sire of cow as random effects. Calf's sex was included in the same models for BWT and WWT. The model for MS included sire of dam breed and YRAGE only. YRAGE was significant for all traits ($P < 0.05$) except MS. Adjusted means (LSM) for BWT for calves out of cows by B, Bo, and T sires were 34.1, 34.0 and 34.1 kg respectively, and were not different from each other ($P > 0.05$). LSM for WWT for calves out of cows by B, Bo, and T sires (236.7, 217.5 and 197.2 kg) were significantly different. For BWT and WWT, male calves were heavier ($P < 0.05$) than females. LSM for CCB for cows sired by B, Bo, and T sires were 0.87, 0.94 and 0.89; Bo-sired cows were higher ($P < 0.05$) than B and T. They ranked the same for CCW as for CCB with LSM of 0.81, 0.89 and 0.84, respectively, with Bo higher ($P < 0.05$) than B. CW LSM for cows by B, Bo and T sires were 537.1, 468.9 and 462.6 kg respectively, with B-sired cows heavier ($P < 0.05$) than Bo and T-sired cows. BCS for B, Bo, and T-sired cows were 5.2, 5.4, and 5.2 respectively, with Bo-sired cows being highest ($P < 0.05$). MS were evaluated with two models. B and Bo-sired cows (0.87 and 0.83) had higher MS ($P < 0.05$) than T-sired cows (0.65) when broken and solid mouths were scored 1, and smooth 0. When solid was 1 and smooth and broken were 0, B (0.40) were higher than T (0.07) ($P < 0.05$); Bo (0.30) was not different from either ($P > 0.05$). Higher reproductive rates were found for Bo-sired cows, but B-sired cows weaned heavier calves.

Key Words: Brahman, Boran, Tuli

60 Coefficient of heritability for underline scores in Beefmaster cattle. B. R. Kutz*[1], A. H. Brown, Jr.[1], T. L. Perkins[2], Z. B. Johnson[1], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas, Division of Agriculture*, *Fayetteville*, [2]*Beefmaster Breeders United*, *San Antonio, TX*.

Performance records (n = 92,898) of Beefmaster Breeders United (BBU) recorded from 1966 through 2008 were used to estimate heritability of underline scores. The calf, the sire and dam of each calf are recorded in the registry of the Beefmaster Breeders United. Scores were recorded by classifiers approved by Beefmaster Breeders United. Underline scores (1-4) are based on the different sizes and shapes of sheaths in bulls and navels in heifers. A score of 1 is used to designate the least amount of navel or sheath and a score of 4 represents the maximum amount of navel or sheath accepted as a Beefmaster Breeders United registered Beefmaster. Heritability was estimated using an animal model with only direct additive effects and MTDFREML. Fixed effects of the inspector and contemporary group were included in the analysis with contemporary group generated as birth year and sex. Age of dam was included as the covariate. Coefficient of heritability for underline score was 0.42. This high estimate of heritability suggests that underline score can be readily improved through artificial selection.

Key Words: Beefmaster cattle, underline score, heritability

61 Effects of hair coat shedding on weaning performance and association to hair measurements in beef cattle females. N. B. Simmons*, M. L. Marks, J. A. Parish, S. T. Willard, and T. Smith, *Mississippi State University*, *Starkville*.

The objectives of this study were to develop a method for evaluating hair shedding in beef cattle and determine its effects on cattle performance. Data was recorded on Angus (n=438), Charolais (n=70), and Hereford (n=38) females for 3 years over a 5-mo period every 28 days beginning in March and continuing through July. Animals were observed by trained technicians and given a numeric score of 1 to 5, with 1 referring to an animal that has shed its winter coat, and 5 referring to an animal with no signs of shedding. An average was obtained for each month to give five distinct scores over the course of the study. The mo in which a female had an average shedding score of < 3.5 was considered the mo of first shedding (MFS). Data were analyzed by using the mixed procedure in SAS with adjusted 205 day weight (d205wt) as the response variable and considered a trait of the dam with fixed effects of year, sex, location, MFS with a random effect of calf sire (n=62). All fixed effects except for location were significant except for MFS in Charolais and Hereford. In Angus cattle, dams with an MFS of March and April weaned calves 19.93 ± 9.92 and 18.833 ± 9.84 kg, respectively, heavier than dams with an MFS of July ($P < 0.05$). Weaned calves from dams with MFS of May, June, and July were not significantly different ($P > 0.40$). Phenotypic correlations were estimated on a small subsample of Angus dams (n=121). Data for hair characteristics included hair number and distribution for hair length which included percentage small (< 2 cm), medium (2 to 4 cm), and long (> 4 cm). Average visual hair score was positively correlated with hair number (0.11), percentage medium (0.73), and percentage long (0.36) and negatively correlated with percentage small (-0.80) distributions. Results from this data indicate that hair shedding may play a role in decreased weaning weights when evaluated as a trait of the dam.

Key Words: hair coat shedding, weaning weight, beef cattle

62 Effects of osteopontin single nucleotide polymorphisms on bull semen quality. C. L. Williams*, T. D. Lester, M. P. Rowe, C. F. Rosenkrans, Jr., and R. W. Rorie, *University of Arkansas Division of Agriculture*, *Fayetteville*.

Osteopontin (OPN) was shown to be a fertility-associated protein found in greater concentrations in seminal plasma of bulls with higher proven conception rates. This ubiquitous protein is expressed in both the ampulla and seminal vesicles of the bull and may be related to sperm-egg interaction and fertilization. Recent research has shown that polymorphisms found within OPN promoter region on chromosome 6 affects the level of OPN produced in milk. The objective of this study was to determine if single nucleotide polymorphisms (SNP) in the Bos taurus OPN gene (GenBank accession # AY878328.1) promoter region were related to sperm quality parameters as determined by computer-assisted sperm analysis (CASA). Semen was collected weekly for 9 consecutive weeks from 19 Angus and Balancer bulls. Within 5 min of each collection, semen samples were evaluated for percentage motile, progressive and rapid sperm using CASA. Each bull was genotyped for reported SNP in the promoter region of the OPN gene by PCR amplification of two 700 base pair fragments and sequencing of the resulting PCR product. Eight SNP were identified at base pairs 3379, 3490, 3492, 4967, 5075, 5205, 5209, and 5263 of the OPN gene. Effects of individual SNP on percentage of motile, progressive and rapid sperm were evaluated using SAS mixed procedures for repeated measures. None of the individual SNP were found to affect ($P > 0.1$) percentage motile, progressive or rapid sperm. Therefore, haplotypes were constructed based on the individual SNP. Eleven haplotypes were identified and compared for differences in sperm motility parameters. Sperm motility for bulls with haplotypes 8, 9 and 4 averaged 77% compared to an average of 52% motile sperm for bulls with haplotypes 6, 7, 5 and 1 ($P < 0.05$). Bulls with haplotypes 8 and 9 also were higher ($P \leq 0.05$) than those with haplotypes 7, 5 and 1 for progressive (59 vs. 37%) and rapid (77 vs. 46%) motility. Haplotype 1 was the same as the reported normal reference sequence found in the OPN gene promoter region. Results suggest that polymorphisms within the promoter region of the bovine OPN gene might be useful in selection of bulls with improved semen quality.

Key Words: fertility, osteopontin, polymorphism

Ruminant Animal Production II

63 SS-ASAS Emerging Scholar Award: Weaning management of newly received beef calves with or without exposure to a persistently infected bovine viral diarrhea virus type 1b calf: Effects on health, performance, bovine viral diarrhea virus type 1a titers, and circulating leukocytes. J. T. Richeson*[1], E. B. Kegley[1], J. G. Powell[1], B. L. Vander Ley[2], and J. F. Ridpath[3], *[1]University of Arkansas, Fayetteville, [2]Iowa State University, Ames, 3USDA-ARS, National Animal Disease Center, Ames, IA*.

Bovine viral diarrhea virus (BVDV) is a major culprit in the development of bovine respiratory disease (BRD) either directly via acute clinical illness or indirect effects of immunosuppression. Calves born persistently infected (PI) with BVDV are the primary transmission source of the virus; however, consequences of exposure to a PI-BVDV calf in single-source, preconditioned (PC) vs. commingled, auction market (AM) cohorts may differ because these distinct management groups may possess different physiological and immunological circumstances. Our objective was to compare treatments of PC or AM origin, with (PI) or without (CON) continuous exposure to PI-BVDV type 1b challenge in a 2 × 2 factorial arrangement to evaluate main effects of source, exposure, and their interaction on health parameters and growth performance during a 42-d receiving trial. Four sets (block) of crossbred PC steers (n = 236) from 3 ranch-origins were selected randomly, dewormed, administered 5-way respiratory, 7-way clostridial, and Manheimia haemolytica vaccines, tested for PI-BVDV status, and weaned on the ranch for ≥ 42 d. After the pre-trial weaning phase ended, PC steers were transported to a stocker receiving unit (RU), weighed (251 ± 2 kg), bled, stratified by d -1 BW, and assigned randomly to treatment (PCPI or PCCON) with no additional processing. Simultaneously, 4 sets of crossbred AM calves (n = 292) were assembled from regional auction markets for delivery to the RU within 24 h of PC arrival. The AM calves were weighed (245 ± 1.3 kg) and administered identical processing procedures as PC received at their origin ranch; however, bull calves were stratified by gender and d -1 BW, castrated surgically, then

AM calves were assigned randomly to treatment (AMPI or AMCON). Treatment pens (0.45 ha) were arranged spatially so that PI did not have fence-line or water source contact with CON. Calves were fed identically and followed the same antibiotic treatment protocol. Daily gain from d 0 to 42 was greater ($P < 0.001$) for PC (1.2 kg) than AM (0.85 kg). There was an exposure effect ($P = 0.002$) on ADG from d 28 to 42; CON gained 1.12 vs. 0.90 kg for PI. Morbidity rate was markedly greater ($P < 0.001$) in AM (70%) than PC (7%). Although PI exposure did not affect ($P = 0.41$) the overall BRD morbidity rate, treatment with a third antibiotic occurred more often ($P = 0.04$) for PI-exposed cohorts. A treatment interaction ($P = 0.06$) was observed for the percentage of chronically ill animals; AMPI had the greatest number of chronically ill calves (7.6%), AMCON was intermediate (1.1%), and PCCON and PCPI were least (0.4 and 0.3%, respectively). A trend ($P = 0.10$) was observed for PI-exposed calves having an increased antibiotic treatment cost which averaged $12.59 and $10.40/animal for PI and CON, treatments respectively. Within AM calves, PI exposure resulted in an antibiotic treatment cost of $4.06/animal more than CON; this numerical difference being similar to PI-BVDV testing cost/animal. The BVDV type 1a antibody titer levels were greater on d 0 for PC (treatment × day, $P < 0.001$), and seroconversion to BVDV type 1a on d 0 was 100% for PC vs. 23% in AM. Exposure to PI-BVDV type 1b challenge did not impact ($P = 0.98$) BVDV type 1a titer levels, which suggests that antigenic differences may exist among these BVDV subgenotype strains. Total leukocytes were greater ($P < 0.001$) for PC on d 0, 14, and 28. The neutrophil:lymphocyte (N:L) ratio was greater ($P < 0.001$) for AM on d 14 and 28. Platelet count increased transiently ($P < 0.001$), with greater platelets observed in AM ($P < 0.001$). Results of our study indicate that PC steers gain faster and require fewer antibiotic treatments than AM calves because stress is reduced and immunity is improved as evidenced by differences in N:L ratio and on-arrival BVDV type 1a antibody titers. Health consequences of exposure to PI-BVDV challenge may be greater for AM calves because chronically ill cattle were most frequent for AMPI. Furthermore, PI-BVDV exposure reduced ADG from d 28 to 42, perhaps due to an additive affect of continuous immune stimulation resulting in nutrients being preferentially utilized for immune pathways rather than tissue deposition. Preconditioning management practices have long-term implications for health, performance, profitability, and animal well-being.

Key Words: bovine respiratory disease, bovine viral diarrhea virus, preconditioning

64 Performance of beef steers finished on three forage systems in the deep south. G. Scaglia*[1], J. Rodriguez[2], G. Gentry[2], K. McMillin[2], and J. Gillespie[3], *[1]Louisiana State University, Agricultural Center, Iberia Research Station, Jeanerette, [2]Louisiana State University, Agricultural Center, School of Animal Sciences, Baton Rouge, [3]Louisiana State University, Agricultural Center, Department of Agricultural Economics and Agribusiness, Baton Rouge.*

The evaluation of three forage systems (S1, S2, and S3) different in soil intensity use (percent of the land area for each forage component) for finishing of beef steers on a 100% forage diet was initiated in June 2009. Spring weaned calves (n=54; 257 ± 2.5 kg; 3/8 Gelbvieh, 3/8 Red Angus, and ¼ Brahman) were allotted based on initial body weight (d 0) to 9 groups that were randomly assigned to replicates within system (3 replicates per system). Steers in S1 grazed bermudagrass (45% of area) during summer, ryegrass (35% of area) and ryegrass sod-seeded into bermudagrass paddocks (20% of area) in winter. Steers in S2 grazed bermudagrass (45% of area) in summer, dallisgrass/clover mix (20% of area) during fall and spring, and ryegrass/clover mix (35% of area) during winter while those in S3 had access to bermudagrass (20% of area) and sorghum-sudangrass hybrid/forage soybeans during summer (15% of area), dallisgrass/clover mix (20% area) during fall and spring, and ryegrass/clover mix (45% of area) during winter. Excess forage was cut for hay and fed within system when necessary. Pastures were rotationally stocked with a stocking rate of 1 steer per hectare for all systems through the grazing period of 324 d. Eighteen steers (2 per replicate) were harvested in a commercial abattoir to obtain carcass information. Data were analyzed using the GLM procedure with mean separation conducted using Tukey (alpha = 0.05). Average daily gains for S1, S2, and S3 for the whole grazing season (0.64, 0.58, and 0.56 kg) and winter period (1.20, 1.11, and 1.23 kg) were not different ($P > 0.05$) between systems. Summer ADG was different ($P = 0.04$) between systems and lower than expected. Steers in S1 gained more than those grazing on S3 (0.33 vs. 0.21 kg/d) while those on S2 were intermediate (0.27 kg/d). Hot carcass weight, fat thickness, ribeye area, kidney pelvic and heart fat, and dressing percent were not different ($P > 0.05$) between systems. Lack of forage mass and nutritive value at certain times during the grazing season may have contributed to lower than expected performance during those periods.

Key Words: forage-fed beef, forage systems, steers

65 Do heating treatments change the *cis*-9, *trans*-11 conjugated linoleic acid level in dairy products? G. Davila-El Rassi and V. Banskalieva*, *Oklahoma State University, Robert M. Kerr Food and Agricultural Products Center, Sillwater.*

Investigating the effect of thermal treatments on the levels of the health beneficial *cis*-9, *trans*-11 conjugated linoleic acid (CLA) is of special interest with respect to dairy products containing considerably high amounts of this unique fatty acid. In this study, the effect of traditional heat treatments on the amount of total fat and CLA in milk and cheese were examined.Two samples of cow milk from each of two commercial sources were boiled or microwaved for 2 min, and two replicates of Mozzarella and Extra Sharp Cheddar cheeses were broiled at 232^0C for 12 min, or heated in microwave for 30 sec. Compared to untreated products, boiling and broiling increased the percent of fat from 3.39 (±0.02) to 3.67 (±0.09) and from 22.88 (±0.51) to 26.38 (±0.4) and from 32.16 (±1.01) to 36.35 (±0.37), respectively, for milk, Mozzarella and Cheddar cheeses. Microwaving increased milk fat by 6%, whereas fat content in cheeses changed only by 1%. No treatment differences were found in the percent CLA (0.44) in milk. In both cheeses after broiling and microwaving a tendency for lower levels of CLA, from 0.64(±0.04) to 0.61 (±0.06) and from 0.64(±0.04) to 0.57 (±0.03), respectively was observed. The content of CLA as mg/g lipid decreased after broiling from 5.58 (±0.04) to 4.77 (±0.18) in Mozzarella, and from 6.19 (±0.01) to 5.29 (±0.32) in Cheddar cheese. No noticeable differences in both cheeses after microwaving were found. However, after boiling and microwaving, the CLA level in milk changed from 5.25 (±0.02) to 5.04 (±0.19) and from 5.25 (±0.02)to 5.16(±0.21), respectively. The observed differences between milk and cheese were probably reflected by product matrix and heat conditions. These preliminary results with milk and cheese suggest that using conventional heat treatments such as boiling, broiling and microwaving causes some thermal degradation of CLA. Further studies are necessary to determine if similar results occur when heat is applied to food containing dairy products.

Key Words: dairy products, heating, CLA

66 Effects of form and level of nitrogen intake on serum urea nitrogen and urine urea nitrogen concentrations, and total nitrogen

excretion in feedlot cattle. A. Gueye*[1,2], C. R. Richardson[2], and N. A. Cole[3], *[1]Mount Ida College, Newton Center, MA, [2]Texas Tech University, Lubbock, [3]USDA-ARS Conservation and Production Research Laboratory, Bushland, TX.*

Twenty-seven crossbred steers with initial BW = 353.2 ± 8.4 kg were used in three sampling periods (35, 95, and155 d on feed) to evaluate the effects of dietary crude protein (CP) source and concentrations on serum urea nitrogen (SUN) and urine urea nitrogen (UUN) concentrations, and total nitrogen excretion in feedlot cattle. Treatments were arranged in a factorial arrangement and consisted of three dietary CP concentrations (11.5, 13.0, and 14.5% of dietary dry matter) and three supplemental urea:cottonseed meal (CSM) ratios (100:0, 50:50, and 0:100 of supplemental N). In the first collection period, SUN (mg/dL) increased linearly ($P = 0.001$) with increasing CP concentration. Urine urea nitrogen (UUN; mg/dL) increased linearly ($P < 0.05$) with increasing CP concentration, and steers in the 50:50 treatment tended ($P = 0.10$) to have higher UUN (mg/dL) than steers in the 0:100 treatment. Total nitrogen excretion (g/d) increased linearly ($P = 0.002$) with increasing CP concentration. In the second collection period, SUN (mg/dL) increased linearly ($P = 0.009$) when dietary CP increased from 11.5 to 14.5%. Urine urea N (mg/dL) increased linearly ($P < 0.0001$) with increasing CP. Total nitrogen excretion (g/d) increased linearly with increasing CP concentration. In the third collection period, SUN (mg/dL) increased linearly ($P = 0.003$) with increasing CP concentration. Increasing CP concentration produced a linear increase ($P = 0.04$) in UUN (mg/dL). As days on feed increased, total N excretion (g/d; $P < 0.02$) and UUN (mg/dL; $P < 0.0001$) increased as well. These results indicate that feeding growing steers diets containing 11.5 to 13.0% CP, along with decreasing the proportion of supplemental CP supplied by urea, may potentially optimize N utilization and potentially reduces N losses to the environment.

Key Words: nitrogen, crude protein, feedlot

67 Influence of crude glycerin in the growing diet on Angus and Braunvieh-sired steer calves. M. H. Poore*, J. P. Cassady, M. A. Alley, and K. A. Gray, *North Carolina State University*, *Raleigh*.

This study compared Angus (A) and Braunvieh (B) as sire breeds for use on Angus-based cows, and evaluated effects of level of crude glycerin (CG) in a steer growing diet on performance. Cows were randomly assigned within age to either A or B sires. Cows were synchronized and bred AI to the assigned sire breed, and then exposed to cleanup bulls of the same breed. Resulting A-sired (n=42) and B-sired (n=34) steer calves were weaned and preconditioned, and then fed using Calan gates for a 71- and 75-d growing phase, and an 83- and 51-d finishing phase in yr 1 and 2, respectively. Calves were penned by weight, and assigned within breed to 1 of 4 diets. The control diet contained (DM basis) 68% corn silage (CS), 15% corn, 15% soybean meal and 2% minerals (with 20 g/ton monensin). CG was substituted for corn at 4, 8, or 12% of diet DM, and diets were balanced to 14% CP. During finishing, all calves were fed a diet with DM composed of 10% CS, 76% corn, 12% soybean meal, and 2% minerals (30 g/ton monensin). Calves were harvested when backfat for the group was estimated at 1.25 cm. Methanol content of the CG was 11,101 ppm in yr 1 and 5,110 ppm in yr 2. Angus-sired calves had higher ($P < 0.01$) starting BW (358 vs. 341 kg), final BW (593 vs. 557 kg), overall ADG (1.68 vs. 1.55 kg/d), overall DMI (11.23 vs. 10.55 kg/d), carcass weight (370 vs. 348 kg), back fat (1.32 vs. 0.98 cm), marbling score (6.30 vs. 5.11), and yield grade (3.12 vs. 2.54) compared to B-sired steers. Gain:feed and ribeye area did not differ between sire-breeds. Inclusion of CG had a linear effect ($P < 0.01$) on ADG (1.89, 2.12, 2.09, 2.16 kg/d), and gain:feed (0.196, 0.202, 0.212, 0.220), and had a quadratic effect ($P = 0.04$) on DMI (9.74, 10.53, 9.92, 9.86 kg/d for 0. 4, 8, and 12% CG, respectively) during the growing period. Including CG in the growing diet had a quadratic effect ($P < 0.07$) on overall ADG (1.54, 1.71, 1.59, and 1.62 kg/d for 0. 4, 8, and 12% CG, respectively), but did not influence any other measurement. These results showed that A-sired steers had superior performance and higher carcass quality than B-sired steers, and that CG is a viable feed ingredient for CS-based growing diets.

Key Words: Angus, Braunvieh, crude glycerin

68 Evaluation of an ear-mounted thermometer device and antibiotic metaphylaxis in newly received beef calves. J. T. Richeson*, J. G. Powell, E. B. Kegley, J. A. Hornsby, *University of Arkansas, Fayetteville.*

Use of an ear-mounted thermometer device (FeverTag; FT) may be an innovative and objective method to identify bovine respiratory disease (BRD). High-risk beef calves (n = 152; BW = 248 kg) from regional auction markets were shipped to a stocker receiving unit on March 12 (n = 39 bulls, 33 steers) and April 11 (n = 80 heifers), 2010 to determine effects of FT and antibiotic metaphylaxis (AM). Upon arrival (d -1), calves were weighed and individually identified, stratified by gender and BW, allocated randomly to pen, then pens (0.41 ha) were assigned randomly to treatment. On d 0, calves received respiratory and clostridial vaccinations, an anthelmintic, bulls were castrated, and selected calves were affixed with a FT device and/or received AM with tilmicosin phosphate (1 mL/30 kg BW) resulting in treatments of 1) FT with AM, 2) FT without AM, 3) no FT with AM, and 4) no FT without AM. During the 32-d receiving period, 2 methods were used to determine BRD morbidity. The post-treatment interval (PTI) following AM was 72 h; thus, immediately for the calves not given AM, and once the PTI expired for AM, non-FT calves were evaluated daily for clinical signs of BRD. If ≥ 2 clinical signs existed for non-FT, calves were pulled, and treated if rectal temperature was ≥ 39.8°C. Cattle with FT were monitored daily at 0800 and treated for BRD based solely on the status of the FT; if temperature ≥ 39.8°C an indicator light activated on the FT device. Neither AM nor FT affected ADG ($P \geq 0.53$). Morbidity did not differ ($P = 1.0$) based on the use of FT; however, AM reduced morbidity (13 vs. 39%; $P = 0.03$) and BRD antibiotic cost ($3.46 vs. $11.42; $P = 0.04$). When cattle were monitored by experienced personnel, there was no difference in performance or morbidity using FT vs. traditional pull and treat method; therefore, FT may be an effective method for identifying BRD if labor or expertise is limited but additional cost of the FT device must be considered. Morbidity rate was reduced by AM but ADG was not improved by either AM or FT.

Key Words: beef calves, bovine respiratory disease, metaphylaxis

Tuesday, February 8, 2011
SYMPOSIA AND ORAL SESSIONS

Extension I

69 A survey of soil and plant tissue nutrient status of established Bahiagrass pastures in south west Florida. R. D. Speckmann*[1], M. L. Silveira[1], B. Carlisle[2], C. L. Kirby[2], R. W. Gornto[2], and L. F. Wiggins[2], *[1]University of Florida, Range Cattle Research and Education Center, Ona, [2]University of Florida, IFAS Extension, Gainesville.*

Bahiagrass occupies approximately 1 million ha in Florida and is the predominant planted forage species for beef cattle production in the state. Pasture P fertilization is a relevant topic of agronomic and environmental importance. To better predict bahiagrass P requirements, University of Florida fertilizer recommendations for established bahiagrass pastures include soil and tissue testing. Free testing was provided for samples received between April 1 and June 30, 2010 to promote implementation of the practice. Paired soil and tissue samples (n=169) were solicited from beef cattle producers in south west Florida and submitted to a commercial laboratory for analysis; as such, the results described herein do not represent all soils in the sampled regions and are not intended to be indicative of average bahiagrass pasture nutrient loads in south west Florida. Average soil pH ranged from 4.2 to 8.0, which was slightly greater than the target pH of 5.5. Approximately 44% of samples exhibited pH between 5.1 and 5.9. Biosolid application and reclaimed mine lands accounted for high pH. Samples collected from reclaimed mine lands also account for the excessively high soil P values (>200 ppm) observed. Exclusion of these samples reduced the average within the range defined by UF-IFAS soil scientists as medium (20 ppm). Soil P was very low or low (<10 ppm) in 68% of samples. Only three samples exhibited tissue P concentrations below the critical level of 0.15%, warranting P fertilization. The remaining 97% samples exhibited adequate P levels to sustain bahiagrass production. Soil K was very low (< 20 ppm) in 32% of samples, low (20-35 ppm) in 40%, medium (36- 60 ppm) in 15%, and high (61-125 ppm) in 13%. Only one sample returned a very high level of K (> 125 ppm). The potential impact of this effort may include a reduction in unnecessary or excess P fertilization.

Key Words: extension, Bahiagrass, soil

70 Forage/management systems for beef cow-calf production. R. Burris*, L. Anderson, D. Bullock, J. Lehmkuhler, and J. Randolph, *University of Kentucky*, *Princeton*.

Seventy-five cow-calf pairs were used in a three-year trial to evaluate five different management systems for beef production. Cows were allotted by breed into 5 groups of 15 and randomly assigned to on of the following treatments: spring calving-continuous grazing-high endophyte fescue (SCH), spring calving-rotational grazing-high endophyte fescue (SRH), spring calving-rotational grazing-low endophyte fescue (SRL), fall calving- rotational grazing-high endophyte fescue (FRH) and fall calving-rotational grazing-high endophyte fescue with creep feed (FRHC). Any cow that did not have a calf was replaced. Cows were artificially inseminated (AI) with one round of timed AI followed by 45 days of bull exposure. Stocking rate for all treatments was 0.65 ha/cow. Timed AI pregnancy rates were higher (P<.05) for FRHC than for SCH and SRL. Calves born in the fall had lower (P<.05) birthweights than those born in the spring. Spring-born calves were weaned when pastures deteriorated in the fall and fall-born calves were weaned on July 1 of the following year. Actual weaning weights of calves were 261.7, 263.8, 268.3, 276.6, and 295.6 kg/hd for SCH, SRH,SRL,FRH and FRHC, respectively. FRHC calves consumed 373 kg of creep feed. Cows on the SRH, SRL, FRH and FRHC returned an additional 34.62, 65.70, 34.09, and 73.87 $/cow above the control (SCH) treatment.

71 Effect of stocking rate on the dawn to dusk activity of non-lactating beef cows. M. S. Gadberry[1], G. Montgomery*[2], and W. Whitworth[2], *[1]University of Arkansas, Coop Ext Serv, Little Rock, [2]University of Arkansas, SEREC, Monticello.*

Visual clues of a limited forage supply may include forage height and grazing behavior. The relationship between forage height and forage mass can be deceiving; therefore, the objective of this study was to examine changes in grazing behavior at 3 stocking rates. Sixty, non-lactating beef cows were randomly assigned to 1 of 3 groups to study the effect of stocking rate on dawn to dusk activity. A latin-square study design was employed from June 14 to August 13, 2010. Each group was assigned to 1 of 3 pastures that measured 4.2, 5.6, or 7.4 ha. During each of 3 periods, cattle were given a 2 wk pasture acclimation period followed by 1 wk observation. Following the end of an observation period, the groups were re-assigned pastures. During the observation week, forage mass was measured on d 1 and d 5. On d 2-4, the number of cows grazing, lying, or standing/walking was recorded at 1 h intervals beginning with an initial observation at dawn and final observation at dusk. Initial and final BW or body condition score did not differ among study group ($P > 0.20$). Forage mass measured 33.4, 62.1, and 97.2 kg/100 kg BW at the high, moderate and low stocking rate ($P < 0.01$). Grazing activity was analyzed using the GLIMMIX procedure. The effect of stocking rate (low, moderate, or high), time of day, and their interactive effect was examined for the binomial response of grazing, lying, and standing/walking percentage. Percentage of cows grazing, lying or standing/walking was only affected by time of day ($P < 0.01$). Percentage of cattle grazing during the dawn and dusk observation was also analyzed for stocking rate differences. At dawn, more cattle were observed grazing at the low stocking rate compared to the high stocking rate ($P = 0.03$). The percentage cattle grazing at dawn for the low, moderate, and high stocking rate was 92%, 57%, and 11%, respectively. The percentage of cattle grazing at dusk was not affected by stocking rate. In summary, when 33.4 to 97.2 kg/100 kg BW forage was available, observations of cattle activity were similar throughout the day.

Key Words: beef cattle, stocking rate, grazing behavior

72 An intensive production system using lightweight stocker cattle as an alternative to traditional systems. R. R. Reuter*, J. K. Rogers, J. D. Springer, B. C. Flatt, and J. T. Biermacher, *The Samuel Roberts Noble Foundation, Inc.*, *Ardmore, OK*.

An intensive, lightweight stocker cattle production system was compared to models of typical Southern Great Plains production systems to determine potential economic returns. Conceptually, the intensive

system was designed to purchase lightweight calves when purchase price is seasonally low, add valuable gain and management, and then sell preconditioned stocker cattle. This system was conducted as a demonstration on a research farm in south-central Oklahoma from 2002 to 2004. Across the two years, 646 lightweight (147 kg), mixed breed steers and bulls were purchased out of regional auction markets in four groups per year. Group purchase timing was dictated by forage conditions. Upon arrival, calves were surgically castrated, dewormed, implanted, administered metaphylactic antibiotic, individually weighed and placed on forage immediately after processing with minimal supplementation. Cattle were rotationally grazed on 30 paddocks comprising 26 hectares in total. Nine hectares were managed as a rye/crabgrass double crop, and the balance were bermudagrass. Paddocks were managed with high rates of nitrogen fertilizer (> 168 kg actual nitrogen / hectare) and seeding to maintain high forage yield and quality. Cattle were sold after approximately 60 d on pasture at an average of 204 kg. Average daily gain was 0.52 kg/d, and was lower than expected likely due to intensive stocking rates and the short ownership period of the cattle. However, value of gain averaged $2/kg, which is $0.44-$0.66/kg greater than is typical in a traditional stocker operation. Cost of gain, including mortality, averaged $1.01/kg, and ranged from $0.42 to $3.50/kg across the purchase groups. Mortality ranged from 0% to 13%, averaging 5% for the 2 years. Morbidity averaged 30%. When compared to standardized enterprise budgets for traditional production systems suited to this land type (cow/calf, traditional stocker, hay, wheat, etc.), the intensive stocker system generally improved net return. System selection for greatest net return was not dependent on farm size, but the intensive system was the first to be constrained when capital was limited.

Key Words: stocker cattle, profit, forage

73 UGA Basic Balancer: A computer based ration balancing program. R. L. Stewart, Jr.*[1], D. W. Hancock[1], and R. C. Lacy[2], [1]*University of Georgia*, *Athens*, [2]*University of Georgia*, *Tifton*.

The UGA Basic Balancer is a computer-based spreadsheet program to balance basic rations for beef cattle. Extension Agents and State Specialists have less time for interaction because positions are vacant and Specialists are increasing their teaching and research obligations. The result often leads to an increase in response times for producers seeking information from their county agent who often seek guidance from a state specialist. Therefore, it is important for specialist to develop tools to aid Extension agents and decrease the turn-around time for clients to receive information. Thus, the UGA Basic Balancer program was developed to allow users to determine least cost feedstuffs, balance rations, and evaluate rations. The program is available for download and consists of four components: a feed library, feed cost analyzer, sections to balance rations for brood cows, bulls, heifers, and stockers, and a ration analyzer. The feed library is pre-populated with common feedstuffs and reports values for DM, CP, TDN, Ca, P, and price per ton. Users can update and add feeds based on nutrient analysis and current prices. The feed cost analyzer calculates cost per pound of CP and TDN and allows users compare feedstuffs to determine the most economical source of CP and TDN. The balancer sections allow the user to describe the cattle (i.e. weight, group size, and target growth/production), select feedstuffs from the feed library, and develop a ration containing a maximum of four feedstuffs. A report can be generated with contact information, cattle description, ration, and any notes associated with the ration. Finally, the ration analyzer allows the user to construct a ration or evaluate a premixed ration of known proportions. These can be incorporated into the feed library for future balancing. The rations are balanced for CP and TDN and will report Ca:P ratio, but will not incorporate other requirements such as fat, fiber, or micro-minerals. Users should consult an agent or specialist with nutritional experience. The UGA Basic Balancer is a tool to increase the ability of agents and specialist to meet their clientele's needs with decreased resources available.

Key Words: beef cattle, ration formulation, computer program

74 Evaluation of ranking performance tested bulls by reducing the testing period from 112 days to 84 days. F. D. Kirkpatrick*, J. B. Neel, and B. T. Campbell, *University of Tennessee*, *Knoxville*.

The bull test station for the state of Tennessee has provided a place for Tennessee beef producers to not only purchase quality genetics, but also a place to prove the value of their genetics to other producers through a controlled performance test. This test has historically been a 112 day test, but with the increase in the price of grain there has been incentive to move the test from 112 days to only 84 days. The objective of this study was to evaluate the potential for reducing the length of testing bulls in the Central bull test station from 112 days to 84 days. Data evaluated were cumulative average daily gain ratios of 84 day and 112 day weight periods of bulls within each year′s test from 2004 to 2007 on 419 Angus bulls. The bulls were tested at the University of Tennessee Central Bull Test Station at the Middle Tennessee Research and Education Center in Spring Hill, Tennessee. The cumulative average daily gain ratios for the bulls tested for 112 days and those tested for 84 days were found to be highly correlated. The correlation between the cumulative 84 day ratio and cumulative 112 day ratio was 0.86. Also 73% of the variation in the cumulative 112 day ratio was attributed to the variation in the cumulative 84 day ratio. This data shows that there should not be a negative effect from reducing the bull test from 112 days to 84 days. The shorter time on test should help reduce the cost of the test, but it should also help to keep the bulls from being over conditioned at the end of the test so they will be more suited to leave the test and be turned out on pasture to begin working immediately.

Key Words: bull, performance

75 Using estrus synchronization and AI to improve market value of calves. L. H. Anderson*[1], K. D. Bullock[1], J. D. Rhinehart[2], J. W. Lehmkuhler[1], and W. R. Burris[1], [1]*University of Kentucky*, *Lexington*, [2]*University of Tennessee*, *Knoxville*.

Commerical cattle producers have limited opportunity to capture the value of the genetics of their calves at marketing. We hypothesize that steers sired by bulls with proven feedlot and carcass performance will increase their performance and profit potential. Estrus was synchronized in crossbred cows (n = 605) using the standard 7-day Select-CIDR protocol in which cows were time inseminated approximately 66 h after CIDR removal and injection of prostaglandin. One Angus, one Hereford, and one Simmental sire were used. Each sire was highly accurate in the ability of their progeny to perform in the feedlot and on the rail. At weaning, independent evaluators established a value of calves sired by either AI or natural service. All calves were backgrounded for 60 days and were shipped to the feedlot the same week as a local graded feeder calf sale. Independent evaluators established the value of the calves if they were marketed in this graded feeder calf sale. Two loads (n = 70) of calves were fed to finish at Decatur Feedlot in Kansas; one load was harvested in November/December of 2009 while the other load was harvested in July 2010. Each load contained calves sired by AI and by natural service. Average daily gain was higher ($P < 0.05$) in AI-sired steers (1.68 kg /d) than in natural service-sired steers (1.59 kg/d). A higher ($P < 0.05$) percentage of AI sired-steers graded choice (89%) and upper two-thirds choice (67%) than natural service sired-steers (54%

Choice and 38% upper two-thirds Choice). No difference ($P > 0.05$) was observed between groups in the percentage that graded Prime (9% and 2% for AI-sired and natural service-sired steers, respectively). Similar ($P > 0.05$) percentages of AI-sired steers (8%) and natural service-sired steers (6%) had a yield grade of 4 or greater. Net return to ranch was $128 higher for AI-sired steers than for natural service-sired steers. From these data we can conclude that incorporating proven feedlot and carcass genetics can markedly improve the feedlot and carcass performance of steers and return greater profits to a commercial beef cow-calf producer.

Key Words: artificial insemination, beef cattle, carcass

Pastures and Forages

76 Effects of sow stocking rates on soil nutrients in a bermudagrass (*Cynodon dactylon*) pasture. S. Pietrosemoli*[1], J. C. Guevara[2], and J. T. Green[3], *[1]North Carolina State University, Animal Science Department, Raleigh., [2]Alternative swine research and extension project, Raleigh, NC, [3]North Carolina State University, Crop Science Department, Raleigh.*

Outdoor swine operations may exhibit environmental impact such as ground cover deterioration and nutrient upload. At the Center for Environmental Farming Systems (CEFS) located in Goldsboro, NC, a rotational grazing experiment was conducted during winter (Jan-Mar 2009) to determine the effect of sow stocking rates (SR ; 10, 15 or 25 sows/ha) on soil nutrient concentrations. Composites samples were collected using a hand auger before the start and after animal removal at two plot locations (L): heavy use area (HUA) or other sections (OS), and two depths (D): 15 cm (D1) and 30 cm (D2). Experimental plots measured 0.4 ha. Samples were analyzed at the NCDA soil laboratory, and standard procedures were implemented to measure nutrient concentrations. Twenty Yorkshire mature sows (295 kg BW) were used and fed concentrate (3.2kg/d, 16%CP). The experimental design was a randomized complete block with 2 field replicates (REP). Analysis of variance was performed with Proc GLM (SAS v 9.1) and included SR, REP, L, D, and initial nutrient concentration as covariate. Statistical differences were established between SR for S ($P = 0.03$), Cu ($P = 0.05$), and Na ($P = 0.02$). Nutrient concentrations varied among L for Fe ($P = 0.02$). Except for P, nutrient concentrations were higher in D1. Following the removal of sows from the plots S, Cu and Na soil concentrations were higher with the highest SR.

Table 1. Soil nutrients (mg/dm^3) in a mineral soil of bermudagrass plots grazed at different sow stocking rates

	10 Sows/ ha	15 Sows/ ha	25 Sows/ ha	HUA	OS	D1	D2
p	465^a	483^a	452^a	456^a	477^a	473^a	460^a
K	178^a	212^a	195^a	201^a	189^a	238^a	152^b
Ca	801^a	909^a	809^a	838^a	841^a	976^a	703^b
Mg	161^a	199^a	172^a	181^a	173^a	213^a	141^b
S	19^b	18^b	22^a	20^a	19^a	22^a	18^b
Mn	16^a	17^a	18^a	17^a	17^a	20^a	15^b
Zn	8^a	8^a	10^a	9^a	9^a	11^a	6^b
Cu	0.9^b	1^{a,b}	1^a	1^a	1^a	1^a	0.9^b
Na	21^b	22^b	28^a	25^a	23^a	26^a	21^b
Fe	1168^a	1199^a	1095^a	1099^b	1209^a	1084^b	1224^a

Means with different letters are different ($P \leq 0.05$)

Key Words: outdoor swine, stocking rate, soil nutrients

77 Effects of year-round stocking rates and stocking methods on cow-calf productivity and forage nutritive value. W. E. Wyatt*[1], B. C. Venuto[2], J. M. Gillespie[3], and D. C. Blouin[3], *[1]Louisiana State University Agricultural Center, Jeanerette, [2]Grazing Lands Research Laboratory, USDA, ARS, El Reno, OK, [3]Louisiana State University Agricultural Center, Baton Rouge.*

Effects of stocking method and rate on cow-calf performance and forage nutritive value were evaluated by the following treatments: rotational-stocked pastures (8 paddocks per pasture) at a low (1.2; 624; RL) medium (2.0; 970; RM), and high rate (2.7 cows per ha; 1,371 kg liveweight/ha; RH) and continuous-stocked pasture at a medium rate (2.0 cows per ha; 962 kg liveweight/ha CM). Brangus cows were stocked on replicated treatment pastures on a year-round basis for two years. Cows were weighed 5 times annually and mean cow weight was calculated. Spring-born calves were weighed at weaning. Prevalent forages were annual ryegrass (*Lolium multiflorum*) in the February-April period and common bermudagrass (*Cynodon dactylon* [L.] Pers.) and dallisgrass (*Paspalum dilatatum* Poir.) in the July-October period. Data were analyzed as a randomized block design with repeated measures. The linear model for statistical analyses included replication (2) and replication x year as random effects and stocking treatment, year (repeated measure), and stocking treatment x year interaction as fixed effects. Mean non-grazing days were 36, 55, 86, and 67 d for RL, RM, RH, and CM. Forage mass estimates did not differ ($P = 0.13$) among stocking treatments. Crude protein concentrations (CP) did not differ ($P = 0.19$) among stocking treatments, but CP was greater ($P < 0.05$) for CM compared to RM (15.4 vs 12.6%). In vitro true digestibility concentrations were similar ($P = 0.83$) among stocking treatments. Mean cow weight was affected ($P < 0.01$) by stocking treatment (569, 527, 522, and 530 kg for RL, RM, RH, and CM) and was greater ($P < 0.01$) for RL compared to RM. Calf weaning weight per hectare was affected ($P < 0.01$) by stocking treatment (306, 477, 658, and 501 kg/haf or RL, RM, RH, and CM) and was greater ($P < 0.01$) for RM compared to RL and for RH compared to RM. Stocking rate had a greater effect on cow-calf productivity than did stocking method.

Key Words: cow-calf, stocking method, stocking rate

78 Comparing nitrogen fertilizer to interseeded clovers or alfalfa in bermuagrass pastures for growing calves. P. Beck*[1], T. Hess[1], D. Hubbell[1], J. Jennings[1], and D. Miller[2], *[1]University of Arkansas, Division of Agriculture, Little Rock, [2]Producers Choice Seed, Nampa, ID.*

This study was conducted to determine the impact of interseeding legumes on performance of growing calves and carrying capacity of bermudagrass pastures compared to commercial N fertilization. Bermudagrass pastures (n=8; 0.81 ha) were interseeded with 13 kg/ha of red clover (*Trifolium pretense*, cv. Morningstar, Cal/West Seeds,

Woodland, CA) and 3.3 kg/ha of ladino white clover (*Trifolium repens*, cv. Regal Graze, Cal/West Seeds) or 28 kg/ha of alfalfa (*Medicago sativa*, cv. Rebel, Producers Choice, Woodland, CA). Twelve additional bermudagrass pastures received 0, 56, or 112 kg N/ha as ammonium nitrate with split applications in May and July. Steers (n = 92, BW = 234 ± 14.5) were placed on pastures on 25 May and grazed until 20 August 2010. Grazing was managed using put-and-take with 4 tester calves per pasture and grazer calves were added as necessary to equalize forage allowance. Data were analyzed as a completely randomized design with the mixed procedure of SAS. Single df contrasts were used to determine the linear and quadratic N fertilization rate effects, and predicted differences separated the effects of alfalfa and clover. Daily gains and BW ($P < 0.01$) increased linearly with increasing N rate. In this extremely dry grazing season, daily gains and BW of steers from alfalfa pastures did not differ ($P \geq 0.52$) from 56 kg N, but were less than ($P = 0.01$) 112 kg N. Daily gains of clover steers were less ($P \leq 0.05$) than 56 and 112 kg N and BW at the end of the grazing season was less than ($P < 0.01$) 112 kg N and tended ($P = 0.07$) to be less than 56 kg N. Grazing-d/ha and gain/ha increased linearly ($P = 0.01$) with increasing N. Grazing-d/ha of clover and alfalfa pastures were greater ($P < 0.01$) than 112 kg N. Pastures containing clover produced more ($P = 0.02$) BW gain/ha than 56 kg N but did not differ ($P = 0.22$) from 112 kg N. Gain/ha of alfalfa was greater ($P \leq 0.04$) than clover and the 112 kg N. Legumes interseeded into bermudagrass pastures can be as effective as N fertilization with commercial sources.

Key Words: alfalfa, cattle, clover

79 Intake and digestibility of corn stover by beef cattle. M. H. Poore, S. R. Freeman*, S. M. White, G. Whitener, A. D. Shaeffer, and S. L. Vick, *North Carolina State University*, *Raleigh*.

North Carolina experienced an extreme drought in 2007 that forced beef producers to seek out alternative maintenance feeds for cattle. Corn stover was one option; however, there was little information available on its nutritive value or how nutrient availability was influenced by moisture at baling. To gain knowledge about this emergency feedstuff, 12 steers (start wt = 262 ± 15.8 kg) were blocked by weight. One steer in each weight block was randomly assigned to one of 3 diets: mixed grass hay (H), corn stover baled at 71% DM (WS), or corn stover baled at 90% DM (DS) with a corn and soybean meal supplement to balance CP at 11% for all diets (4 replications). Baling corn stover at 71% DM resulted in more heat generation than baling at 90% DM (maximum bale temperature: 62º C and 42º C for WS and DS, respectively; $P < 0.001$). *Ad libuitum* intake was measured for 35 d after which total excreta collections allowed determination of feed apparent digestibility and nutrient balance. Dry matter intake (% BW) for H was greater than for WS or DS ($P < 0.01$, Table 1). Steers fed H gained weight during the trial while the WS and DS steers merely maintained their BW. Apparent DM digestibility was highest for H and similar for WS and DS ($P = 0.04$). Apparent N digestibility was similar for all treatments ($P = 0.07$). Steers consuming H retained more N than those consuming either WS or DS ($P = 0.05$). Corn stover proved to be a suitable feed for maintaining cattle in emergency situations; however, appropriate supplementation to meet minimal CP requirements is recommended. Baling with more than 10% moisture content had little impact on subsequent feeding value.

Table 1. Intake and digestion of emergency feeds for beef cattle (n = 4 per treatment)

Treatment	Hay	Wet stover	Dry stover	SEM	P value
DM intake (% BW)	2.61[a]	1.42[b]	1.45[b]	0.08	<0.001
ADG (kg/d)	1.05[a]	0.16[b]	0.18[b]	0.12	0.002
DM digestibility (%)	62.5[a]	57.7[b]	57.5[b]	1.25	0.036
N digestibility (%)	63.9	55.4	61.1	2.14	0.075
N retention (g/d)	32.5[a]	5.9[b]	11.8[b]	6.29	0.036

[a,b,c]Values within a row without common superscripts differ (P < 0.05)

Key Words: cattle, corn stover, drought

80 Relationships between performance and feed efficiency in Bonsmara heifers when confinement fed or on pasture. L. M. Wiley*[1,2], T. D. A. Forbes[2], A. N. Hafla[1], C. M. Hensarling[2], B. G. Warrington[2], and G. E. Carstens[1], [1]*Texas A&M University*, *College Station*, [2]*Texas AgriLife Research*, *Uvalde, TX*.

Feed efficiency determination is carried out under confinement feeding, yet the cow herd is fed primarily on forage thus understanding relationships between confinement and forage feeding is essential. Bonsmara heifers (BW 275.0 ± 3.38 kg, n=53) were individually fed in Calan gates at College Station, TX a forage-based total mixed ration (2.07 Mcal ME/kg DM, 13.1 g CP/kg DM). Feed intake was recorded daily, animals were weighed weekly for 70 d, and residual feed intake (RFI) was calculated. Heifers were ranked by RFI, and those with the lowest (n = 12, LRFI) and highest (n = 12, HRFI) RFI were placed on annual ryegrass pasture at Uvalde TX. Animals (initial BW = 361 ± 5.93) were weighed weekly over 56 d, and three, 10-d intake measurement trials were conducted using the alkane method. Estimates of DMI were calculated daily and averaged within trials. Correlation coefficients between HRFI and LRFI animals confinement fed or grazed were calculated for estimates of DMI, ADG initial BW (IBW) and feed conversion ratio (FCR). Estimates of DMI were lower in LRFI than HRFI animals (7.7 ± 0.11 and 8.5 ± 0.23 (LRFI) vs 7.9 ± 0.16 and 10.5 ± 0.22 kg DM/d (HRFI) on pasture and in confinement, respectively) as were estimates of ADG (0.89 ± 0.040 and 1.21 ± 0.082 (LRFI) vs 0.92 ± 0.041 and 1.22 ± 0.065 kg/d (HRFI) on pasture and in confinement, respectively). Intake was correlated with initial BW (IBW) in confinement and grazing (0.53, $P = 0.007$ and 0.48, $P = 0.022$, respectively).Under confinement, FCR was correlated with ADG (-0.83, $P < 0.0001$) but not DMI or IBW, while pasture FCR was correlated with ADG (-0.88, $P < 0.0001$) but not pasture DMI or IBW. Confinement feeding RFI was not correlated with ADG, but was correlated with DMI (0.77, $P < 0.0001$) and FCR (0.53, $P = 0.007$). Confinement fed DMI and ADG were correlated with forage DMI and ADG (0.44, $P = 0.03$ and 0.43, $P = 0.03$. There were no correlations between confinement fed RFI rank and forage DMI, ADG or FCR. These data suggest that alkanes can be used reliably for estimating forage DMI, but that variables that determine RFI in confinement may not be the same under grazing.

Key Words: residual feed intake, grazing, alkanes

81 Effect of cultivar, maturity, and harvest form of peanut (*Arachis hypogaea*) on nutritive value and in situ degradation kinetics. J. L. Foster*[1], G. C. Lamb[2], B. Tillman[3], J. Marois[3], D. Wright[3], and M. K. Maddox[2], *[1]Texas A&M University, Texas AgriLife Research, Department of Soil and Crop Sciences, Beeville, [2]North Florida Research and Education Center, University of Florida Department of Animal Sciences, Marianna, [3]North Florida Research and Education Center, Agronomy Department, Marianna.*

There is interest in growing peanut (*Arachis hypogaea*) for forage, but little is known about the nutritive value and forage quality. This experiment assessed the nutritive value and in situ degradation kinetics of 3 peanut cultivars [C99-R (C9), Georgia-01R (G1), or York (YK)] harvested at R2 or R8 using 2 forms of harvest in completely randomized design (3 × 2 × 2 factorial) with two replicates. At harvest a fresh sample was collected to 5 cm stubble height with clippers (triplicate; 0.25 m2 quadrat). Additional samples were field cured as hay (R2; pegging) or stover (R8; harvest maturity). Samples were ground in a Wiley mill to 4 mm for in situ incubation and a subsample ground to 1 mm for laboratory analyses. Herbage mass among these 3 cultivars was not different ($P > 0.23$). Herbage mass was greater ($P < 0.01$) at R2 than at R8 for G1 (6,640 vs 2,800 ± 640 kg/ha), maturity did not affect ($P > 0.18$) HM for C9 or YK. Crude protein was greater ($P < 0.01$) and NDF lesser ($P < 0.01$) at R2 than at R8 (18.9 vs 10.3 ± 1.0%; 31.9 vs 40.4 ± 1.5%, DM basis, respectively) among all cultivars and harvest forms. Water soluble carbohydrate concentration was not affected by maturity, but was greater ($P < 0.05$) in C9 than G1 or YK (7.8, 5.5, and 5.7 ± 0.6%, DM basis, respectively). Lignin was not different ($P > 0.19$) among cultivars, but was greater ($P < 0.01$) at R8 than at R2. Dacron bags (10 × 20 cm with 4.5 g sample) were incubated in duplicate for 0, 4, 8, 16, 24, 48, or 96 h in 3 Brangus steers. Immediately soluble DM fraction was greater ($P < 0.05$) for R2 maturity, fresh C9 and G1 cultivars and YK hay than C9, G1, and YK stover. For immediately soluble NDF fraction this relationship was reversed. Extent of DM and NDF degradation were greater ($P < 0.05$) at R2 for all cultivars. Lag was not different ($P < 0.05$) among treatments. Peanut maintains nutritive value when stored as hay or stover, and all 3 of these cultivars are a forage option.

Key Words: peanut, degradation kinetics, nutritive value

82 Seeding winter legumes into Bermudagrass (*Cynodon dactylon*) pastures: forage yield and impact on subsequent summer hay crop. S. R. Freeman*, M. H. Poore, A. D. Shaeffer, and H. M. Glennon, *North Carolina State University*, *Raleigh*.

Seeding winter legumes into Bermudagrass (*Cynodon dactylon*) offers an opportunity to extend grazing season and provide nitrogen to the subsequent grass crop. Arrowleaf (*Trifolium vesiculosum* Savi cv. Yuchi, A) and crimson (*T. incarnatum* cv. Dixie, C) clovers, Austrian winter pea (*Pisum sativum*, P), and vetch (*Vicia villosa* cv. AU Merit, V) were seeded into 2 fields of bermudagrass (2 replications per field) and compared to plots with no legume (control, N). Plots were subdivided and forage yield and quality determined on one set of sub-plots every 2 weeks beginning April 12 (legume height = 25 cm). Legume yield was similar in both fields and peaked at harvest (LH) 2 after which time the plants began to senesce (1916, 3594, and 3054 kg DM/ha for LH1, 2, and 3, respectively; $P < 0.001$). At LH1 and LH3, forage yield was similar in A, C, P, and V and higher than in N ($P < 0.05$, Table 1). At LH2, C and V had greater yields than A and P and all legumes yielded more than N. Yield and quality samples were taken from the LH2 sub-plots prior to each cutting of hay (HC, June 29 and August 30). Hay yield did not differ between HC1 and HC2 (2790 vs. 2371 kg/ha, respectively; $P = 0.105$). However, TDN content was lower at HC2 than HC1 (63.5 *vs.* 58.7%, respectively; $P < 0.001$). Crude protein varied by legume at HC1 (Table 1) and had similar tendencies ($P < 0.08$) at HC2. These data suggest that seeding winter legumes into Bermudagrass can lengthen grazing season and influence the nutrient content of the grass crop.

Table 1 Forage yield (kg/ha) and CP content (% DM) of legumes seeded into Bermudagrass

Harvest	Arrowleaf clover	Crimson clover	Winter pea	Vetch	Control	SEM
LH1[1] DM	1875[a]	2681[a]	1814[a]	2478[a]	732[b]	429
LH2[1] DM	3403[a]	4734[b]	3663[a]	4790[b]	1382[c]	429
LH3[1] DM	3090[a]	3208[a]	3156[a]	4506[b]	1309[c]	429
HC1[1] CP	13.7[a]	14.2[a,c]	14.9[a,c]	16.1[c]	11.9[b]	0.68
HC2[1] CP	12.5	11.9	12.2	13.7	10.7	0.68

[1]LH1, 2, 3, HC1, 2: Legume harvest 1, 2, 3 or hay cut 1, 2, respectively
[a,b,c] Values within a row without common superscripts differ (P < 0.05)

Key Words: forage quality, over-seeding, winter legumes

83 Forage quality of triticale fertilized with poultry litter or commercial fertilizer. C. Britton, W. Owsley*, R. Muntifering, and C. Wood, *Auburn University*, *Auburn, AL*.

Two triticale cultivars, Trical 342 and Trical 2700, were amended with 3 fertilizer treatments: commercial nitrogen fertilizer (CF), broiler litter (BL), or no fertilizer (C). Forage yield and nutritive value, were determined for 3 stages of maturity: early-tillering stage, stem extension, and boot-flowering stage. At early stage tillering, NDF was greater for Trical 342 than for Trical 2700 (60% vs. 58%, ($P \leq 0.0001$). Forages amended with CF produced greater ($P \leq 0.0004$) crude protein (13.37% vs. 12.06%, 12.16%) than with BL or C, respectively. Additionally, DM yield for CF amended forages was superior ($P = 0.042$) to either BL or C treatments (CF: 3305 kg/ha vs. BL: 2924 kg/ha, C: 2989 kg/ha). At stem extension stage of growth, Trical 342 yielded more ($P = 0.0553$) DM forage per hectare (3640 kg vs. 3350 kg), as well as more ($P = 0.0049$) CP per hectare (441kg vs. 389 kg). Both NDF and ADF concentrations were highest ($P = 0.0005$,$P = 0.0285$ respectively), in all Trical 342 fertilizer source combinations. For Trical 2700, NDF was greater in the CF amended forage than in BL or C. ADF for both BL and C treatments was greater than for CF. TDN from NDF values were greater for Trical 2700 with BL and Trical 2700 with C treatment ($P = 0.0009$) than the CF. In early boot stage, Trical 2700 yielded a greater ($P = 0.0064$) wet weight (28339 kg/ha vs. 25116 kg/ha). Trical 2700 had a greater ($P = 0.0101$) CP concentration than did Trical 342 (8.22% vs. 7.75%). Trical 2700 amended with CF had greater ($P = 0.074$) NDF than Trical 2700 amended with BL or the Trical 2700 C, both of which had greater NDF than any of the Trical 342 fertilizer source combinations (Trical 2700; CF:75.33, C:73.55, BL:73.36, Trical 342; PL:71.07, CF:70.88, C:70.33). CF produced the highest value in every measurable forage quality yield parameter ($P \leq 0.0001$), including TDN values. BL produced greater forage quality yield parameters ($P \leq 0.0001$) than C. Results of this study indicate that the bioavailability of nitrogen in a commercial nitrogen fertilizer provided superior triticale forage productivity and quality when compared against short-term application of broiler litter at the same nitrogen rate.

Key Words: fertilizer, forage, triticale

84 Effect of endophyte infected tall fescue seed extract on cytochrome P450 system. A. S. Moubarak*[1], Z. B. Johnson[1], M. L. Looper[2], and C. F. Rosenkrans, Jr[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA-ARS*, *Booneville, AR*.

Endophyte infected tall fescue (E+) is the base diet for nearly all beef cattle in the southern USA. It has been linked to a variety of toxicological conditions due to the presence of large numbers of ergot alkaloids. This report was designed to study the effects of E+ seed extract and selected ergot alkaloids on the detoxification pathway by cytochrome P450 (CYP3A4) enzyme system. Tests were performed using the P450-Glo CYP3A4 enzyme activity kit (Promega, WI), according to the manufacturer′s manual. Luminescence was measured using a single tube TD20/20 luminometer. Endophyte infected tall fescue seed was extracted with 50/50 methanol/ 25 mM ammonium carbonate, cleaned and concentrated on Strata-X reversed phase column (Phenomenex). The extracts were evaluated on an HPLC, and then tested using a serial dilution method. Commercially available ergnovine (EN), ergocorine (ER), bromocryptine (BC) and ergocryptine (EC) were tested individually using 0 to 44 nM concentrations. Seed extract of E+ produced a significant ($P < 0.05$) dose dependent inhibition of CYP3A4 enzyme activity similar to that produced by the commercially available ergot alkaloids. Ergocryptine, ER, BC and EN inhibited CYP3A4 enzyme activity in a significant ($P < 0.05$) dose dependent manner with EC being most potent, followed by ER, BC, and then EN (70%, 40%, 30% and 10% at 44 nM concentration). The similarity of the inhibition curves of seed extract to that of the commercially available ergot alkaloids suggest that the use of such ergot alkaloids and CYP3A4 assay is a good model to study the toxicity of tall fescue. Furthermore it provides the foundation to identify the toxic individual components of purified endophyte infected tall fescue extract.

Key Words: seed extract, tall fescue, CYP3A4

85 Ingestion of tall fescue (Festuca arundinacea Schreb.) seed reduces surface temperature of Angus steers in a thermoneutral environment. B. Junell*, G. Huntington, M. Ashwell, M. Poore, and A. Rodger, *North Carolina State University*, *Raleigh*.

Endophytes in tall fescue produce ergot alkaloids which cause reduced intake and weight gain in grazing cattle. We hypothesized that those chronic changes in intake and gain are related to immediate metabolic and physiological responses to ergot alkaloids. Eight Angus steers (246 ± 20 kg, 396 ± 12 d) proceeded through adaptation (Period 1, d 1 to d 28), fescue ′Kentucky 31′ feeding (Period 2, d 29 to d 42) and washout (Period 3, d 43 to d 78). Steers were indoors in individual stalls in a thermoneutral environment (55 to 60 °C). Steers were fed 3.60 kg DM/d of chopped switchgrass hay and 2.56 kg DM/d of an energy, mineral, and protein supplement which contained 0.45 kg soy hulls (Periods 1 and 3) or 0.45 kg fescue seed to provide 1.7 g/d of total ergot alkaloids (Period 2). Liver biopsies and blood samples were collected on d 22, 43, and 78. Rectal and digital infrared surface temperatures (°C) were recorded on at least 2 d within Period. Periods were statistically tested against steers within Periods, and days within Periods were repeated measures. Compared to feeding soy hulls (Periods 1 and 3), feeding fescue seed (Period 2) decreased ($P < 0.01$) surface temperature of the left rib cage (21.2 vs. 23.2 °C, $P < 0.01$) and rear hocks (16.3 vs. 22.6 °C, $P < 0.06$), but increased ($P < 0.01$) the CV of left rib cage temperature (6.1 vs. 5.1%). Rectal temperature (38.5 vs. 38.5 °C) or liver Cu (115 vs. 135 mg/kg) was not affected by feeding fescue seed. Rectal temperature and rib cage temperature decreased ($P < 0.01$) with time, but rear hock temperature was not affected ($P < 0.36$). Compared to feeding soy hulls, feeding fescue seed tended to decrease plasma prolactin (107 vs. 257 mg/L, $P < 0.12$), plasma protein (63 vs. 65 g/L, $P < 0.12$), and blood monocytes (273 vs. 394 cells/uL, $P < 0.15$), but tended to increase blood eosinophils (446 vs. 237 cells/uL, $P < 0.11$). We conclude that the vasoconstrictive properties of ergot alkaloids in tall fescue are immediate and present in a thermoneutral environment.

Key Words: fescue, steer, temperature

Physiology I

86 Differential response to lipopolysaccharide (LPS) and corticotrophin-releasing hormone (CRH) on immune parameters. N. C. Burdick*[1,2], L. E. Hulbert[1,3], J. A. Carroll[1], L. C. Caldwell[2], M. A. Ballou[3], R. C. Vann[4], A. N. Loyd[2], T. H. Welsh, Jr.[2], and R. D. Randel[5], [1]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [2]*Texas AgriLife Research, Texas A&M System*, *College Station*, [3]*Texas Tech University, Department of Animal and Food Sciences*, *Lubbock*, [4]*MAFES, Mississippi State University*, *Raymond*, [5]*Texas AgriLife Research*, *Overton, TX*.

The ability of LPS and CRH to elicit immune responses was compared. Brahman heifers were transported from Overton to Lubbock, TX, were fitted with jugular catheters and separated into 2 treatments groups, LPS (0.25µg/kg BW; n=6; 194±11 kg) or CRH (0.5 µg/kg BW; n=6; 202±9 kg). Blood samples were collected at 0.5- or 1-hr intervals from -2 to 8 hr relative to the challenge and again at 12 and 24 hr post-challenge to determine white blood cell (WBC) and haptoglobin concentrations. Blood was collected at 0, 1, 2, 4, 6, and 24 hr post-challenge to measure phagocytic and oxidative burst capacities against an E. coli. Data were analyzed using the Mixed procedure of SAS specific for repeated measures with treatment, time, and their interaction included as fixed effects. In response to challenge, WBC concentrations ($9.7\pm0.6 \times 10^6$ and $8.1\pm0.6 \times 10^6$ cells/mL for CRH and LPS, respectively at time 0) decreased at 1 hr for both CRH- ($7.2\pm0.6 \times 10^6$ cells/mL) and LPS-treated heifers ($1.9\pm0.6 \times 10^6$ cells/mL; $P < 0.05$), and WBC concentrations remained suppressed until 24 hr in the LPS-treated heifers. The percentage of neutrophils (N) and lymphocytes (L), and the N:L ratio did not change in response to CRH ($P < 0.05$). Percent N and the N:L ratio initially decreased (1 to 4 hr; $P < 0.05$) in response to LPS before increasing above baseline values (7 to 8, and 24 hr; $P < 0.05$). Percent L increased (1 to 4 hr; $P < 0.05$) before decreasing (7 to 8 hr; $P < 0.05$) in response to LPS. The percentage of N phagocytizing and producing an oxidative burst increased in response to LPS ($P < 0.01$), but decreased following the CRH challenge ($P < 0.01$). Haptoglobin concentrations peaked 24 hr post-LPS ($P < 0.01$; 1.9±0.2, 450 nm abs x 100) and 0.5 hr post-CRH, although the response was transient and quickly returned to baseline values ($P < 0.01$; 3.1±0.2, 420 nm abs x 100). These data indicate that acute stress can stimulate indices normally associated with the pro-inflammatory immune response. The data imply that assessing the immunological status of an animal via one time point may not be an accurate depiction of the animal's overall health as it may reflect a response associated with handling.

Key Words: CRH, immune, LPS

87 Effect of temperament on response to cannulation and glucose challenge in crossbred beef heifers. B. L. Bradbury*[1], R. C. Vann[2], L. C. Mapel[3], A. W. Lewis[1], T. H. Welsh Jr.[3], and R. D. Randel[1], *[1]Texas AgriLife Research, Overton, TX, [2]MAFES-Brown Loam Experiment Station, Raymond, MS, [3]Texas AgriLife Research, College Station, TX.*

Temperamental cattle have greater serum concentrations of cortisol (CS) which mediates glucose metabolism. The objective was to determine the effects of temperament on blood glucose (G) and insulin (I) following a stressor and a subsequent glucose challenge. Angus crossbred heifers (200-300 kg) were evaluated for temperament and 6 calm (C) and 6 temperamental (T) heifers were fitted with jugular catheters and placed in individual stalls. Blood was collected at cannulation and then via a cannula at 0, 30, 60, and 90 min. Following 90 min dextrose was infused via the cannula at 0.5 mg/kg BW. Blood samples were collected at -5, 0, 10, 15, 20, 30, 40, 60, 80, 100, 120, 140, 160, 180 min after the challenge. CS and I were assayed by RIA and G by colorimetry. CS, G, I, insulinogenic index and their interactions with time and temperament were analyzed by GLM for repeated measures. Peak I concentration, time to peak, G disappearance and time to half life were analyzed using GLM procedures. During cannulation there was a significant effect of temperament on G ($P = 0.0517$) and I ($P = 0.0496$), but not for CS ($P > 0.05$). There was no temperament by time interaction influencing G, I, or CS during cannulation. During the challenge temperament by time interactions affected CS ($P = 0.0295$), G ($P = 0.0004$), and I ($P = 0.011$). Glucose concentrations were significantly higher in T heifers ($P = 0.0485$) at half life ($P = 0.0485$), but time to half life was similar ($P = 0.7789$) between temperaments. Peak I concentrations (mIU/mL) for the C and T heifers were 27.52 ±12.96 and 62.54±12.96 respectively. Insulinogenic index was not affected by temperament nor was there a temperament by time interaction. These data indicate that temperament has an impact on CS secretion following cannulation stress which subsequently results in elevated G and I concentrations. Temperament clearly modifies metabolic regulatory responses to a metabolic challenge in heifers.

Key Words: cattle, temperament, glucose

88 Plasma cortisol levels in roping calves. A. L. Greathouse*, B. Pousson, K. Comeaux, J. Browning, and C. E. Ferguson, *McNeese State University*, *Lake Charles, LA*.

This study was designed to determine if roping activities increased plasma cortisol levels in acclimated calves. A total of 16 cross-bred beef calves between the ages of 4 to 6 months and ranging in weight between 95 to 147 kg were used. All calves were acclimated to activities for 6 wks prior to initiation of study and then randomly allotted to treatments based on a latin square experimental design with treatments as follows; remaining at farm (farm), hauling to arena (haul), running through roping chute but no chase or roping (score) and being roped and tied down (rope). Each calf was restrained in a hydraulic chute and blood samples were collected (at farm) via jugular vena puncture, received respective treatment (at arena) and then second blood samples were collected (at farm). The total time from first blood sample to administration of treatments score and rope was ~ 140 min and time from end of treatment to second blood sample was ~ 30 min. The total time from first blood sample to second blood sample was between 3 and 4 h. This experiment was a 2-yr study (n = 8 calves/spring). These calves were roped 4 d per week, including the study period 1 d per week for 4 weeks, with no more than two attempts per roping day. Plasma cortisol levels were determined by radioimmunoassay and reported in µg/dL. All statistical analysis were performed in SAS (Proc GLM) and the variable change was the post-event sample subtracted from the pre-event sample. There were no differences in cortisol levels between years therefore all data was pooled. The mean±SE pre-treatment, post-treatment and change in plasma cortisol levels were: farm (n = 16), 4.49±0.93, 3.62±0.56, -0.87±0.58; haul (n = 16), 4.91±0.57, 4.40±0.35, -0.51±0.58; rope (n = 15), 5.06±0.59, 4.13±0.63, -0.93±0.80; score (n = 16), 5.00±0.52, 3.35±0.33, -1.6±0.39. Treatments did affect change in cortisol levels among calves and indicate that activities such as hauling and roping do not illicit a cortisol stress response once animals have become conditioned to these activities.

Key Words: cortisol, stress, calves

89 Body temperature measurements of Senepol and crossbred calves in the tropics. D. L. Rubino*[2], A. J. Weis[1], A. M. Hogg[1], and R. W. Godfrey[1], *[1]University of the Virgin Islands, St Croix, [2]Delaware Valley College, Doylestown, PA.*

This study was conducted to evaluate body temperature of tropically adapted Senepol (SEN; n = 18) and crossbred (SENX; n = 11; Charolais X Angus X Senepol) calves at 118 d of age. Thermal imaging of the left and right side of each calf was done in the shade to determine temperature of areas over the shoulder, ribs and rump. Thermal images of the left and right eye and rectal temperature (RT) were taken while the calf was restrained in a chute. Hair was shaved over the ribs in a 40.6 cm^2 area and thermal imaging was used to determine the temperature of shaved and unshaved areas. Ambient temperature, humidity and THI during the sampling period were 31.5 °C, 71.9% and 83.9, respectively. Calf temperature was analyzed using GLM and correlation procedures with breed, gender and site on the animal as the independent variables. Gender was not significant in the model so it was removed and the data were pooled for the final analysis. Across breeds, RT and eye temperature were higher than shaved ($P < 0.05$), unshaved, rump, rib or shoulder ($P < 0.0001$) temperatures (39.46 ± 0.23, 39.24 ± 0.16, 38.67 ± 0.23, 37.96 ± 0.23, 37.61 ± 0.16, 37.59 ± 0.16 and 37.52 ± 0.16 °C, respectively). Temperature of the shaved area was higher ($P < 0.03$) in SENX than in SEN calves (39.18 ± 0.36 vs. 38.17 ± 0.29 °C, respectively). Eye temperature and RT were positively correlated ($P < 0.0004$) in SEN but not SENX calves (r = 0.744 vs. 0.543, respectively). RT was correlated with temperature of the shaved and unshaved areas in SEN ($P < 0.0001$; r = 0.819 and 0.791, respectively) and SENX calves ($P < 0.05$; r = 0.321 and 0.694, respectively). Eye temperature was correlated with temperature of the shaved and unshaved areas in SEN ($P < 0.007$; r = 0.723 and 0.613, respectively) and SENX calves ($P < 0.05$; r = 0.623 and 0.707, respectively). Temperature of the shaved area was correlated with temperature of the unshaved area in SEN ($P < 0.0001$; r = 0.874) and SENX calves ($P < 0.001$; r = 0.845). Senepol and crossbred calves had similar body temperatures in tropical conditions. This work was supported in part by USDA-NIFA 2008-38416-19574 and 2008-34135-19505.

Key Words: cattle, body temperature, breed

90 A novel role for arginine in enhancing neonatal thermogenesis. S. M. Greff*, G. Wu, and M. C. Satterfield, *Texas A&M University*, *College Station*.

Maintenance of body temperature is one of the first and most important physiological processes that must be initiated after birth. Indeed, in sheep, 40% of non-predator deaths are attributed to cold and cold-related causes. Brown adipose tissue (BAT) is an essential mediator of thermogenesis and is responsible for 50% of the heat generated in the newborn lamb despite comprising only 2% of body weight. Previously,

we found that maternal arginine supplementation increased fetal perirenal BAT by 62%. This observation led us to test the hypothesis that increased fetal BAT will enhance neonatal thermogenesis at birth and thus combat the effects of cold stress. Thirty-one multiparous suffolk ewes gestating singletons and twins were assigned to receive either intravenous injections of L-arginine (27 mg/kg bodyweight; n=17) or sterile saline (n=14) three times daily from Day 75 to Day 125 of gestation. Following parturition lambs were removed from their dams, placed in a thermoneutral environment, and fed artificial colostrum on a per weight basis. At 4 h of age, lambs were cold challenged at 0°C for 2 h. Rectal temperatures were recorded at 15 min intervals. At 6 h of age all singletons and one lamb of each twin pair was sacrificed. The remaining twin lamb was challenged again at 22 h of age for an additional 2 h prior to necropsy. Rectal temperatures were higher for the duration of both cold challenges in lambs from arginine-treated ewes than lambs from saline-treated ewes ($P < 0.05$). Interestingly, at time of necropsy, there was no difference ($P > 0.10$) in BAT weight between treatments. UCP1 mRNA levels were not affected by treatment or age ($P > 0.10$). However, TEK, PGC1A, NRF1, NRF2, PPARG, B3AR, ARG2, RPS6KA1, EIF4EBP1, ODC were not affected by treatment ($P > 0.10$) but were upregulated ($P < 0.05$) by age; being greater at 24 hours of age versus 6 hours of age. Results indicate that maternal arginine treatment results in increased neonatal thermogenesis after birth. Although the underlying mechanisms remain to be elucidated, these data are a first step in improving neonatal survival in response to cold. (Supported by USDA-NRI 2009-35206-05211)

Key Words: arginine, brown adipose tissue, thermogenesis

91 Effects of GnRH and prostaglandin combined with a short progestin regimen on the synchrony of estrus and pregnancy rate in ewes. J. W. Dickison*, W. S. Ramsey, D. W. Forrest, G. A. Holub, and C. A. Cavinder, *Texas A&M University*, *College Station*.

Two trials were conducted to quantify the effects of GnRH and prostaglandin in conjunction with a 7-d CIDR on estrus and on pregnancy rate in comparison with a traditional synchronization protocol. In trial 1, ewes (n=12) were randomly allotted to one of three treatments: CIDR (7 d) with administration of GnRH (Cystorelin, 50µg, im) at CIDR insertion and $PGF_{2\alpha}$ (Lutalyse, 20 mg, im) on d 6.5 (GnRH1); the GnRH1 protocol with a second injection of GnRH 30 h after CIDR removal (GnRH2); and CIDR (11 d) with administration of $PGF_{2\alpha}$ at CIDR insertion and PMSG (400 iu) at CIDR removal (PMSG). A blood sample was obtained every 2 h for 42 h after CIDR removal for serum LH analysis. On d 8 after CIDR removal, blood samples were obtained at 12 h intervals for 36 h for serum P4 analysis. One ewe in the GnRH1 group did not retain the CIDR device and was excluded from the analysis. Mean LH concentration did not differ ($P = 0.48$) among groups. Time and time x treatment affected ($P < 0.001$) mean LH concentration. Mean P4 concentration was not affected ($P = 0.26$) by time, treatment or their interaction. In trial 2, ewes (n=72) were randomly allotted to one of the three treatments described in trial 1. At CIDR removal, three ewes per treatment were joined with a single ram fitted with a marking harness in each of 8 pens. Ewes were monitored every hour for estrus activity and ultrasounded transabdominally 60 d after CIDR removal for pregnancy. Estrus activity did not differ ($P > 0.05$) among the groups. Marking frequency was 92%, 75%, and 88% for GnRH1, GnRH2, and PMSG groups, respectively. Mean interval to estrus was shorter ($P < 0.05$) for the GnRH2 than for the PMSG group and tended to be reduced ($P < 0.10$) compared with the GnRH1 group. Pregnancy rate differed ($P < 0.05$) among treatments (79%, 58% and 38% for GnRH1, GnRH2, and PMSG groups, respectively). These results indicate that synchrony of estrus and pregnancy rate to natural service can be increased in response to a CIDR protocol when combined with administration of GnRH rather than PMSG.

Key Words: estrus synchronization, GnRH, progestin

92 Evaluation of organic versus inorganic trace mineral supplementation on bull semen quality. M. P. Rowe*, C. L. Williams, R. J. Page, T. D. Lester, C. F. Rosenkrans, Jr., J. G. Powell, and R. W. Rorie, *University of Arkansas, Division of Agriculture*, *Fayetteville*.

Studies indicate that organic forms of trace minerals can improve cow reproductive performance, particularly during periods of stress. However, limited information is available on the effects of organic trace mineral supplementation on bull fertility. The objective of this study was to evaluate the effect of trace mineral supplementation on bull semen quality, as measured by computer-assisted sperm analysis (CASA). Angus and Balancer bulls were assigned to inorganic (n = 9) and organic (n = 10) trace mineral treatments, based on semen quality, breed, body weight, and age. The bulls were maintained in a dry lot pen and fed mixed grass hay. Three times each week bulls were individually fed a ration containing either inorganic or organic Zn, Cu, Co and Mn trace mineral for 123 days (mid May to mid September). Starting on day 60, semen was collected by electroejaculation weekly for 9 weeks. Semen was evaluated by CASA for percent motile, progressive and rapid sperm within 5 minutes of each collection. Data was analyzed by treatment, week and their interaction, using SAS PROC Mixed for repeated measures. No interaction occurred between week and treatment, nor was week significant ($P > 0.05$). Bulls supplemented with organic trace mineral had more ($P = 0.019$) motile sperm than those supplemented with inorganic trace mineral (67.3 versus 56.3%, respectively). Likewise, progressive sperm was improved ($P = 0.004$) for bulls receiving organic (70.0%) versus inorganic (55.4%) trace mineral. The percentage of motile sperm with rapid motility (path velocity > 50 µm/sec) was also greater ($P = 0.002$) for bulls supplemented with organic as compared with inorganic trace mineral (50.7 versus 38.0%, respectively). Sperm motility is the single most important semen quality parameter influencing bull fertility. These results suggest organic trace mineral supplementation may improve bull semen quality. Additional studies are needed to determine if this improvement in semen quality translates into higher pregnancy rates.

Key Words: trace mineral, fertility, beef bulls

932 Conception rates of sex-sorted semen in beef heifers and cows. J. D. Rhinehart*[1], A. M. Arnett[2], L. H. Anderson[3], W. D. Whittier[4], J. E. Larson[5], W. R. Burris[3], J. B. Elmore[6], D. T. Dean[7], and J. M. DeJarnette[2], [1]*University of Tennessee*, *Knoxville*, [2]*Select Sires Inc.*, *Plain City, OH*, [3]*University of Kentucky*, *Lexington*, [4]*Virginia Tech University*, *Blacksburg*, [5]*Mississippi State University*, *Starkville*, [6]*Auburn University*, *Auburn, AL*, [7]*Sexing Technologies*, *Navasota, TX*.

Cryopreserved bovine sperm that have been sex-sorted by flow cytometry have been documented to achieve conception rates of 70 to 90% of that obtained using unsorted conventional semen in dairy heifers and cows. Limited trials have investigated conception rates of this product in commercial beef herds. Though dairy and beef heifers have similar fertility, dairy cows are considered to be less reproductively efficient compared to beef cows. Two trials were conducted to investigate fertility differences of sex-sorted and conventional semen when used in beef cows and heifers. For both trials, beef cows and heifers were synchronized by a modified 5-day CO-Synch+CIDR protocol. Females received an injection of GnRH and Controlled Internal Drug Release device on

D 0. On D 5, the CIDR was removed and an injection of dinoprost was administered. A second dinoprost injection followed 12 h later. For trial 1, females were inseminated with either sex-sorted (SS) or conventional (CON) semen 12 h after the first display of standing estrus until 80 h after the initial dinoprost injection, at which time all remaining females were mass inseminated and a GnRH injection was administered. For trial 2, females were mass inseminated with either SS or CON semen at an average of 80 h after the first dinoprost injection. For trial 1, conception rate of both cows and heifers bred to observed estrus was lower ($P < 0.05$) to SS semen (30%, 31/103 and 30%, 16/53; respectively) than CON semen (62%, 61/98 and 68%, 38/56; respectively). Conception rate to CON and SS semen was similar between cows and heifers. For trial 2, conception rate to CON semen was lower ($P < 0.05$) for heifers (31%, 39/124) than cows (43%, 169/369). Conception rate to SS semen was similar for cows and heifers (33%, 78/240 and 36%, 24/66; respectively). In trial 2 conception rates for both cows and heifers were similar between CON and SS. In conclusion, results from trial 1 indicated an overall decreased fertility to SS semen while results from trial 2 did not. Relatively low conception to CON semen in trial 2 suggests that lower overall fertility might not be exacerbated by SS semen use in beef cows and heifers.

Key Words: sex sorted semen, fertility, beef cattle

94 Use of MATRIX and P.G. 600 in combination to synchronize estrus in replacement gilts. M. J. Estienne*, *Virginia Polytechnic Institute and State University, Blacksburg.*

Both MATRIX and P.G. 600 are approved for use in swine and are marketed by Intervet/Schering-Plough Animal Health (De Soto, KS). MATRIX (altrenogest) is a progestogen that effectively synchronizes estrous cycles in sexually mature gilts, but does not stimulate estrus in prepubertal females. P.G. 600 (400 IU eCG and 200 IU hCG) is a gonadotropin product that stimulates onset of estrus in prepubertal, but not cycling gilts. It is common, however, for swine producers to have groups of replacement gilts that include both cycling and prepubertal animals, or to have groups of replacement gilts, the cycling status of which is unknown. The objective of this experiment was to evaluate a system employing a combination of both MATRIX and P.G. 600 to synchronize estrus in replacement gilts. Crossbred gilts (143 kg BW) assumed to be a mix of cycling and prepubertal females, were allocated to one of four treatments (n = 16/TRT): TRT 1, MATRIX (15 mg/d) fed for 14 d and i.m. P.G. 600 24 h after last feeding of MATRIX; TRT 2, MATRIX for 7 d and P.G. 600 24 h after last feeding of MATRIX; TRT 3, P.G. 600 only; and, TRT 4, i.m. water only. Treatments were staggered so that injections of P.G. 600 or water occurred on the same day. The percentage of gilts in estrus within 7 d after injections was greatest ($P < 0.02$) and days to estrus least ($P < 0.05$) for gilts receiving MATRIX for 14 d and P.G. 600 (TRT 1, 91.7% and 5.4 ± 1.9 d; TRT 2, 50% and 9.2 ± 2.0 d; TRT 3, 33% and 13.8 ± 2.1 d; and, TRT 4, 50% and 9.1 ± 1.9 d). The method (TRT 1) was subsequently evaluated on two commercial farms. A total of 240 gilts were treated on a 1,000-sow company farm and 83% of the gilts were in estrus by d 10 after the last MATRIX feeding; Conception rate was 85.2% (Alberti et al., 2011). On a 100-sow independent operation, 17 gilts were treated with 94.1% in estrus by d 7 after the last feeding of MATRIX. The use of MATRIX and P.G. 600 in combination effectively synchronizes estrus in gilts and has potential as a strategy for synchronizing estrus in a mix of prepubertal and mature cycling gilts.

Key Words: gilt, progestogen, gonadotropin

95 The incidence of calving was influenced by barometric pressure and maximum and minimum temperatures. T. R. Troxel*[1] and Z. B. Johnson[2], *[1]Univeristy of Arkansas, Little Rock, [2]University of Arkansas, Fayetteville.*

Calving data from the Southwest Research and Extension Center (Hope, AR), Livestock and Forestry Station (Batesville, AR), Savoy Research Unit (Savoy, AR) and David Miller farm (Melbourne, AR) were used to examine the relationship of barometric pressure and maximum and minimum temperature to the incidence of calving. The barometric pressure and maximum and minimum temperature data from the Hope, AR weather station were obtained from National Oceanic and Atmospheric Administration. Weather data from the Mountain Home and Fayetteville, AR weather stations were obtained from the Southern Regional Climate Center, Louisiana State University, Baton Rouge, LA. All cows were multiparous, predominately Angus based, and naturally bred. There was a positive relationship ($P < 0.05$) between the barometric pressure on the d of calving and 1, 2 and 3 d prior to calving denoting as barometric pressure increased so did the number of calvings. Cows were 1.2 times more likely to calve if there was a 10 mbar increase in barometric pressure on 3 d prior to calving or on the d of calving. A negative relationship was detected between the maximum ($P < 0.05$) and minimum ($P < 0.20$) temperature on the d of calving and 1, 2 and 3 d prior to calving. More cows were likely to calve if maximum temperature decreased 3 d prior to calving ($P < 0.02$) and on the d of calving ($P < 0.02$). Cows were less likely to calve (0.91 times as likely) if the maximum temperature increased 5.6° C on 3 d prior to calving or on the d of calving. Cows were less likely to calve if the minimum temperature increased 5.6° C on 3 d prior to calving (0.87 times as likely) or on the d of calving (0.91 times as likely). This data indicates monitoring weather conditions may provide an indication of calving incidences and possibly assist producers to be prepared to provide assistance to calving beef cows.

Key Words: barometric pressure, temperature, calving, beef cattle

Small Ruminant Production II: Nutrition, Carcass and Reproduction

96 Growth performance and carcass characteristics of Awassi lambs fed diets containing carob pods (Ceratonia siliqua L). B. S. Obeidat*, M. A. Alrababah, A. Y. Abdullah, M. N. Alhamad, M. A. Gharaybeh, T. M. Rababah, and M. A. Abu Ishmais, *Jordan University of Science and Technology*, *Irbid, Jordan*.

Thirty-three Awassi lambs (18.0 ± 0.86 kg initial body weight; 75 ± 2.21 days of age) were used in a completely randomized design to study the effect of partial replacement of barley grain by carob pods (cp) on growth performance, carcass characteristics and meat quality. Treatment diets were no cp (CON; n=11), 125 g/kg cp (cp125; n=11), and 250 g/kg cp (cp250; n=11) of dietary dry matter. At the end of the experiment all lambs were slaughtered to evaluate carcass characteristics and meat quality. Dry matter (DM) intake was similar among treatment diets ($P > 0.05$; 945.8, 932.8, and 999.5 g/d for the CON, cp125, and cp 250 diets, respectively). Other nutrient intakes (organic matter (OM), crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber

(ADF) followed the same pattern. There were no differences ($P > 0.05$) among treatment diets with regards to nutrient digestibility. Similarly, average daily gain and G:F were comparable among treatment diets. Cost of gain ($/kg gain) was diminished ($P < 0.05$) for cp250 fed lambs than for lambs fed the CON diet, with no differences were detected between the CON and cp125 treatment diets and averaged $1.97, 1.69, and 1.49 for the CON, cp125, and cp250 treatment diets, respectively. No differences ($P > 0.05$) were observed among treatment diets with respect to all carcass characteristics and meat quality parameters. In conclusion, results of the current experiment indicated that replacing part of barley grain with carob pods had no effect on feed intake, growth performance, and carcass characteristics and meat quality while reducing cost of gain of Awassi lambs fed fattening diets.

97 Carcass characteristics of wether lambs fed increasing levels of distillers dried grains with solubles. G. Abdelarhim*[1], J. Khatiwada[1], J. Vizcarra[1], N. Gurung[2], and D. Rankins[3], *[1]Alabama A&M University, Huntsville, [2]Tuskegee University, Tuskegee, AL, [3]Auburn University, Auburn, AL.*

The objectives of this study were to determine the influence of feeding various quantities of dried distillers grains plus solubles (DDGS) on carcass characteristics in finishing wether lambs. Twenty-four wether lambs (46.1 ± 2.2 kg initial BW, and 8 to 9 mo of age) were obtained and used in a randomized complete-block design (4/trt replicated twice for a total of 8/trt). Diets (on a dry matter basis) were: control, 10% DDGS, and 20% DDGS. All diets contained 50% fescue/bermudagrass mix hay, and 50% of the respective concentrate mixes. The concentrate mixes containing DDGS were formulated to be isonitrogenous at 16% crude protein. The DDGS replaced corn and soybean meal in the concentrate mixes so that diets contained desired amounts of DDGS. Lambs were allowed 7-d adjustment period, followed by 7-d transition period to the DDGS diets. After 135-d feeding period final weight was determined, lambs were slaughtered, and carcass characteristics were collected after a 48-h chill. Both growth and carcass quality data were analyzed as a completely randomized design. Final body wt (62.5, 61.3, and 63.0 kg, $P = 0.82$) was not different between treatments. Also, no differences were observed in hot carcass wt (30.7, 30.1, and 30.3 kg, $P = 0.71$), cold carcass wt (30.8, 30.0, and 30.2 kg, $P = 0.63$), body wall fat (2.0, 2.2, and 2.0 cm, $P = 0.99$), ribeye area (6.55, 7.0, 7.0 cm, $P = 0.19$), 12th rib fat (0.9, 1.1, and 0.85 cm, $P = 0.90$), and kidney and pelvic fat (2.3, 1.89, 2.13 kg, $P = 0.61$) between treatments. Based upon the findings of this research, DDGS can replace a portion of the ground corn and soybean meal commonly fed to lambs without any negative effect on carcass characteristics.

Key Words: distillers dried grains with soluble, carcass, lamb

98 Carcass characteristics of pasture-raised goats. S. G. Schoenian*[1], M. B. Bennett[5], E. N. Escobar[6], D. G. Gordon[3], J. W. Semler[2], and M. S. Updike[4], *[1]University of Maryland, Keedysville, [2]University of Maryland, Boonsboro, [3]University of Maryland, Derwood, [4]University of Maryland, College Park, [5]West Virginia University, Martinsburg, [6]University of Maryland, Eastern Shore, Princess Anne.*

One of the goals of the Western Maryland Pasture-Based Meat Goat Performance Test is to evaluate and compare carcass characteristics of meat goats consuming a pasture-only diet. From the 2009 and 2010 tests, nineteen mostly Kiko bucks (29.2 ±10.8 kg) were selected for harvest and deboning at LambCo LLC, a USDA/custom abattoir in New Windsor, Maryland. The following data were collected on each buck: live weight (LW), hot carcass weight (HCW), cold carcass weight (CCW), body wall thickness (BWT), kidney and heart fat weight (KH), ultrasound rib eye area (U-REA), actual rib eye area (A-REA), fat weight (F), bone weight (B), and lean weight (L). Dressing percentages and carcass percentages of kidney and heart fat (%KH), fat (%F), bone (%B), and lean (%L) were calculated, along with overall carcass yields (CY). Regression analysis showed U-REA and BWT to be the best indicators of percent lean in a goat carcass. The equation to predict percent lean was determined to be 0.47 + 0.07 U-REA + 0.1 BWT (r^2 =0.78). The equation to predict total pounds of meat in a goat carcass was determined to be -0.22 + 0.18 LW + 4.93 U-REA ($r^2 = 0.69$). The lighter live and carcass weights and lower fat measurements of the goats harvested in 2010 were attributed to the extreme drought conditions. The higher dressing percentages of the goats harvested in 2010 can be explained by the inclusion of the organ meats in the carcasses.

Table 1. Carcass measurements

Variable	2009	2010
No. goats	9	10
LW, kg	32.7 ± 4.2	26.0 ± 3.0
HCW, kg	14.1 ± 1.9	12.5 ± 1.9
DP, %	43.1 ± 3.6	48.1 ± 3.1
CCW, kg	13.2 ± 1.9	12.2 ± 1.8
BWT, mm	10.1 ± 2.3	5.1 ± 2.3
U-REA, cm^2	8.0 ± 1.4	6.5 ± 1.2
A-REA, cm^2	11.5 ± 1.5	6.7 ± 2.0
KH, %	0.98 ± 0.70	0.76 ± 0.27
F, %	6.1 ± 1.9	2.0 ± 0.70
B, %	32.2 ± 2.5	32.7 ± 1.9
L, %	60.9 ± 3.2	57.5 ± 2.4
CY	25.4 ± 3.3	25.3 ± 2.8

Key Words: goat, meat, carcass

99 Effect of feeding tannins-containing pine bark on growth performance, rumen fermentation, blood metabolites, and carcass traits in Kiko-cross goats. B. R. Min*[1], S. Solaiman[1], N. Gurung[1], J. Behrends[2], J. Eun[3], E. Taha[1], and J. Rose[1], *[1]Tuskegee University, Tuskegee, AL, [2]Mississippi State University, Mississippi State, [3]Utah State University, Logan.*

Twenty-two Kiko-cross meat goats (*Capra hircus*; 27.46 ± 1.04 kg) were used to quantify animal performance, feed efficiency, rumen fermentation characteristics, blood parameters and carcass traits in condensed tannins (CT)-containing pine bark (PB) supplementation in goats during 83 d experimental period. Experimental treatments included: the control diet – 0% PB and 30% wheat straw (WS; 0.17% CT DM; n = 8); 15% PB and 15% WS (1.6% CT DM; n = 7) and 30% PB and 0% WS (3.2% CT DM; n = 7) as fed. Freshly dried PB and WS were finely (1.5–3 mm) ground and incorporated in the grain mix portion of the diet to provide 0, 16, and 32 g CT/kg DM in 0, 15, and 30% PB diets. Goats were individually housed indoors in pens of approximately 1.2 m^2 and fed different mixed diets. Data were analyzed by the Mixed model procedure of the SAS for completely random design, with the factors examined being three levels of PB supplementation in the diets. Linear and quadratic effects were determined utilizing poly-nominal orthogonal contrasts for equally spaced treatments. There was no difference in initial BW and hay intake among treatments; however, final BW ($P = 0.06$), ADG ($P < 0.001$), grain mixture intake ($P < 0.001$), total DMI ($P < 0.001$) and G:F ratio ($P < 0.04$) increased (linear) as the level of PB supplement increased in the diet. Added ground PB linearly decreased molar proportion of ruminal acetate, acetate/propionate (A/P) ratio and ammonia level. There was no difference in HCW, transport shrink, dressing percentage, 12th

rib fat thickness, LM area, body wall fat, leg circumference, loin, and kidney fat, but empty BW ($P = 0.17$), cold carcass weight ($P = 0.06$) and shoulder ($P = 0.14$) tended to increase in goats fed 15 and 30% PB. Breast, sirloin and trim traits increased (linear, $P < 0.01$) with addition of PB. Pine bark supplementation had no negative effect on the animal health and blood chemistry. The CT-containing PB has the potential to increase ADG and carcass traits by altering feed efficiency and rumen fermentation with no adverse effect on animal health.

Key Words: ADG, condensed tannins, pine bark

100 Treated olive cake as a non-forage fiber source: effects on nutrient intake, nutrient digestibilities, and performance of finishing Awassi lambs. M. S. Awawdeh*, *Jordan University of Science and Technology, Irbid, Jordan.*

The objective of this study (lasted for 68 days) was to investigate the effects of partial replacement of wheat hay with sun-dried olive cake (SOC) or acid-treated SOC (ASOC) on nutrient intake, nutrient digestibilities, and performance of finishing Awassi lambs. Additionally, we studied the effects of sun-drying and acid treatment of olive cake (OC) on its chemical composition and nutritive value. Twenty seven male lambs (initial BW 17.6 ± 0.75 kg) individually housed in shaded pens were randomly assigned to one of three dietary treatments. Dietary treatments were formulated by replacing 50% of wheat hay in the control diet (CTL) with SOC or ASOC and to meet all nutrient requirements. Sun-drying of OC did not significantly affect its chemical composition. However, acid treatment mainly decreased NDF and increased EE contents. Dietary treatments did not significantly impacted lamb intake or nutrient (dry matter, organic matter, crude protein, neutral detergent fiber, or acid detergent fiber) digestibilities. Lambs fed the SOC diet tended to have greater ADG and heavier final BW in comparison with those fed the CTL diet, but not different from those fed the ASOC diet. Additionally, lambs fed the SOC diet tended to have heavier HCW than those fed the ASOC diet, but not different from those consumed the CTL diet. Dressing percentages and feed conversion ratios (F: G) were similar among dietary treatments. In conclusion, replacing half of wheat hay with SOC in finishing diets improved performance of Awassi lambs with no detrimental effects on nutrients intake or digestibility. No further improvements were achieved with acid treatment of sun-dried olive cake.

Key Words: alternative feed, Awassi sheep, finishing lambs, non-forage fiber, olive cake

101 Performance of two breeds of lactating hair sheep ewes fed rumen by-pass fat following winter lambing. S. Wildeus* and E. J. Chozu, *Virginia State University, Petersburg.*

The experiment evaluated effects of supplementation with rumen by-pass fat (Megalac-R®) on reproductive performance, pre-weaning lamb growth, and milk composition in hair sheep ewes managed under 8-mo accelerated mating following December lambing. Primiparous and multiparous Barbados Blackbelly (BB) and St. Croix (SC) ewes (n=100) were bred in July and managed as one group on pasture during pregnancy. Ewes were supplemented with corn/whole soybean during the third trimester of pregnancy, increasing from 1 to 1.5% BW. As ewes lambed on pasture they were allocated, blocked by breed, to be fed either a control cracked corn, soybean meal supplement (16% CP) or the same supplement containing rumen by-pass fat (Megalac-R; 50 g/ewe/d) at 1.5% of BW. For the trial ewes were transferred together with their lamb(s) to one of 6, 0.4 ha pastures within 7 d after lambing (3 pastures per treatment group). Ewes were provided with grass hay *ad lib* once pasture forage became limited. Sterile rams with marking harnesses were used for estrus detection. Milk samples were collected from ewes at 50 d, and lambs weaned at 60 d post-partum. Megalac supplementation had no effect ($P > 0.05$) on litter weaning weight and litter pre-weaning ADG (13.4 vs. 13.9 kg, and 137 vs. 140 g/d for control and Megalac, respectively). Ewe ADG during lactation was also not affected ($P > 0.05$) by Megalac supplementation (-39 vs -41 g/d), nor was time to first post-partum estrus (32.5 vs. 35.2 d). Milk composition was not different between treatments, with the exception of solids-not-fat, which were higher in control than Megalac (11.4 vs. 11.0%, respectively). Breeds had similar ($P > 0.05$) litter weaning weights, pre-weaning litter ADG, and ewe lactation ADG, but time to first post-partum estrus was longer in BB than SC (39.1 vs. 28.7 d; $P < 0.01$). Breeds differed in milk composition, with higher milk fat (7.53 vs. 7.05%; $P < 0.05$) and lower protein (5.04 vs. 5.42%; $P < 0.01$) in BB than SC. Data suggest that rumen by-pass fat supplementation at 50 g/hd/d had limited effect on milk composition, and no effect on the weaning performance in the hair sheep ewes in this trial.

Key Words: hair sheep, lactation, rumen by-pass fat

102 Evaluating the influence of breed on hair coat characteristics and body temperature of hair sheep in the tropics. T. Creighton*[2], A. M. Hogg[1], and R. W. Godfrey[1], *[1]University of the Virgin Islands, St Croix, [2]Tuskegee University, Tuskegee, AL.*

St. Croix White sheep are adapted to the hot, humid tropics but the Dorper breed was developed in an arid environment and may not be as adapted to high heat and humidity. The objective of this project was to compare body temperature and hair coat traits of St Croix White and Dorper x St Croix White hair sheep in the tropics. Hair samples were collected from 12 ewes of each breed type. A 40.6 cm^2 area over the ribs or flank of each ewe was shaved using electric clippers and the hair was collected into a pre-weighed sample bag. Thermal images were taken of the shaved area, the adjacent unshaved area and the left and right eyes of the ewes. Rectal temperature was also measured at this time. Hair samples were analyzed for weight and number density (mg/cm2 and hairs/cm^2), hair weight (µg) and hair length (cm). Thermal images were analyzed for maximum temperature based on previous work in our lab. Data were analyzed using GLM procedures of SAS with breed type and site as the main effects. During the sampling period ambient conditions were 26.7°C, 89.7% relative humidity and a THI of 78.7. There was no difference ($P > 0.10$) in any of the temperature measurements between breed types. The temperatures of the eye and the shaved area were greater ($P < 0.001$) than the rectal and unshaved area temperatures (40.25 ± 0.26, 40.07 ± 0.37, 39.17 ± 0.37 and 38.14 ± 0.37°C, respectively). There were no differences ($P > 0.10$) between breed types in hair weight density, number density, weight or length (20.5 ± 2.5 mg/cm^2, 205.3 ± 20.3 hairs/cm^2, 99.9 ± 9.9 µg and 2.1 ± 0.02 cm, respectively). The temperature of the unshaved area was lowest because the thermal imaging only measures the temperature of the hair surface. The eye, shaved area and rectal temperatures may be more indicative of core body temperature. Because the crossbred ewes had 50% St Croix White genetics, it may be necessary to sample pure Dorper sheep to detect any differences in hair coat traits. This work was supported in part by USDA-NIFA 2008-38416-19574.

Key Words: hair sheep, body temperature, hair coat

103 The effects of increased molybdenum on testicular morphology and serum testosterone in Boer-Cross goats. O. U. Bolden-Tiller*, T. Atkinson, K. Beguesse, and S. Solaiman, *Tuskegee University*, *Tuskegee Institute, AL*.

Molybdenum (Mo) toxicity is of growing concern in various livestock species. It has been shown to impair fertility and production in cattle and sheep; however, little is known about the effects of Mo on fertility in goats. Further, although much is known about the effects of Mo on fertility in females, information is limited on the effects of Mo toxicity on male reproductive function, particularly in goats. The objective of the current study was to determine the effect of Mo on testicular function in the goat. Eighteen intact male Boer-crosses, approximately 4-5 months of age, were administered 0 ppm Mo (Group A; n=6); 5 ppm Mo (Group B; n=6); or 10 ppm Mo (Group C; n=6) as a part of their daily ration for 85 days. On day 86, testis tissue was harvested for histological evaluation, and blood was collected for testosterone analysis via radioimmunoassay. The histoarchitecture of the testis was similar for animals in Groups A, B, and C, with approximately 50 seminiferous tubules that had discernible lumens, three to six germinal layers from basement membrane to lumen and 75%-95% active spermatogenesis. However, spermatogenesis was slightly reduced to 60% in a subset of animals in Group C (2/6). Similarly, serum plasma testosterone levels for Groups A, B, and C all fell within the normal range at 2.58ng/ml, 5.49ng/ml, and 1.97ng/ml, respectively. In conclusion, the current study suggests that male goats may be less susceptible to Mo toxicity than other livestock species; however, other parameters of male fertility must be evaluated to better understand the effects of Mo on testicular function and male fertility in goats.

Key Words: testosterone, molybdenum, goats

Extension II

104 Assessing variability of on-farm post-weaning feeder calf performance. J. W. Lehmkuhler*, K. Burdine, and W. R. Burris, *University of Kentucky*, *Lexington*.

Market price premiums for preconditioned feeder calves have been attractive for Kentucky producers for many years. The performance of calves is a pivotal determinant of profit/loss potential during the backgrounding period. During the fall of 2008, an on-farm demonstration was conducted on 13 Kentucky beef operations which backgrounded calves post-weaning. The objectives were to evaluate feeder calf performance and assess net value addition during a year when corn futures approached $14/45.4 kg. while feeder calf prices moved sharply downward late fall. Calves were weighed on farm either on the day of, or within 48 hrs of, weaning. Market weights obtained from the sales tickets were used as the end weights. In the event that pencil shrinks were applied, these weights were adjusted to obtain market arrival weights. Live weight gain was calculated as market arrival weight less weaning weight. Cash expenses were submitted by operations. The cumulative number of calves represented by these operations was 515 animals. The mean number of calves backgrounded was 40 head (hd) and ranged from 15 to 102 hd. The average days backgrounded was 68 d with the range being 41 to 118 d. The average weaning weight of steers and heifers combined was 243 kg (SD=49). The average post-weaning performance was 0.68 kg/d (SD=0.24), but daily gains were as low as 0.30 kg/d and as high as 1.12 kg/d. The average market weight for steers and heifers combined was 289 kg (SD=38). Feed costs accounted for approximately two-thirds of the estimated expenses. Often economic analyses are presented by extension specialists to assist producers in making informed decisions. Breakeven prices are typically presented based on assumed levels of performance. The wide range in gains observed supports the need for development of on-farm protocols to aid producers in assessing animal performance and assist extension specialists to make realistic assumptions in their analyses. This information is needed to make better informed marketing decisions as market price premiums may not be sufficient to offset the negative economic effects of poor animal performance, high input costs and a down trending market.

Key Words: backgrounding, feeder calf, market

105 Using electronic forms for rapid response. J. W. Lehmkuhler*, S. R. Smith, G. D. Lacefield, M. Bilderback, and W. R. Burris, *University of Kentucky*, *Lexington*.

During the early spring of 2010, Extension agents in various regions of Kentucky received calls regarding frothy bloat and death loss of grazing cattle. In an effort to assess this situation, an electronic form was developed using Adobe LiveCycle Designer software. A portable document file (PDF) was created using the software. Using this software, the form allowed the user to submit the completed form either by printing and faxing or submitting electronically. The form was initially sent electronically to a list serve of Kentucky Cooperative Extension Service County Agricultural Agents and later to a list managed by Kentucky Cattleman's Association. The form provided brief instructions to the agents to randomly contact 10-20 producers in their county. Adobe Acrobat Pro software was used to assimilate responses for forms submitted electronically into a single file. Forty-two counties submitted at least one completed form. A total of 295 completed forms were received in a period of seven working days. The assimilated responses were exported to a spreadsheet file and pivot tables were used to quickly interpret responses. The use of technology allowed for a rapid assessment of a situation that is short-lived. Extension is often positioned to respond to these types of events and the use of electronic forms is an alternative media for gathering information.

Key Words: electronic form, extension, software

106 Use of a cattle artificial insemination school as extension programming. J. A. Parish, M. L. Marks*, and J. E. Larson, *Mississippi State University*, *Mississippi State*.

In 1997, the Mississippi State University Extension Service (MSU-ES) initiated an annual cattle artificial insemination (AI) school in response to producer demand. The objectives of this cattle AI school are to provide producer education in cattle reproductive management, semen handling, and insemination technique. The school is unique from other AI training programs in that it consists of 7 hours of classroom training in economics, reproductive anatomy, estrous cycle, estrus synchronization, estrus detection, AI equipment, nutrition, sire selection, herd health, and biosecurity in relation to AI. Instructors are Mississippi State University (MSU) faculty and Extension agents with expertise in each

subject area. Hands-on laboratory handling of bovine female reproductive tracts is provided as part of this initial classroom instruction. The program includes a minimum of 8 hours of hands-on experience with semen handling and cattle insemination technique. The entire course spans a Thursday evening, Friday morning and afternoon, and Saturday morning and is scheduled twice per year. Overall participant ratings of AI school sessions averaged 4.7 on a 1 to 5 scale where 1 = poor and 5 = excellent. Changes to the AI school were made over time based on producer feedback from course evaluations. These improvements included expansion of the program from one offering per year to two offerings per year, relocation of the school from an off-campus experiment station to the MSU campus, inclusion of more MSU faculty and graduate students in instructional roles, creation of a course website, and development of MSU-ES authored publications for inclusion in course reference manuals. The MSU-ES cattle AI school consistently fills to participant capacity at each offering with waiting lists formed each time for future offerings, indicating a strong demand for this program. School participation has expanded from primarily Mississippi-based attendees to attendee representation from 11 additional states in the program. In excess of 500 persons have completed the MSU-ES cattle AI school since its inception.

107 Use of a twice monthly videconference to meet extension needs. D. L. Rankins, Jr.* and W. N. Presley, *Auburn University, Auburn, AL.*

In the past decade, Animal Science extension programming has used video conference technology in a variety of ways. It appears that one of the most important uses of this technology is for timely and structured, face-to-face interactions between animal science specialists and county/regional agents. On the first and third Wednesday of each month a discussion forum is held to cover any variety of topics related to animal science and forages. The forum is led by a specialist and is an informal discussion. The technology that is used to conduct the forum is standards based H.323 interactive videoconferencing technology. This technology affords the best possible audio and video collaborative experience available over the commercial internet. It also provides the ability to connect multiple sites into one conference with no performance degradation. Since it is standards based technology, it allows connections from any endpoint or computer from anywhere in the world. Our extension system infrastructure includes a Radvision Scopia 400 Multipoint Control Unit (MCU) and Gatekeeper, Polycom Viewstation endpoints in approximately 40 off campus locations, and ScopiaDesktop to allow any PC or MAC to connect using a webcam/headset. Anyone can participate in the forum from a conventional endpoint or their personal PC. Participation routinely varies from 6 to 20 sites. These sites often include participants from other states or institutions. The forum was initiated in 2007 and has been continuously used since its inception. Topics of discussion have ranged from the simple and mundane to the complex and extraordinary. Each forum lasts from 40 min to 1 h. In general, forage and weed topics are discussed to a greater extent than animal science topics. The use of video conferencing to disseminate timely information to agents is an excellent tool.

Key Words: extension, agents, videoconference

108 Beef IQ: Use of Critical Control Points to evaluate and improve beef cattle management practices. B. L. Barham*[1], M. S. Gadberry[1], P. Beck[2], W. Witworth[3], J. Jennings[1], and J. Powell[4], *[1]University of Arkansas, Division of Agriculture, Little Rock, [2]University of Arkansas, Division of Agriculture, Hope, [3]University of Arkansas, Division of Agriculture, Monticello, [4]University of Arkansas, Division of Agriculture, Fayetteville.*

Beef IQ is a multi-session educational program designed to provide in depth and hands on training for Arkansas beef producers. Six sessions were designed to cover topics in breeding and genetics, reproduction, animal health, economics, forage and pasture management, and nutrition. In 2009, a critical control point (CCP) survey was developed to help producers identify critical areas related each of the six topics. The breeding and genetics section was made up of 26 CCP's covering record keeping, sire and heifer selection, marketing and culling. The reproduction survey was comprised of 19 CCP's covering recordkeeping along with calving, breeding and culling management. CCP's for herd health included 39 items including record keeping, cow and calf health management, BQA and biosecurity. Financial management and economics CCP's included 18 items covering ranch objectives and planning, record keeping, herd performance indicators and financial performance indicators. Forage and grazing management CCP's covered 28 topics including record keeping, fertility management, grazing management and weed control. Nutrition management CCP's covered 20 items including feedstuff evaluation, supplementation and economic evaluations. Attendee's reported that they currently utilize 33% of the stated breeding and genetics CCP's, 61% of the reproduction CCP's, 57% of the herd health CCP's, 41% of the financial management CCPs, 51% of the forage management CCP's and 50% of the nutrition CCP's in their operations. The yes/no design of the survey allows follow-up surveys to be easily completed in very little time from the producer, hopefully increasing response rates. This design also allows for easily identifying areas that additional attention and education might be needed.

Key Words: critical control point, beef cattle, management

109 Beef IQ program: 2-year follow-up survey of participants. M. S. Gadberry*[1], B. L. Barham[1], T. R. Troxel[1], P. Beck[2], W. Whitworth[3], J. Powell[4], and J. Jennings[1], *[1]University of Arkansas, Coop Ext Serv, Little Rock, [2]University of Arkansas, SWREC, Hope, [3]University of Arkansas, SEREC, Monticello, [4]University of Arkansas, Dept. of ANSC, Fayetteville.*

Beef IQ is a 6 session in-depth management program for AR cattle producers. The objective of the Beef IQ, 2-yr follow-up survey was to quantify areas of management changes implemented on AR ranches as a result of participating in the program. In 2007 and 2008, a survey was mailed to 47 and 18 participating households, respectively. The survey included questions regarding changes to the operation, adoption of core practices, and goal setting. The survey response rate was 30% and 28% for the 2007 and 2008 program years. Six questions categorized subject matter based changes to breeding (B), reproduction (R), herd health (H), economic (E), forage (F), and nutrition (N) management. The response to change in practices differed by subject matter ($P = 0.04$) with 52, 53, 46, 53, 56, and 71% of the responses indicating changes in B, R, H, E, F, and N management. One question identified how each session fit into the short (1-2 yr), medium (2-5 yr) and long-term (> 5 yr) goals of the operation. Short, medium, and long-term goal setting did not differ ($P = 0.43$) among B, R, H, E, F, and N management areas addressed. The overall percentage of participants that indicated no goal setting versus short, medium and long-term goal setting was 22%, 41%, 32%, and 6%, respectively. Eighty-nine percent of participants indicated they had done a better job of managing ranch resources and believe their ranch is better positioned for success after completing the Beef IQ program. Seventy-seven percent indicated using the county Extension office more frequently and 50% indicated an increased attendance at University of Arkansas sponsored field days.

Key Words: beef cattle, management, extension programs

Extension III

110 Building confidence and skills of female livestock extension agents.

A. D. Shaeffer*, M. H. Poore, M. J. Kistler, J. A. Moore, and M. L. Alley, *North Carolina State University*, *Raleigh*.

Over the past 20 years, the number of female livestock extension agents in NC has increased from 7% to 26% and all have ≤ 10 years experience. During annual training, lecture and hands-on activities are presented with both genders present. Observations made during hands-on exercises showed that male agents actively participated, while the female agents were more likely to watch. We have observed similar behavior with female producer participation in extension activities. This observation demonstrated the need for female agent training with the goal of building self-confidence and skills needed for career success in a non-intimidating atmosphere and to help them be better role models for female producers. A 1-day training was conducted and 13 of 15 female agents attended. Before the training, a questionnaire (1 to 5; not important to very important, respectively) designed to serve as a springboard for discussion during the training was sent to all 15 female livestock agents (11 responded). When asked the importance of conducting an all female producer training, 81% felt it was somewhat to very important. All respondents agreed that marketing programs to women producers would be somewhat to very important. After the female agent training, agents responded to an online survey via the Extension Learning Management System. The survey included 23 questions (scale of 1= Strongly Disagree to 5= Strongly Agree). Selected questions and mean evaluation score ± SD were; the training was relevant to my needs (4.0±0.89), was at the appropriate level (4.54±0.52), I gained knowledge/skills/attitudes about the topics presented (4.45±0.52), I can use the knowledge and skills gained to impact my Extension clientele (4.36±0.50), some workshops should be targeted to an all female audience (3.72±0.90), gender and ethnic diversity issues should be discussed at the Annual Livestock Agent Training (3.91±0.83). Female Agents appear to be conflicted on the topic of targeting workshops to an all female audience.

Key Words: female, extension agent, training

111 The impact of "Beef Cattle Time" as perceived by Tennessee beef producers. C. L. Perez, J. B. Neel*, R. G. Waters, C. A. Stephens, and B. T. Campbell, *University of Tennessee*, *Knoxville*.

A study was conducted to assess the impact of Beef Cattle Time as perceived by Tennessee beef producers on the utilization, satisfaction, benefit and future of the newsletter. Beef Cattle Time is a quarterly news letter that is published and distributed by the University of Tennessee Extension service. The news letter is one way management strategies are conveyed to the beef producers of Tennessee, and it encompasses all aspects of beef production. A self-developed 76 question survey was developed and forwarded to 639 randomly selected Tennessee beef producers. Two hundred seventy six (43%) producers responded, One hundred thirty four (48.6%) reported reading Beef Cattle Time and 142 (51.4%) had never read Beef Cattle Time. Beef Cattle Time as a source of information was found to be less utilized than other sources of information by all respondents. Producers reported the most popular source of information was cattle and farm magazines. The beef producers that read Beef Cattle Time were very satisfied with it as a publication and it was considered to be beneficial by those producers who read it. It was determined that Beef producers did want Beef Cattle Time to continue in the future as a source of information.

Key Words: beef, cattle

112 Effect of size of beef operations on management techniques. J. B. Neel*[1], C. D. Lane[1], F. D. Kirkpatrick[1], W. W. Gill[2], and B. T. Campbell[1], [1]*University of Tennessee*, *Knoxville*, [2]*Middle Tennessee State University*, *Murfreesboro*.

"The Master Beef Producer Program" is a 12-week educational program to provide information to Tennessee's beef producers, to improve the profitability and sustainability of their operations, compete with other states in the production of feeder cattle and to help the Tennessee beef industry become one of the best in the country. Each participant of the course was requested to complete a registration form which asked for information pertaining to the producer, land and pasture, cattle inventory, breeding, nutrition, herd health, management and marketing practices. Participants were grouped into one of two categories: Large producers or small producers Group I. 0-100 head, Group II. 101 head or larger. The size of operations ranged from 0 cattle for those producers who are just getting into the business to 700 head of mature cows. The adoption of new technologies by producers is a factor in profitability of the operations and Larger producers are more likely to adopt new practices in order to maximize profits. The use of artificial insemination was looked at and it was found that the use of this technology did not depend on the size of the operation. Approximately 20% of producers have adopted this technology, larger operations may be reluctant to adopt this because of the added management it requires. We also examined the likely hood of a producer raising their own replacement heifers and it was found that producers with more than 100 head of cattle were more likely to raise their own replacement females rather than purchase them ($P<0.05$). This may be simply a factor of size. With smaller operations there may not be the space to raise replacement females, or it may be cheaper to purchase them if there is only the need for a few replacements.

Key Words: beef, cattle

113 Effect of producer characteristics on size of beef operations and management practices. B. T. Campbell*[1], J. B. Neel[1], C. D. Lane[1], F. D. Kirkpatrick[1], and W. W. Gill[2], [1]*University of Tennessee*, *Knoxville*, [2]*Middle Tennessee State University*, *Murfreesboro*.

"The Master Beef Producer Program" is a 12-week educational program to provide information to Tennessee′s beef producers, to improve the profitability and sustainability of their operations, compete with other states in the production of feeder cattle and to help the Tennessee beef industry become one of the best in the country. Each participant of the course was requested to complete a registration form which asked for information pertaining to the producer, land and pasture, cattle inventory, breeding, nutrition, herd health, management and marketing practices. Participants were grouped into one of two categories: Group I. 50 years and younger, Group II. 51 years old and older. Age of producers ranged from 14 to 90 years and was used to compare the size of operations that are in Tennessee. Age of producers and its affect on the size of the operations was analyzed. The age of the producer had no statistical influence ($P > 0.05$) on the herd size. Age of producers also had no influence ($P > 0.05$) on the size of the operations based on the number of acres that are used for grazing. On average the producers that were 50 or younger had 118 acres and those that were 51 or older had an average of 110 acres. It is possible that this may be caused by family farms that are passed from one generation to the next, partially explaining the similar farm size among age groups

Key Words: beef, cattle

114 Affects of fat content and source on consumption time by two year old quarter horses. M. L. McMillan*, K. R. Hall, S. F. Kelley, and L. R. McMillan, *Sam Houston State University*, *Huntsville, TX*.

Previous research has indicated that feeding fat to horses can provide many benefits. The objective of this study was to determine consumption time when feeding 2 year old quarter horses different types and amounts of fats. Twelve 2 year old quarter horses were used in a completely randomized block design blocking by sex and location in barn. All horses received 1% BW grain and 1.5% BW Coastal Bermudagrass hay twice daily. Upon initiation of the study, horses were assigned to 3 treatment groups. Treatment 1 received no additional oil in the diet consuming ~3.5% fat in the total diet. Treatment 2 received 0.2 kg additional soybean oil in the diet every feeding consuming ~5.5% fat in the total diet. Treatment 3 received 0.2 kg additional fish oil in the diet every feeding consuming ~5.5% fat in the total diet. Horses were fed and observed for 21 days. Results indicate that over the 21 d treatment period, treatment 1 consumed diets faster ($P < 0.001$) than treatments 2 and 3. On day 0, treatment 2 consumed the diet in less time ($P < 0.01$) than treatment 3, but treatment 1 was similar to both. In week 1, consumption time did not differ ($P > 0.05$) between treatment groups. However, in weeks 2 and 3, treatment 2 and 3 took longer ($P < 0.01$) to consume diets than treatment 1. When considering consumption of treatment over time, treatment 1 was consumed the same ($P > 0.05$) throughout the trial. Treatment 2 was consumed the same ($P > 0.05$) from day 1 to day 11, but consumption time was increased from d 14 to 21($P < 0.001$). Treatment 3 was consumed the same ($P > 0.05$) from day 2 to day 8, but consumption time was increased ($P < 0.001$) from d 11 to d 21. Conclusions of this research indicate that additional oil in horses diets may increase consumption time. However, when comparing consumption time between horses receiving additional soy oil or fish oil in the diet, no differences were seen.

Key Words: horse, fat, consumption

Meats

115 Effects of phase-feeding beef tallow on growth performance and carcass characteristics of growing-finishing pigs fed dried distillers grains with solubles. N. A. Browne*, J. K. Apple, C. V. Maxwell, J. W. S. Yancey, C. L. Bradley, R. J. Stackhouse, and C. A. Keys, *University of Arkansas, Division of Agriculture, Department of Animal Science*, *Fayetteville*.

Crossbred pigs (n = 216) were used to test the effects of phase-feeding beef tallow (BT) on live performance and carcass characteristics of growing-finishing swine. Pigs were blocked by initial BW (26 ± 5.3 kg) and gender before allotment to pens (6 pigs/pen), and pens (6 pens/block) were allotted randomly to 1 of 6 dietary treatments. Corn-soybean meal grower and finisher dietary treatments consisted of a negative control (NC) devoid of BT for all phases; a positive control (PC) with 5% BT for all phases; or treatments including 5% BT during phases 1 and 2 (BT12), during phases 1, 2, and 3 (BT123), during phases 3, 4, and 5 (BT345), or during phases 4 and 5 (BT45). All dietary treatments were formulated with 30% dried distillers grains with solubles (DDGS) during phases 1, 2, and 3, 15% DDGS during phase 4, and no DDGS during phase 5. Pigs were slaughtered at an average BW of 124.1 kg. Live pig performance (ADG, ADFI, and G:F) were not affected by the dietary treatments during phase 1 ($P \geq 0.15$), phase 2 ($P \geq 0.44$), phase 3 ($P \geq 0.54$), and phase 5 ($P \geq 0.11$); however, ADFI was reduced ($P < 0.05$) in pigs fed the PC when compared to pigs in the BT12, BT123, and BT45 treatments during phase 4. Over the entire trial, pigs fed BT345 tended to have greater ($P = 0.10$) ADG than the NC, BT123, and BT45 treatments, and the ADG of BT45-fed pigs was less than that of BT12- and BT345-fed pigs. In addition, pigs fed PC tended to consume less ($P = 0.09$) feed than all other dietary treatments. There was no ($P \geq 0.23$) effect of beef tallow inclusion on dressing percentage, carcass lean percentage, back fat level, and LM depth. Results of this study indicate that phase-feeding BT to pigs fed diets formulated with DDGS had little to no impact on live pig performance and carcass characteristics.

Key Words: pork, phase feeding, beef tallow

116 Effects of residual feed intake classification on carcass characteristics, tenderness and value in Angus-based composite steers. J. W. Behrens*, R. K. Miller, J. C. Bailey, J. T. Walter, L. O. Tedeschi, and G. E. Carstens, *Texas A&M University*, *College Station*.

Angus-based composite steers (n = 493; initial BW = 310 ± 56 kg) obtained over 3 years from Rex Ranch were used for this study. Steers were fed a high-grain diet (ME = 3.08 Mcal/kg DM) for 70 d and individual feed intake measured using a GrowSafe feed intake system. Residual feed intake (RFI) was calculated as the residual from linear regression of DMI on mid-test BW $^{0.75}$ and ADG for each year. Steers were categorized into low, medium, and high RFI phenotype groups based on ± 0.50 SD from the mean RFI within year. Steers were commercially harvested and USDA Yield and Quality grade measurements were obtained. Warner-Bratzler and slice shear force assessments were conducted on top loin steaks after 1, 7, and 14 d of vacuum-packaged storage at 2°C. Carcasses from low-RFI steers had less ($P < 0.0001$) adjusted fat thickness (1.09 mm) than medium and high RFI steers (1.24 and 1.27 mm, respectively). Carcasses from low-RFI steers had larger ($P = 0.002$) REA and lower ($P < 0.0001$) Yield grades than high-RFI carcasses (30.3 vs 29.26 cm^2, and 2.80 vs 3.06 respectively). Marbling score ($P = 0.06$) and Quality grade ($P = 0.05$) tended to be lower for carcasses from low-RFI steers, but Warner-Bratzler shear force after 1 ($P = 0.34$), 7 ($P = 0.19$), and 14 ($P = 0.06$) days, and slice shear force after 1 ($P = 0.58$), 7 ($P = 0.17$), and 14 ($P = 0.77$) days did not differ across RFI groups. Carcass value based on a grid price adjusted for premiums in Quality grade (Choice, Prime), and discounts for carcass weight (< 250 kg, > 454.55 kg), Quality grade (Select, Standard) and high Yield grade (≥ 4) carcasses did not differ ($P = 0.37$) across RFI groups. While carcasses from steers with low RFI had less back fat thickness and larger REA resulting in lower Yield grades compared to carcasses from high RFI steers, there were minimal affects of RFI class on Quality grade and tenderness characteristics.

Key Words: RFI, carcass value

117 Translocation of surface-inoculated *Escherichia coli* into whole muscle non-intact beef striploins following blade tenderization. D. Johns[1], C. Bratcher*[1], C. Kerth[2], and T. McCaskey[1], [1]*Auburn University*, *Auburn, AL*, [2]*Texas A&M University*, *College Station*.

The objective of this study was to determine the translocation of *Escherichia coli* from one loin to subsequent loins during blade tenderization. Beef striploins were inoculated on the lean side with 6.4 to 7.2 ml of a nalidixic acid resistant *E. coli* at a concentration ranging from 8.2 to

10.1 log CFU/mL. Total CFU inoculated on striploins ranged from 1.12 × 10^9 to 9.10 × 10^{10}. Striploins were passed once, lean side up, anterior end first, though a mechanical blade tenderizer. Subsequent uninoculated beef striploins (n = 5) were passed once, lean side up, anterior end first, through the same mechanical tenderizer following the inoculated striploins. Six core samples were taken from each striploin starting with the anterior end. Each core was cut into six sections. Sections 1 through 4 represented the top 4 cm and sections 5 and 6 represent the remaining portion split in half. Following tenderization, *E. coli* levels were greatest ($P < 0.05$) in loin 1. Loin 2 had greater ($P < 0.05$) levels than loins 4, 5, and 6. There were no differences ($P > 0.05$) between loins 3, 4, 5, and 6 which were below detectable limits. Levels of *E. coli* from sections 1 were greater than all other sections. Sections 2 had greater ($P < 0.05$) levels than 3, 4, 5, and 6. *E. coli* recovery from sections 6 were greater ($P < 0.05$) than 3, 4, and 5. There were no differences ($P > 0.05$) between sections 3, 4, and 5. Data indicate that even with high initial inoculum numbers, contamination from one loin to another is quickly reduced to non-detectable levels.

Key Words: *E. coli*, whole muscle non-intact, blade tenderization

118 Evaluating the flavor profile of pre-cooked roasts from forage versus grain fed beef. K. McMurtrie[1], C. Bratcher*[1], C. Kerth[2], B. Smith[3], and P. Curtis[1], *[1]Auburn University, Auburn, AL, [2]Texas A&M University, College Station, [3]John R White, Birmingham, AL.*

The objective was to assess the potential of a natural ingredient cured forage-finished pre-cooked roast. Beef inside rounds were obtained from from forage-fed cattle (n = 72) and grain-fed cattle (n = 72). Roasts were portioned to 0.45 to 0.68 kg. Each roast was randomly assigned one of the following treatments: control, pumped-no cure and pumped-cured and assigned a serving temperature (hot and cold) and storage treatment (0 or 28 d post cooking). Two roasts per cattle diet, injection, serving temperature, and storage period combination were pumped. Pumped roasts were injected to 30% of green weight with the appropriate brine. Sensory characteristics were evaluated by a trained panel. Surface and interior color; shear force; lipid oxidation; and pumped, tumbled and cook loss weight percentages were evaluated. Cured and uncured roasts had greater scores ($P < 0.05$) for soy, salty, grassy and sweet flavor intensity. Tenderness values were greater ($P < 0.05$) for cured and uncured roasts as compared to control roasts from both groups. The greatest intensity ($P < 0.05$) of grassy flavor was found in forage control roasts stored 28 d. Forage control roasts stored 0 d and uncured forage roasts, both 0 and 28 d, had similar scores ($P > 0.05$). Cured forage roasts had the lowest ($P < 0.05$) grassy flavor scores for both storage periods. Cured roasts served cold had the lowest ($P < 0.05$) grassy flavor. Control roasts stored 28 d served hot had greater ($P < 0.05$) grassy scores than cured or uncured roasts. Forage-fed beef was perceived as more juicy ($P < 0.05$) than grain-finished beef. Cured roasts had the lowest warmed over flavor scores ($P < 0.05$) regardless of serving temperature or diet. Animals fed a forage-based diet yielded roasts with greater ($P < 0.05$) shear force values. Control roasts had greater ($P < 0.05$) shear force values than both roasts that were cured and pumped with no cure. Surface and interior a* values were greater ($P < 0.05$) for forage-finished animals and all cured roasts. Data suggests that injecting brines into forage-fed beef significantly improves tenderness and multiple flavor characteristics.

Key Words: pre-cooked roasts, forage finished beef, natural cure

119 Effects of cytochrome P450 genotype and tall fescue cultivar on taste panel evaluation of and alkaloid concentrations in beef. C. Rosenkrans, Jr.*[1], M. Looper[2], C. Krehbiel[3], D. VanOverbeke[3], and N. Hill[4], *[1]University of Arkansas, Fayetteville, [2]USDA-ARS, Booneville, AR, [3]Oklahoma State University, Stillwater, [4]University of Georgia, Athens.*

The objective of this experiment was to determine the relationships among cattle cytochrome P450 genotypes (C994G), tall fescue cultivars, and eating quality of beef. Angus-sired crossbred steers (n = 58) were assigned to graze either stockpiled toxic or stockpiled non-toxic tall fescue during a 176 d stocker phase, followed by finishing for 135 d. During the finishing phase, subcutaneous fat biopsies were collected on d 0, 60, and 120. Fat samples were stored at -80 C until total alkaloid concentration was determined by ELISA. Rib sections were collected after harvest and prepared for professional taste panel evaluation. Genomic DNA was purified from white blood cells and used for steer genotyping at cytochrome P450 3A28 C994G site. Criteria evaluated by the taste panel were not influenced ($P > 0.15$) by C994G genotype. Steak tenderness, as represented by Warner-Bratzler shear (WBS) force and taste panel was affected ($P < 0.05$) by fescue cultivar (WBS, 3.1 vs. 3.5 kg, SE = 0.12 for non-toxic and toxic tall fescue, respectively). Taste panel evaluation indicated that steers that had grazed toxic tall fescue had more ($P < 0.05$) connective tissue than steers that had grazed non-toxic tall fescue. Although total alkaloids were very low, days on finish, fescue cultivar, and C994G genotype were all significant sources of variation for fat alkaloid content. Alkaloid content decreased ($P < 0.05$) over time (0.3, 0.14, 0.17 ppb, SE = 0.05, respectively for d 0, 60, and 120). Toxic tall fescue contains more alkaloid in the forage and steers grazing toxic tall fescue had more alkaloids in their fat than steers grazing non-toxic (0.33 vs. 0.08 ppb, SE = 0.05). Steers homozygous for the minor allele at C994G had more ($P < 0.1$) total alkaloid in their fat than other steers (0.28 vs. 0.13 ppb, SE = 0.05). Our findings suggest that grazing cattle on toxic tall fescue during the stocker phase of development may have residual effects on beef quality.

Key Words: steer, endophyte, meat

120 Demographics of branded beef consumers: Have they changed over time? M. Beverly*[1], K. Stutts[1], S. Kelley[1], R. Hanagriff[2], and R. Rhoades[2], [1]*Sam Houston State University*, *Huntsville, TX*, [2]*Texas A&M University*, *Kingsville*.

Branded beef products are marketed based on specifications or production standards that are unique to the brand and these products typically have a relatively defined consumer population. The objective of this study was to determine the demographics of consumers of branded beef products and to determine if these consumers have changed over time. An online survey was sent to known branded beef consumers and results of this study were derived from 270 consumer responses. Although the total population is difficult to determine, the results created a reliability score of 0.89 (Cronbach's alpha), which is a high reliability score. Consumers responded to several questions designed to create consumer profiles and these results were compared to results of a similar study conducted in 2007 to identify any changes in consumer demographics. The majority of respondents were from married households (73%) with the least represented households being those of single parents with children (7.4%). Most of the respondents were employed full-time (70%), over 45 years of age (68%), and had a gross annual household income of $45,000 to $120,000. Groups that were least represented were those that were less than 25 years of age

and had an annual income of $20,000 or less. These results are similar to the previous study. Small changes between the two studies were observed in gender of respondents and gross annual household income of respondents. In the current study, 66% of respondents were male and 34% were female, whereas in 2007, 58% of respondents were female and 42% male. In the current study, there was a decrease in the number of households represented at all income levels below $120,000 and an increase in all income levels over $120,000 compared to 2007. These results indicate that branded beef consumers predominantly are over 45 years of age, have families, and are in professional occupations. A new marketing approach may be necessary to increase demand of branded beef in younger consumers.

Key Words: branded beef, beef consumer, value added beef

121 Product characteristics and promotional items that impact consumer beef purchases. K. J. Stutts*[1], M. M. Beverly[1], S. F. Kelley[1], R. D. Hanagriff[2], and R. D. Rhoades[2], [1]*Sam Houston State University*, *Huntsville, TX*, [2]*Texas A&M University*, *Kingsville*.

Beef is a highly consumed meat in the United States with an average annual per capita consumption of approximately 30 kg. When purchasing beef, consumers visually inspect the product and the packaging to determine what they believe will be a satisfactory eating experience. The objective of this study was to determine which product attributes had the greatest impact on consumer purchases and which promotional items were most effective in encouraging purchases of beef. An online survey was sent to known beef consumers and results of this study were derived from 270 survey responses. Total response of 270 was less than desirable, but a Cronbach's alpha score was calculated to determine validity of the sample and resulted in a score of 0.89 defining this sample as an accurate sample. Consumers assigned values to various attributes of beef products on a 1 to 4 scale (1 = no value; 4 = always important). Attributes with the highest mean values as rated by consumers were: previous experience in buying the product (3.47), guaranteed satisfaction (3.44), guaranteed tender (3.38), country of origin (3.32), and all natural (3.18). Attributes with the lowest mean value ratings were: recipe instructions on package (2.34), attractive packaging (2.35), and product spokesperson (2.41). Respondents also rated the impact of various promotional methods on their purchasing decisions. Recommendation of the product by an acquaintance had a significant or very significant impact for 67% of respondents, and product discount coupons had a significant impact for 51% of respondents. The lowest rated promotional method was social media which only had a significant impact on 7% of respondents and had no impact on 70% of respondents. These results indicate that the consumer's previous experience with the product and guarantees by the manufacturer are the most important attributes of beef products at the time of purchase, and recommendations and coupons also have a significant impact on the consumer when purchasing beef products.

Key Words: beef, consumer preferences, marketing

Physiology II

122 Insulin resistance in Brahman bulls and heifers selected for residual feed intake. G. L. Shafer*[1,2], A. W. Lewis[1], D. A. Neuendorff[1], L. C. Mapel[2], T. D. A. Forbes[3], T. H. Welsh, Jr[2], and R. D. Randel[1], [1]*Texas AgriLife Research*, *Overton*, [2]*Texas AgriLife Research*, *College Station*, [3]*Texas AgriLife Research*, *Uvalde*.

Residual feed intake (RFI) identifies animals requiring less feed to achieve the same performance. This study evaluated the effect of a glucose (G) challenge on 6 efficient (L_{RFI}) and 6 inefficient (H_{RFI}) Brahman yearling bulls (n=12) and heifers (n=12) evaluated for RFI. Bulls and heifers were tested at different times and data analyzed separately. Animals were infused with a 50% dextrose solution at 0.5 mL/kg BW by catheter. Blood was collected at -5, 0, 10, 15, 20 (heifers: 25), 30, 40, 60, 80, 100, 120, 140, 160, and 180 min relative to challenge. Insulin (I) was determined by RIA and G by colorimetry. Repeated measures ANOVA were conducted using the MIXED model of SAS for analysis of RFI, time, and their interactions on I, G and insulinogenic index IIND for each sex. Time to peak I and half-life of G were analyzed using GLM. In bulls, time affected ($P < 0.0001$) I and G and the interaction of RFI and time ($P < 0.0025$) affected I. RFI did not affect ($P > 0.05$) I peak or peak time in bulls. L_{RFI} and H_{RFI} bull I peaks were (mIU/mL) 46.1 ±14.0 and 72.6 ± 14.0, respectively and I peak times (min) were 45.8 ± 12.0 and 25.0 ± 12.0, respectively. RFI did not affect ($P > 0.05$) G half life in bulls. IIND was not affected ($P > 0.05$) by time or RFI in bulls. Among heifers time affected ($P < 0.0001$) I and G. There was no interaction between RFI and time ($P > 0.05$) affecting I or G. RFI did not affect ($P > 0.05$) I peak or peak time. L_{RFI} and H_{RFI} heifers had an I peak (mIU/mL) of 62.3 ± 13.4 and 89.2 ± 13.4, respectively and I peak times (min) were 22.5 ± 2.6 and 23.3 ± 2.6, respectively. RFI did not affect ($P > 0.05$) G half life in heifers. IIND was not affected ($P > 0.05$) by time or RFI in heifers. L_{RFI} bulls have a lesser I response to a glucose challenge than H_{RFI} bulls. Heifers had similar numeric responses but they were not significant. There may be differences in energy metabolism between bulls and heifers.

Key Words: insulin, glucose, residual feed intake

123 Chromium supplementation enhances the acute phase response of steers to a lipopolysaccharide (LPS) challenge. N. C. Burdick*[1], B. C. Bernhard[2], J. A. Carroll[1], J. W. Dailey[1], R. J. Rathmann[2], and B. J. Johnson[2], [1]*Livestock Issues Research Unit, USDA-ARS, Lubbock, TX,* [2]*Texas Tech University, Department of Animal and Food Sciences, Lubbock.*

The study examined the effect of chromium supplementation on the response of steers to an LPS challenge. Twenty crossbred steers (235±4 kg BW) received 0 ppb (Control; C) or 200 ppb chromium propionate (CHR) for 55 days. Steers were fitted with jugular catheters and rectal temperature (RT) recording devices. Blood samples were collected at 30-min intervals from -2 to 8, and at 24 hr relative to an LPS challenge (0.5 µg/kg BW). Steers were also assigned a sickness behavior score from 1 (alert) to 5 (unresponsive) after each sample collection. Serum was isolated and stored until analyzed for cortisol and cytokines. Data were analyzed using the Mixed procedure of SAS specific for repeated measures. Fixed effects included treatment, time, and their interaction. Prior to administration of LPS, CHR had greater RT (38.91±0.02 ºC) than C (38.77±0.02ºC; $P = 0.002$). Post-LPS RT increased in both treatments ($P < 0.001$), with C producing a greater change in RT (0.40±0.01ºC) than CHR (0.26±0.01ºC; $P < 0.01$). Sickness behavior scores did not differ between treatments pre-LPS ($P > 0.05$). However, C had greater sickness behavior scores (1.20±0.01) than CHR post-LPS (1.15±0.01; $P = 0.03$). Cortisol concentrations did not differ between treatments

pre-LPS ($P = 0.68$). Post-LPS cortisol concentrations increased ($P < 0.01$) but did not differ due to treatment ($P = 0.26$). Concentrations of IL-4 increased post-LPS ($P < 0.01$) but were not affected by treatment pre- or post-LPS ($P = 0.70$ and 0.32, respectively). Treatment did not affect pre-LPS TNF-α and IFN-γ concentrations ($P = 0.80$ and 0.18, respectively). Post- LPS TNF-α and IFN-γ increased, with CHR producing greater TNF-α and IFN-γ (40±33 and 19±1 pg/mL, respectively) than C (29±3 and 16±1 pg/mL, respectively; P<0.01). Concentrations of IL-6 were greater in CHR (10.7±1.8 pg/mL) than C pre-LPS (4.9±1.9 pg/mL; P=0.03). Post-LPS IL-6 increased ($P < 0.01$) and was greater in CHR (506±35 pg/mL) than C (296±37 pg/mL; $P < 0.01$). In summary, our data suggests that chromium propionate supplementation enhances the acute phase response of steers to an LPS challenge, which may expedite recovery.

Key Words: chromium, LPS, steers

124 Acute modulation of cytokine gene expression in bovine PBMCs by endogenous cortisol. N. C. Burdick*[1,3], B. J. Agado[2], R. D. Randel[2], D. A. Neuendorff[2], J. A. Carroll[3], R. C. Vann[4], C. G. Chitko-McKown[5], S. D. Lawhon[6], and T. H. Welsh, Jr.[1,6], [1]*Texas AgriLife Research, Texas A&M System*, *College Station*, [2]*Texas AgriLife Research, Texas A&M System*, *Overton*, [3]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [4]*MAFES, Mississippi State University*, *Raymond*, [5]*US Meat Animal Research Center, USDA-ARS*, *Clay Center, NE*, [6]*Texas A&M University, College of Veterinary Medicine*, *College Station*.

Cortisol suppresses many aspects of immune function. However, recent publications suggest acute cortisol exposure may actually enhance immune function (Dhabhar, Neuroimmunomod 2009;16:300). The objective of this study was to determine the influence of acute increases in endogenous cortisol on expression of cytokines and associated receptors in isolated peripheral blood mononuclear cells (PBMCs). Brahman heifers (n=12; 334±12 kg BW) had jugular catheters inserted prior to a challenge with 0.1 IU/kg BW ACTH. Blood samples were collected into EDTA vacutainers at 0, 1, 2, and 4 hr relative to the challenge. Plasma cortisol was determined by RIA. The PBMCs were isolated via density gradient centrifugation and frozen at -80oC until RNA isolation. Extracted RNA was amplified by real-time RT-PCR to determine expression of 11-β Hydroxysteroid dehydrogenase I (11-βHSD I), 11-βHSD II, ACTH Receptor (ACTHR) Interleukin-1β (IL-1β), IL-2, IL-6, IL-1 Receptor (IL-1R), and Tumor Necrosis Factor-α Receptor (TNF-αR). Cytokine expression data are expressed as the fold change in gene expression relative to samples collected at time 0. All data were analyzed using the Mixed procedure of SAS, with time and animal as class and random variables, respectively. Expression of 11-βHSD I, 11-βHSD II, IL-1R, TNF-αR increased and were greatest at 4 hr (5.4 ± 1.1 fold, 1.8 ± 0.2 fold, 28.8 ± 7.6 fold, and 2.9 ± 0.5 fold, respectively; $P \leq 0.05$). However, the 4-hr samples were the last samples collected and therefore it is not clear whether expression of these genes continued to increase. Expression of the ACTHR ($P = 0.31$), IL-1β ($P = 0.34$), IL-2 ($P = 0.30$), and IL-6 ($P = 0.14$) did not change. This suggests that stimuli that increase endogenous cortisol concentrations may influence the expression of cytokines, and therefore modulate or possibly prime the immune system prior to a subsequent immune challenge.

Key Words: cattle, cortisol, cytokines

125 Comparison of peripheral concentrations of adrenocorticotropin (ACTH), cortisol (CS) and insulin-like growth factor-I (IGF-I) in term septic and non-septic neonatal foals. J. R. Gold[1], L. C. Caldwell*[2], B. L. Ideus[2], N. D. Cohen[1], and T. H. Welsh, Jr.[2], [1]*Texas A&M University,*, *College Station*, [2]*Texas AgriLife Research*, *College Station, TX*.

This project compared peripheral concentrations of ACTH, CS and IGF-I in term septic and non-septic neonatal foals. Blood samples were obtained from term septic foals less than 7 days of age admitted to the Texas A&M Veterinary Medical Center in 2009 (n=15) and 2010 (n=6). Foals were classified as septic by a sepsis score ≥ 11 and(or) a positive blood culture. Non-septic (control) term foals (2009: n=12; 2010: n=5), less than 7 days of age with a negative sepsis score and blood culture, were obtained from the Texas A&M Horse Center or admitted to the medical center for reasons other than sepsis. Blood samples were obtained at admission, 24 hr post-admission, and 5 days post-admission or at the time of discharge. Plasma concentration of ACTH and serum concentration of CS and IGF-I were determined by RIA. Analysis of variance, specific for repeated measures, was conducted using the MIXED model procedure of SAS for analysis of time and health status effects on hormone concentrations. Although ACTH in septic foals averaged > 30 pg/mL and ACTH in non-septic foals averaged < 19 pg/mL, time and health status did not affect plasma concentration of ACTH. Time and health status were significant sources of variation in serum cortisol concentration ($P < 0.006$). Serum cortisol was greater in septic (42 ± 3.2 ng/mL) than non-septic (20.7 ± 3.8 ng/mL) foals in 2009 but not 2010 (non-septic:25.8 ± 7.6 ng/mL; septic:37.3 ± 8.1 ng/mL). Time, health status, time × health status were significant sources of variation for serum concentration of IGF-I ($P < 0.0003$). Non-septic foals had higher concentrations of IGF-I (2009: 128.7 ± 6.1 ng/mL; 2010: 151.5 ± 14.7 ng/mL) relative to septic foals (2009: 88.8 ± 5.3 ng/mL; 2010: 115.7 ± 14.1 ng/mL). These observations regarding systemic concentrations of metabolic hormones will help develop intervention procedures to improve survival and subsequent maturation of foals that experience a critical illness as neonates.

Key Words: IGF-I, neonatal foal, sepsis

126 Differences in hepatic IGF signaling in IUGR and IUGA fetuses from nutrient restricted dams. M. C. Satterfield*, R. M. Simmons, S. M. Greff, and K. A. Dunlap, *Texas A&M University*, *College Station*.

It is widely accepted that maternal nutrient restriction results in offspring that are smaller at birth than counterparts from adequately fed ewes. Insulin-like growth factors 1 and 2 are potent mitogens that act as critical mediators of fetal growth. Indeed, perturbations in IGF signaling result in fetal growth restriction (IUGR). Interestingly, preliminary studies indicate that the variation in lamb birth weights is greater in ewes fed at 50% of NRC requirements (mean = 4.84 kg; range = 2.5-7.1 kg, n=54) as compared to those receiving 100% NRC (mean = 6.28 kg; range = 5.2-7.2 kg; n=13). These data suggest that either the fetus or placenta adapts in a subpopulation of ewes to maintain normal fetal growth despite inadequate nutrition. Regression analysis of fetal weight on day 125 to maternal weight prior to nutrient restriction indicated that fetal weight was not correlated with maternal weight ($P = 0.26$). Therefore we analyzed the six lightest (IUGR) and six heaviest (IUGA) fetuses to test the hypothesis that normal fetal growth occurred in IUGA fetuses in response to upregulated IGF signaling. Weights of the six IUGR fetuses from nutrient-restricted ewes were less ($P < 0.05$; 2.8±0.1 kg vs 4.1±0.1 and 4.0±0.1 kg) than that of the weights of the IUGA fetuses and 100% NRC fed controls, respectively. IUGR fetuses had reduced ($P < 0.05$) absolute and relative liver weight (79±6 g vs 134±±6 and 119±6 g) on day 125 of gestation compared to IUGA and control fetuses, respectively. Circulating concentrations of IGF1 in the

fetus were greater ($P < 0.05$) in IUGA and control fetuses than IUGR. In contrast, hepatic IGF1R mRNA was increased ($P < 0.05$) in IUGR versus IUGA and control fetuses. There was no difference in hepatic mRNA expression of IGFBPs 1 through 6. Western blot analysis indicated that hepatic ERK1/2 phosphorylation tended to be increased ($P < 0.07$) in IUGR versus IUGA fetuses. There was no change in phosphorylation of AMPK, AKT, mTOR, RPS6, or eIF4E. Results indicate that a reduction in IGF1 action may contribute to a reduction in fetal growth, however these effects are likely not mediated by nutrient sensing pathways in the liver.

Key Words: pregnancy, nutrition, IGF

127 Effects of monensin on *Campylobacter* and *Salmonella* in vitro. N. A. Krueger*[1], R. C. Anderson[1], J. A. Byrd[1], M. D. Flythe[2], and D. J. Nisbet[1], *[1]Food & Feed Safety Research Unit, United States Department of Agriculture, Agriculture Research Service, College Station, TX, [2]University of Kentucky, Forage Animal Production Research Unit, Lexington.*

Monensin is commonly fed to cattle and poultry as a coccidiostat, although its bactericidal effect against Gram positive, obligate amino acid-fermenting (hyper ammonia producing) bacteria is thought to also spare proteins and amino acids from wasteful catabolism within the rumen. Because amino acids can also serve as energy substrates for *Campylobacter* and *Salmonella*, Gram negative pathogens that are much less susceptible to monensin than Gram positive bacteria, we conducted a study to see if monensin may promote the growth of these foodborne pathogens in the cecal environment by depleting populations of the competing hyper-ammonia producing anaerobes. Freshly collected ceca contents collected from 20 market age broilers were pooled in Mueller-Hinton (MH, *C. jejuni*) or Tryptic Soy broth (TSB, *S.* Typhimurium) resulting in a ratio of 9 ml buffer to 1 g cecal contents. Each cecal broth mixture was inoculated with approximately 10^{-4} colony forming units (CFU) of an overnight grown *C. jejuni* (in MH) or *S.* Typhimurium (in TSB) culture. Nine ml volumes of the cecal broth mixture were added to screw top tubes (in triplicate) previously loaded with 1 ml MH, TSB, or monensin to achieve a 0 or 100 g/ton equivalent monensin ratio and were incubated anaerobically at 40ºC. Rates of ammonia production, regressed from concentrations measured in samples collected after 0, 3 and 6 h incubation, were lower ($P < 0.05$) in monensin-treated incubations than in non-treated incubations (0.08±0.02 vs 0.20±0.04 umol/ml per h, respectively) thus indicating that monensin did indeed spare amino acids from being catabolized. However, initial viable cell counts of *C. jejuni* (5.62±0.13 and 5.63±0.7 $\log_{10}$ CFU of *C. jejuni* ml^{-1}) and *S.* Typhimurium (3.92±0.07 and 4.00±0.14, $\log_{10}$ CFU of S. Typhimurium ml^{-1}), did not differ ($P > 0.05$) between monensin and non-treated cultures, respectively, and counts of *C. jejuni* and *S.* Typhimurium did not differ ($P > 0.05$) over time for each of the two treatments. These results demonstrate that while monensin may effectively reduce amino acid and protein catabolism by populations of avian cecal bacteria, it does not promote the growth of *C. jejuni* and *S.* Typhimurium.

Key Words: monensin, *Campylobacter*, *Salmonella*

128 Bioluminescence imaging of luciferase reporter gene expression within intact porcine ovarian follicles in vitro. S. Jung* and S. T. Willard, *Mississippi State University, Mississippi State.*

Time course and reporter plasmid DNA (pGL4) dose responses of luciferase reporter gene expression following lipid–mediated transfection were determined to develop a bioluminescent model for whole ovarian follicles. DNA:lipid complexes were formed at a DNA (μg): lipid (μl) ratio of 2:5, by adding FuGene 6 in PBS to 1 μg, 2 μg or 3 μg of pGL4 DNA and injected into each follicle using a microinjector. A total of n=87 follicles (5.5 to 6.5 mm in diameter) were randomly distributed into 4 groups (negative control (follicles injected with 2 μg DNA without lipid complexes), 1 μg, 2 μg, and 3 μg pGL4 DNA). After 20 h post–transfection, each follicle was imaged (exposure times varied: 30s to 10 min) and signal intensity was reported (and normalized) as mean ± SEM of photons per second (p/s). The experiment was repeated n=10 times. Data were analyzed by MANOVA and ANOVA. The luciferase expression level of follicles in the 3 μg group was significantly greater than the 1 μg group ($P < 0.05$) over time, but did not differ from the 2 μg group ($P = 0.12$). The signal intensity reached a peak at 1 min in the 1 μg ($2.30\times10^7 \pm 7.53\times10^6$ p/s), 2 μg ($4.38\times10^7 \pm 1.53\times10^7$ p/s), and 3 μg ($1.31\times10^8 \pm 4.69\times10^7$ p/s) groups and declined gradually afterward. To verify the luciferase expression in granulosa cells, the cells were isolated from the transfected whole follicles in negative control, 1 μg group, 2 μg group, and 3 μg group and were assayed for luciferase activity using Bright–Glo. The luciferase level of granulosa cells from the 3 μg group ($1.23\times10^8 \pm 1.69\times10^7$ p/s) was significantly higher ($P < 0.05$) than the granulosa cells from the 2 μg group ($8.52\times10^7 \pm 1.13\times10^7$ p/s), 1 μg group ($5.53\times10^7 \pm 3.78\times10^6$ p/s), and negative control group ($1.12\times10^7 \pm 5.72\times10^6$ p/s). A higher level of luciferase expression was observed in follicles transfected with 3 μg of pGL4, with an optimal time for quantification at 1 min after luciferin (substrate) injection. This result indicated that the reporter genes can be transferred and expressed in granulosa cells within an intact, living ovarian follicle by lipid mediated gene transfer.

Key Words: bioluminescence imaging, porcine ovarian follicle, granulosa cell

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Browning, R - TN
Mulvaney, DR – AL

Award - Young Animal Scientist - Education
Welsh, TH - TX (Chair)
Looper, ML - AR
Anderson, LH - KY
Spears, JW - NC
Hilton, G – OK

Award - Young Animal Scientist - Research
Willard, ST - SC (Chair)
Poore, MH - NC
Kim, SW - NC
Sartin, JL - AL
Arthington, JD – FL

Breeding and Genetics
Wyatt, WE - LA (Chair)
Kriese-Anderson, LA - AL
Barham, BL - AR
Elzo, MA – FL

Extension
Hersom, MJ - FL (Chair)
Banta, JP - TX
Rhinehart, JD – MS

Meats
Lawrence, TE - TX (Chair)
Schmidt, T - MS
Morgan, JB - OK
Carr, C – GA

Pasture and Forages
Poore, MH - NC (Chair)
Vendramini, J - FL
Beck, PA - AR
Scaglia, G – LA

Physiology
Looper, ML - AR
Ryan, PL - MS
Tiller, OB - AL
Lents, C – GA

Ruminant Animal Production
Richards, C - OK (Chair)
Adesogan, AT - FL
Hill, GM - GA
Muntifering, RB – AL

Small Ruminant Production
Getz, W - GA (Chair)
Whitley, NC - MD
Solaiman, SG - AL
Andries, K – KY

Teaching and Undergraduate Education
Blanton, JR - OK (Chair)
Rosenkrans, CF - AR
Rude, BJ - MS
Miller, RK - TX
Whitaker, BD – VA

Undergraduate Student Paper Competition
Blanton, JR - OK (Chair)
Rosenkrans, CF - AR
Rude, BJ - MS
Miller, RK - TX
Whitaker, BD – VA

Southern Section
American Society of Animal Science
Past Presidents

2008–09	E. B. Kegley	University of Arkansas
2007–08	C. C. Chase, Jr.	USDA
2006–07	D. A. Coleman	Auburn University
2005–06	R. D. Randel	Texas A&M University
2003–05	K. L. Esbenshade	NC State University
2002–03	D. K. Aaron	University of Kentucky
2001–02	T. R. Troxel	University of Arkansas
2000–01	L. L. Southern	Louisiana State University
1999–00	R. P. Wettemann	Oklahoma State University
1998–99	J. D. Armstrong	Purdue University
1997–98	D. G. Ely	University of Kentucky
1996–97	P. G. Harms	Texas A&M University
1995–96	P. R. Utley	University of Georgia
1994–95	D. S. Buchanan	Oklahoma State University
1993–94	P. R. Nolan	University of Arkansas
1992–93	D. R. Marple	Auburn University
1991–92	R. W. Harvey	NC State University
1990–91	D. E. Franke	Louisiana State University
1989–90	A. L. Eller, Jr.	VPI & SU
1988–89	C. R. Long	Texas A&M University
1987–88	D. G. Spruill	University of Georgia
1986–87	G. L. Cromwell	University of Kentucky
1985–86	B. Baker, Jr.	Mississippi State University
1984–85	C. B. Ammerman	University of Florida
1983–84	W. G. Luce	Oklahoma State University
1982–83	J. R. Hill	Clemson University
1981–82	J. W. Turner	Louisiana State University
1980–81	A. M. Sorenson	Texas A&M University
1979–80	W. C. McCormick	University of Georgia
1978–79	E. R. Barrick	NC State University
1977–78	R. L. McGuire	Auburn University
1976–77	J. J. Guenther	Oklahoma State University
1975–76	C. J. Brown	University of Arkansas
1974–75	S. L. Hansard	University of Tennessee
1973–74	M. Koger	University of Florida
1972–73	J. P. Fontenot	VPI & SU
1971–72	G. E. Mitchell, Jr.	University of Kentucky
1970–71	L. S. Pope	Texas A&M University
1969–70	L. C. Ulberg	NC State University
1968–69	R. C. Carter	VPI & SU
1967–68	G. L. Robertson	Louisiana State University
1966–67	C. E. Lindley	Mississippi State University
1965–66	R. F. Sewell	University of Georgia
1964–65	W. M. Warren	Auburn University
1963–64	R. F. Wheeler	Clemson University
1962–63	E. J. Warrick	USDA
1961–62	G. K. Davis	University of Florida
1960–61	W. Gifford	University of Arkansas
1959–60	J. A. Whatley	Oklahoma State University
1957–58	B. L. Southwell	University of Georgia
1956–57	W. P. Garrigus	University of Kentucky
1955–56	J. C. Miller	Texas A&M University
1954–55	R. A. Damon	Louisiana State University
1953–54	A. E. Cullison	University of Georgia
1952–53	C. M. Kincaid	VPI & SU
1951–52	R. S. Glasscock	University of Florida
1950–51	H. H. Levek	Mississippi State University
1949–50	J. E. Foster	University of Maryland
1948–49	H. M. Briggs	Oklahoma State University
1947–48	E. C. Godbey	Clemson University
1946–47	J. C. Grimes	Auburn University
1941–42	R. E. Hunt	VPI & SU
1940–41	M. G. Snell	Louisiana State University
1939–40	L. E. Richardson	University of Tennessee
1938–39	E. W. Sheets	USDA
1937–38	L. I. Case NC	State University
1936–37	M. P. Jarnigan	University of Georgia
1935–36	J. B. Francioni	Louisiana State University
1934–35	A. L. Shealy	University of Florida
1933–34	L. V. Starkey	Clemson University
1932–33	W. L. Blizzard	Oklahoma State University

Southern Section
American Society of Animal Science
Past Award Recipients
Distinguished Service Award

2009	Not Given	
2008	R. D. Randel	Texas
2007	A. H. Brown	Arkansas
2006	Gary M. Hill	Georgia
2005	Samuel W. Coleman	USDA
2004	Don G. Ely	Kentucky
2003	Don E. Franke	Louisiana
2002	Fred Thrift	Kentucky
2001	Robert Wettmann	Oklahoma
2000	Philip Utley	Georgia
1999	Paul R. Noland	Arkansas
1998	Not Given	
1997	William G. Luce	Oklahoma
1996	Raymond W. Harvey	North Carolina
1995	Gary L. Cromwell	Kentucky
1994	George E. Mitchell, Jr.	Kentucky
1993	L.E. McDowell	Florida
1992	Joseph Fontenot	Virginia
1991	Robert Totusek	Oklahoma
1990	Virgil Hays	Kentucky
1989	Frank Baker	Arkansas
1988	Clarence B. Ammerman	Florida
1987	Lowell E. Walters	Oklahoma
1986	Lemuel Goode	North Carolina
1985	O.M. Hale	Georgia
1984	L.C. Ulberg	North Carolina
1983	C.J. Brown	Arkansas
1982	W.C. McCormick	Georgia
1981	Elliot R. Barrick	North Carolina
1980	J.A. Whatley, Jr.	Oklahoma
1979	Marvin Koger	Florida
1978	Thomas J. Marlowe	Virginia
1977	Sam Hansard	Tennessee
1976	J.C. Hillier	Oklahoma
1975	J.K. Riggs	Texas
1974	T.J. Cunha	Florida
1973	O.D. Butler	Texas
1972	George W. Litton	Virginia
1971	Ray H. Dutt	Kentucky
1970	Robert C. Carter	Virginia
1969	Henry H. Leveck	Mississippi
1968	Wesley P. Garrigus	Kentucky
1967	Byron L. Southwell	Georgia
1966	Charles S. Hobbs	Tennessee
2009	E. van Heugten	North Carolina

Extension Award

2008	F. T. McCollum, III	Texas
2007	M. H. Poore	North Carolina
2006	Allen F. Harper	Virginia
2005	Glen Selk	Oklahoma
2004	Roger L. McCraw	North Carolina
2003	Darrh Bullock	Kentucky
2002	Warren Gill	Tennessee
2001	Walter R. Burris	Kentucky
2000	Tom R. Troxel	Arkansas
1999	George V. Davis, Jr.	Arkansas
1998	G. L. Monty Chappel	Kentucky
1997	Steven H. Umberger	Virginia
1996	Clyde D. Lane, Jr.	Tennessee
1995	John T. Johns	Kentucky
1994	David W. Freeman	Oklahoma
1993	J.R. Jones	North Carolina
1992	James B. Neel	Tennessee
1991	Keith Lusby	Oklahoma
1990	Joe Hughes	Oklahoma
1989	Henry Webster	Clemson
1988	Donald R. Gill	Oklahoma
1987	H. John Gerken, Jr.	Virginia
1986	M.K. Cook	Georgia
1985	W.G. Luce	Oklahoma
1984	Charles Cooper	Virginia
1983	C.W. Absher	Kentucky
1982	C.M. Triplett	Georgia
1981	Arden N. Huff	Virginia
1980	A.L. Eller, Jr.	Virginia

Young Animal Scientist Award

2009[1]	G. G. Hilton	Oklohoma State University
2009[2]	M. L. Looper	USDA, ARS
2008[1]	Jodi A. Sterle	Texas
2008[2]	Jeffery Escobar	VPI & SU
2007[1]	Les Anderson	University of Kentucky
2007[2]	Sung Woo Kim	Texas Tech University
2006[1]	Michael L. Looper	USDA, ARS
2006[2]	Scott T. Willard	Mississippi State University
2005[2]	Clinton Krehbiel	Oklahoma State University
2004[1]	M. Todd See	NC State University
2004[2]	Theo Van Kempen	NC State University
2003[1]	Sam Jackson	Texas Tech University
2003[2]	Tom Spencer	Texas A&M University
2002[1]	Joel Yelich	University of Florida
2002[2]	Beth Kegley	University of Arkansas
2001[1]	Shawn Ramsey	Texas A&M University
2001[2]	Jason Apple	University of Arkansas
2000[1]	Andy D. Herring	Texas Tech University
1999[2]	Chad C. Chase, Jr.	USDA, ARS
1998[1]	Markus F. Miller	Texas Tech University
1998[2]	Arthur L. Goetsch	Langston University
1997[1]	Tim Marshall	University of Florida
1996[1]	William L. Flowers	NC State University
1996[2]	Markus F. Miller	Texas Tech University
1995[1]	Craig H. Wood	University of Kentucky
1995[2]	Jeffrey D. Armstrong	NC State University
1994[1]	Debra K. Aaron	University of Kentucky
1994[2]	Peter J. Hansen	University of Florida
1993[1]	Kevin Pond	NC State University
1993[2]	Rod Geisert	Oklahoma State University
1992[1]	David S. Buchanan	Oklahoma State University
1992[2]	James L. Sartin	Auburn University
1991[1]	W.E. Beal	VPI & SU
1991[2]	Wayne Greene	Texas A&M University
1990[1]	J.W. Mabry	University of Georgia
1990[2]	T.H. Welsh	Texas A&M University
1989	J.W. Spears	NC State University
1988	S.B. Smith	Texas A&M University
1987	D.L. Thompson, Jr.	Louisiana State Univ.
1986	G.J. Hausman	USDA, ARS, Athens, GA
1985	J.W. Savell	Texas A&M University
1984	D.R. Notter	VPI & SU
1983	T.S. Stahly	University of Kentucky
1982	D.N. Marple	Auburn University

[1]Education
[2] Research

NPB Swine Industry Award

2009	E. van Heugten	NC State University
2008	Sung Woo Kim	NC State University
2007	Chad W. O'Gormon	Texas A&M University
2006	Jeffery A. Carroll	USDA, ARS
2005	Zelpha B. Johnson	University of Arkansas
2004	Jason Apple	University of Arkansas
2003	Theo van Kempen	NC State University
2002	Kim Cole	University of Arkansas
2001	G. E. Conatser	University of Tennessee
2000	Not given	
1999	Not given	
1998	Robert A. Cushman	NC State University
1997	M. Todd See	NC State University
1996	William L. Flowers	NC State University
1995	M. Todd See	NC State University
1994	Robert Dove	University of Georgia

Graduate Student PaperAward

Year	Awardee	Place of Meeting	University
2009	S. J. Winterholler	Atlanta	Oklahoma State University
2008	S. L. Hansen	Dallas	North Carolina State University
2007	P. Williams	Mobile Texas A&M	University-Kingsville
2006	L. R. Legleiter	Orlando	North Carolina State University
2005	Margaret Bowman	Little Rock	University of Arkansas
2004	E. G. Brown	Tulsa	Texas A&M University
2003	C. Realini	Mobile	University of Georgia
2002	J. A. Parish	Orlando	University of Georgia
2001	J. Montgomery	Ft. Worth	Texas Tech University
2000	M. R. Stivarious	Lexington	University of Arkansas
1999	T. E. Engle	Memphis	North Carolina State University
1998	C. Barnett	Little Rock	Univ. of Tennessee
1997	D.H. Crews, Jr.	Birmingham	Louisiana State University
1996	None Given		
1995	E.B. Kegley	New Orleans	North Carolina State University
1994	R.D. Coffey	Nashville	University of Kentucky
1993	D.K. Bishop	Tulsa	Oklahoma State University
1992	R.L. Stanko	Lexington	North Carolina State University
1991	G.A. Rohrer	Ft. Worth	Texas A&M University
1990	K.A. Meurer	Little Rock	Mississippi State Univ.
1989	G.M. Davenport	Nashville	University of Kentucky
1988	M.J. Esteinne	New Orleans	University of Georgia
1987	T.W. Burnell	Nashville	University of Kentucky
1986	M.J. Wylie	Orlando	Texas A&M University
1985	M.W. Richards	Biloxi	Clemson University
984 J.	C. Betts	Nashville	Texas A&M University
1983	J.B. Lutz	Atlanta	University of Georgia
1982	K.R. Pond	Orlando	Texas A&M University
1981	L.W. Greene	Atlanta	VPI & SU
1980	D.K. Aaron	Hot Springs	University of Kentucky
1979	T.W. Robb	New Orleans	University of Kentucky
1978	E.F. Gray	Houston	University of Kentucky
1977	T.A. Puglisi	Atlanta	University of Georgia
1976	D.L. Thomas	Mobile	Oklahoma State University
1975	J.C. Cornwell	New Orleans	Louisiana State University
1974	D.M. Hallford	Memphis	Oklahoma State University
1973	A.C. Mills	Atlanta	University of Florida
1972	C. McLellan, Jr.	Richmond	Oklahoma State University
1971	C.L. Fields	Jackonsville	University of Kentucky
1970	A.R. Bellve	Memphis	North Carolina State University
1969	W.L. Brown	Mobile	Auburn University
1968	W.E. Powell	Louisville	Auburn University
1967	F.W. Bazer	New Orleans	North Carolina State University
1966	D.G. Ely	Jackson	University of Kentucky
1965	R.D. Goodrich	Dallas	Oklahoma State University
1964	C.K. Vincent	Atlanta	North Carolina State University
1963	C.B. Ramsey	Memphis	University of Tennessee
1962	J.R. Crockett	Jacksonville	University of Florida

Undergraduate Student Paper Award

Year	Awardee	Place of Meeting	University
2009	C. M. Ballou	Atlanta	North Carolina State University
2008	C. R. Boldt	Dallas	Texas A&M University
2007	L. Starkey	Mobile	University of Arkansas
2006	D. Sykes	Orlando	Mississippi State University
2005	N. Burdick	Little Rock	Texas A&M University-Kingsville
2004	J. L. Roberts	Tulsa	Oklahoma State University
2003	M. Seitz	Mobile	Mississippi State Univ.
2002	B. Spader	Orlando	University of Missouri
2001	R. Horsley	Ft. Worth	Virginia Polytechnic Univ.
2000	B. Robbins	Lexington	Virginia Tech
1999	J. L. Bardugone	Memphis	Virginia Tech
1998	S. F. Flohr	Little Rock	Virginia Tech
1997	T. M. Weick	Birmingham	Louisiana State Univ.
1996	K. J. Goodson	Greensboro	Texas A&M University
1995	B. C. Bloom	New Orleans	Auburn University
1994	Beth Good	Nashville	Oklahoma State University
1993	C. J. Kirby	Tulsa	North Carolina State University

Academic Quadrathlon Winners

2009	University of Georgia	1996	Oklahoma State University
2008	University of Kentucky	1995	Virginia Tech
2007	Texas A&M University	1994	Oklahoma State University
2006	Texas A&M University	1993	Texas A&M University
2005	North Carolina State University	1992	Oklahoma State University
2004	University of Kentucky	1991	University of Kentucky
2003	Texas A&M University	1990	Virginia Tech
2002	University of Florida	1989	Oklahoma State University
2001	University of Kentucky	1988	Texas A&M University
2000	Texas A&M University	1987	University of Georgia
1999	University of Kentucky	1986	University of Georgia
1998	University of Kentucky	1985	University of Kentucky
1997	Oklahoma State University	1984	Texas A&M University

Author Index

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ASAS Southern Section

Future Meeting Dates and Locations

2012	Birmingham, AL	Feb 4-7 (with SAAS)