abstracts

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ABSTRACTS
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Breeding and Genetics

1 Breed effects and heterosis for rectal temperature and coat score in Brahman, Angus, and Romosinuano pure and crossbred cows and calves. D. G. Riley*[1], C. C. Chase[1], S. W. Coleman[1], and T. A. Olson[2], [1]*USDA, ARS*, *Brooksville, FL*, [2]*University of Florida*, *Gainesville*.

The objective was to assess heterosis and breed effects on rectal temperature (RT) and coat score (CS) in pure and crossbred Brahman (B), Angus (A), and Romosinuano (R) cows and calves. One group of cows (Group 1; n = 350) included F_1s of all combinations and contemporary purebreds; their calves (n = 664) were 3-breed crosses or F_1s. A second group (Group 2) consisted of purebred calves (n = 276) and their dams (n = 176). Records were from summer working days in 2 years. CS ranged from 1 (slick) to 20 (woolly) for analyses. Separate analyses were conducted for cows and for calves within groups 1 and 2. Final models included sire and dam breeds and their interaction, year, date, linear and quadratic regressions on time that RT was recorded, random sire, and random animal within sire (cows only). Open cows had higher RT (39.1 ± 0.05°C; $P = 0.01$) than pregnant (39.0 ± 0.05°C) in group 1; otherwise pregnancy or lactation status were not important ($P > 0.32$). In calf results, weight or age were not important for either trait ($P > 0.76$). Bull calves (group 2) had lower (3.2 ± 0.6; $P = 0.001$) CS than steers (5.5 ± 0.3) or heifers (5.3 ± 0.3). From Group 1 cow data, heterosis was detected for RT in AR (-0.2 ± 0.1°C) and AB (-0.3 ± 0.1°C), and for CS in all pairs of breeds; the largest (-2.2 ± 0.3 units) was for AR. The A direct effect was to increase RT 0.8 ± 0.1°C and CS 5.4 ± 0.5 units ($P < 0.001$); the R direct effects ($P < 0.001$) were to lower both traits, and a significant B effect was to reduce CS (-1.6 ± 0.5). In Group 1 (crossbred) calves, 50% A calves had higher RT and CS than BR calves ($P < 0.001$). In Group 2, all breed means differed ($P < 0.001$) except for RT in B and R cows ($P = 0.07$); for both cows and calves, A had the highest CS (7.8 ± 0.2 and 12.1 ± 0.6, respectively) and RT (40.2 ± 0.1 and 40.6 ± 0.6°C, respectively) and R was lowest. A potential use for R may be to enhance adaptation to hot conditions.

Key Words: Romosinuano, Rectal temperature, Coat score

2 Effect of shade on summer body temperature and respiration rate of Angus, Brahman, and Romosinuano heifers. C. C. Chase, Jr.*[1], L. J. Waters[1], J. R. Davis[1], D. G. Riley[1], S. W. Coleman[1], J. A. Carroll[2], and T. A. Olson[3], [1]*USDA, ARS, STARS*, *Brooksville, FL*, [2]*USDA, ARS, LIRU*, *Lubbock, TX*, [3]*University of Florida*, *Gainesville*.

To determine the effect of shade during summer in Florida on rectal temperature and respiration rate, a total of 24 heifers (8 Angus, 8 Brahman, and 8 Romosinuano) were utilized. Heifers were allotted by breed to one of two treatment groups, shade or no shade. Heifers were acclimated to treatments for 14 days, followed by sampling for 4 days. Heifers were then switched to the other treatment and sampling repeated. Rectal temperature was recorded using a rectal probe equipped with a Hobo and vaginal temperature was recorded using an Ibutton attached to a blank CIDR. Respiration rate was manually collected at 0800, 1300, and 1800 h. A simple correlation of 0.64 was obtained between rectal and vaginal temperatures. For analyses reported herein vaginal temperatures were analyzed at 0800, 1300, 1800, and 2400 h. Treatment affected ($P < 0.05$) vaginal temperature at 0800, 1800, and 2400 h with mean temperatures 0.1 to 0.3°C higher for the shade treatment than the no shade treatment. A treatment x breed interaction influenced ($P < 0.003$) vaginal temperature at 1300 h with Angus in no shade (39.7°C) having a higher ($P < 0.009$) vaginal temperature than Angus in shade (39.3°C) while Brahman in shade (39.3°C) had a higher ($P < 0.03$) vaginal temperature than Brahman in no shade (39.1°C). Breed influenced ($P < 0.001$) respiration rate at all times with Angus > Romosinuano > Brahman. At 1300 h a breed x treatment interaction ($P < 0.0001$) indicated that respiration rates were greater for the no shade treatment compared to the shade treatment for Angus and Romosinuano, but did not differ for Brahman. The use of near continuous monitoring of body temperature with minimal intrusion to the animal as used in this study is an important tool for environmental studies. These results are useful in understanding how breed types and animals react to a hot and humid environment.

Key Words: Beef cattle, Body temperature, Respiration rate

3 Post-weaning growth of tropically adapted purebred and crossbred calves when finished in a temperate climate. S. W. Coleman*[1], W. A. Phillips[2], D. G. Riley[1], and C. C. Chase[1], [1]*USDA ARS Subtropical Agricultural Research Station*, *Brooksville, FL*, [2]*USDA ARS Grazinglands Research Laboratory*, *El Reno, OK*.

Typically the adaptation of beef cows that is required for the subtropics has been accomplished by using percentage Brahman breeding. Compromised fertility and carcass quality have increased interest in tropically adapted *Bos taurus* breed types. Tropically adapted cattle have a reputation for poor gains and efficiency when finished in temperate environments. The objective of this study was to evaluate three breeds [A=Angus (control); B=Brahman; and R=Romosinuano] and all possible crosses during different segments of post-weaning growth. Calves (n = 435) born over three years in Brooksville, FL were weaned in late Sept,, backgrounded for at least 21 d (BKG), shipped 2025 km to El Reno, OK in Oct., fed a preconditioning diet for 28 d (RCV), grazed wheat from Nov. to May (WHT), and finished (FIN) on a conventional feedlot diet, and serially slaughtered after approximately 95, 125 and 150 days on feed. Average daily gains (ADG) during each segment were tested using a mixed model that included calf age at weaning, year, breed, winter treatment (control or supplement with reduced grazing of wheat; for wheat and feedlot) and interactions. Sire within sirebreed was random. Year and breed effects were significant ($P < 0.05$) in all phases and gains were positive for each phase. Heterosis was exhibited ($P < 0.05$) for all F_1 combinations in all phases except for B-R during the finishing phase. Maternal and direct effects were inconsistent among breeds across segments and often cancelled each other. From weaning to harvest, calves from A and B sires gained 0.83 kg/d while R calves gained 0.75 kg/d ($P < 0.05$). Breed of dam effects on steer gains were all different (A = 0.88; R= 0.81; and B = 0.71). Steers with 100% tropical adaptation tended to gain at a slower rate than those with temperate adaptation. Whether the cause is climate related or the effect of differing growth curves cannot be ascertained at this time.

Key Words: Tropical adaptation, Romosinuano, Post-weaning gain

4 Evaluation of birth weight, weaning weight, and gestation length in *Bos indicus/Bos taurus* cross calves. A. J. Cooper*, J. O. Sanders, A. D. Herring, C. A. Gill, D. K. Lunt, and J. E. Sawyer, *Texas A&M University*, *College Station*.

Birth weight (BWT), weaning weight (WWT), and gestation length (GL) were evaluated in 13 embryo transfer (ET) full sib families (n = 475, F_2 Nellore-Angus) and, separately, in 4 paternal half sib natural service (NS) families (n = 189, out of 1/2 Brahman 1/2 British cows). The same 4 Nellore-Angus F_1 bulls were the sires of the ET and NS families. Calves were born in both spring and fall from 2003 to 2007. Fixed effects for all analyses included sire, season(birth yr), and gender; family(sire) was included in all ET analyses. Recipient age was a fixed effect in BWT and WWT ET analyses and recipient breed was a fixed effect in the GL analysis. For NS calves, dam breed type and dam(dam breed type) were included as fixed effects. Weaning age was a covariate in the WWT analyses. Embryo transfer calves by bull 432H had the lowest birth (31.3 kg) and weaning weights (213.8 kg) and longest gestations (282.2 d). Natural service calves by 432H also had the lowest birth (34.5 kg) and weaning weights (223.6 kg). Embryo transfer calves by 437J had the highest birth weights (34.0 kg), but, in NS calves, those by bull 551G were heaviest (36.8 kg). Bull 297J had the heaviest weaning weights in both ET (225.0 kg) and NS calves (243.5 kg) and shortest gestations (279.3 d) in ET calves. Embryo transfer males were heavier at birth (33.3 kg) and weaning (225.2 kg) and had longer gestations (282.2 d) than females (32.7 kg, 211.2 kg, and 280.0 d). Natural service males were also heavier at birth (36.6 kg) and weaning (241.9 kg) than females (35.5 kg and 225.7 kg). The regression of WWT on weaning age was 0.88 kg/d ($P < 0.001$) in ET and 0.93 ($P < 0.001$) in NS calves. The above BWT ET analyses did not include GL as a covariate; however, from a separate analysis, the regression of BWT on GL was 0.36 kg/d ($P < 0.001$). The results of these analyses indicate adequate variation both between and within these families for the identification of major genes affecting these traits.

Key Words: Birth weight, Bos indicus crosses, Embryo transfer calves

5 Genetic effects on liveweight gain, hair coat score, temperament, and parasite resistance traits in Angus and Brahman-influenced replacement heifers. W. E. Wyatt*[1], D. E. Franke[2], J. E. Miller[2], and D. C. Blouin[2], [1]*Louisiana State University Agricultural Center*, *Jeanerette*, [2]*Louisiana State University Agricultural Center*, *Baton Rouge*.

Spring-born (2003-2007) weanling Angus (AN) and Braford heifers (n = 56 and 50) (14 and 17 sires) at the Central and AN and Brangus heifers (n = 131 and 108) (17 and 15 sires) at the Iberia Research Station were used to estimate h_2 and genetic correlations for postweaning ADG, hair coat scores, behavioral, and fecal egg count traits. Brangus and Braford heifers were recoded as Brahman-influenced breed type (BI). Heifers were administered a fenbendazole drench (10 mg kg^{-1}) in the fall of their respective birth year. Heifers were weighed, scored for hair coat luster (HLUS; 1 = glossy and 5 = dull) and hair length (HLEN; 1 = short and 5 = long), and chute temperament (CTS; 1 = calm and 5 = berserk frenzy), chute exit velocities (CEV; m/sec) were measured, and a fecal sample obtained (fecal egg count transformed as $\log_{10}$ + 1; FEC) on approximate 42-d intervals throughout the postweaning period (subsequent summer termination). Postweaning gain (PADG) was calculated. Measures and scores were pooled within heifer. Data were analyzed (PROC MIXED) with a model that included location and breed type as a fixed effects and year and sire nested within location by breed type as random effects. Breed type (AN vs BI) affected ($P < 0.05$) PADG (0.62 vs 0.65 kg), HLUS (1.9 vs 1.7), HLEN (2.7 vs 1.8), CTS (1.7 vs 1.8), and FEC (2.2 vs 2.4). Chute exit velocity was similar between breeds (2.8 m/sec). MTDFREML was used to obtain h_2 estimates for each trait and selected r_g among traits. Heritability estimates were 0.36 Â± 0.15, 0.80 Â± 0.13, 0.80 Â± 0.14, 0.34 Â± 0.14, 0.19 Â± 0.14, and 0.51 Â± 0.13 for PADG, HLUS, HLEN, CTS, CEV, and FEC, respectively. Sufficient genetic variation existed for selection in PADG, HLUS, HLEN, CTS, and FEC. However, based upon r_g , there doesn't appear to be a production advantage (i.e., PADG) associated with HLUS, HLEN, CTS, CEV, or FEC.

Key Words: Beef heifers, Parasites, Temperament

6 Relationships between prolactin promoter polymorphisms and Angus calf temperament scores and fecal egg counts. A. B. Rayfield*[1], A. H. Brown, Jr.[1], Z. B. Johnson[1], J. G. Powell[1], J. L. Reynolds[1], S. T. Reiter[1], M. L. Looper[2], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*ARS/USDA*, *Booneville, AR*.

Spring born purebred Angus calves (n = 40) were used to determine the relationships between single nucleotide polymorphisms (SNP) and

calf temperament scores and fecal egg counts of internal parasites. Calves were chute scored, weighed, and fecal sampled at weaning. All calves were treated with anthelmintic (fenbendazole, 10 mg/kg BW) at weaning. Chute scores were estimated as 1 extremely docile and 5 very agitated and frenzied behavior. Genomic DNA was prepared from white blood cells and calves genotyped using our previously published primers for the bovine prolactin promoter. Genotypes were homozygous cytosine (n = 3), heterozygous (n = 25), and homozygous thymine (n = 12). Data included in the analyses were BW, hip height, chute score, and fecal egg counts determined at d 0, 21, 66, 111, 156, 201, and 246. Strongyle and Nematodirus egg counts were normalized with a log 10(X +1) transformation. Data were analyzed with mixed model procedures including genotype as a fixed effect and ages of calf and dam as covariates. Prolactin genotype was related ($P < 0.05$) to strongyle egg counts at weaning (355 vs 149, and 167 eggs per gram; respectively for CC, CT, and TT). Prolactin genotype was not related to other traits at weaning; however, at d 156, chute score and strongyle egg counts were related to genotype. The CC calves were calmer ($P < 0.1$) than others (0.66 vs 1.4, and 1.8 chute score). In addition, CC calves had higher ($P < 0.05$) strongyle egg counts at d 156 when compared with other calves (34 vs 13, and 14 eggs per gram). These preliminary results suggest that susceptibility to natural infection with internal parasites may be associated with elements of the prolactin gene.

Key Words: Prolactin, Internal parasites, Chute scores

7 Evaluation of calf size and growth, udder and teat characteristics, and reproduction in young Bos indicus-Bos taurus cows. C. J. Gladney, A. D. Herring*, J. O. Sanders, D. K. Lunt, and C. A. Gill, *Texas A&M University*, *College Station*.

Sire and family effects were evaluated for calf size and growth (n = 255), udder and teat conformation, disposition (temperament) and reproduction in 2- to 4- yr-old cows (n = 177) from 2003 to 2005 in the Texas A&M McGregor Genomics Project. Cows were produced by embryo transfer (ET; full-sib, F2 cows) and natural service (NS; half-sib cows from Brahman-Angus (BA) and Brahman-Hereford (BH) half-blood dams) from the same 4 F1 Nellore-Angus sires. ET and NS cows were analyzed separately with mixed model procedures with cow nested within family or sire as a random effect. Sire of cow was significant for calf birth weight ($P = 0.014$) among ET cows, but not NS cows. Among NS families, calves from cows out of BH dams were 2.0 kg heavier ($P = 0.064$) at birth than calves from cows out of BA dams. Sire of cow accounted for variation in weaning weight ($P = 0.006$) and preweaning ADG ($P = 0.005$) of calves from ET dams, but not calves from NS dams. Family within sire also accounted for variation ($P = 0.061$) in weaning weights of calves from ET dams. Sire of cow influenced average teat length in ET ($P < 0.001$) and NS ($P = 0.013$) cows. Sire of cow influenced average teat diameter ($P = 0.022$) among NS cows. Sire of cow also affected udder support score ($P = 0.002$), cow disposition at calf birth ($P = 0.002$), and cow weight at weaning ($P = 0.045$) in ET cows. Family and cow age influenced cow disposition at calf birth ($P = 0.015$, $P = 0.041$, respectively) and cow weight at weaning ($P = 0.001$, $P < 0.001$, respectively) among ET cows. Calf year of birth also affected ($P < 0.001$) cow weight at weaning among ET cows. For NS dams, calf year of birth ($P = 0.012$), cow age ($P < 0.001$), and parity within cow age ($P = 0.005$) affected cow weight at weaning. Calf crop born to ET heifers ranged from 81.0 to 97.4% across sire groups and from 75.0 to 100% across cow families with at least 8 females, with similar trends for calf crop weaned. In this population there appear to be substantial differences that will lead to identification of genetic markers for cow productivity traits.

Key Words: Cow productivity, Reproduction, Udder

8 Calf growth as a characteristic of cow from two lines of Angus cows separated by frame size. D. L. Kuhlers*[1], K. Nadarajah[1], G. L. Thompson[2,3], B. E. Norris[3], H. D. Harkins[3], and L. Kriese-Anderson[1,2], [1]*Auburn University*, *Auburn, AL*, [2]*Alabama Cooperative Extension System*, *Auburn, AL*, [3]*Tennessee Valley Research and Extension Center*, *Belle Mina, AL*.

Data on 166 cow-calf pairs from an experimental herd of Angus cows separated into 2 lines based on frame size, namely, small to medium (SM) and medium to large (ML) were analyzed. Repeat measurements of BW, hip heights, and condition scores on cows, along with weaning weights and hip heights of their calves across three calf crops (2006 to 2008) were recorded at weaning time. Individual frame scores for each cow and calf within sex were computed using prediction equations from the Beef Improvement Federation. Cow efficiency (COWE) was defined as ratio of 205 d adjusted weaning weight (205ADJW) of calf per unit of cow BW for each cow-calf pair. Mean hip heights of cows of ML and SM lines were different (135.1 ± 0.6 vs. 128.0 ± 0.5 cm) as well as their means for BW (564 ± 8 vs. 491 ± 7 kg) of respective lines ($P < 0.001$) with no differences in condition scores. Age of cow influenced BW, hip height, and condition scores of cows ($P < 0.001$). Average birth weight of calves born to ML cows were heavier ($P < 0.001$) than calves born to SM cows (41.4 ± 0.7 vs. 36.8 ± 0.6 kg), but means for ADG and 205ADJW of calves did not differ between lines. Age and sex adjusted means for hip height (ML = 111 cm vs. SM = 108 cm) and frame scores (ML = 4.7 vs. SM = 4.3) of calves differed between lines ($P < 0.001$). Means for COWE calculated for each cow-calf pairs in SM line (42%) were higher ($P < 0.001$) compared to the ML line (37%). Influence of sex of calf favored male calves ($P < 0.01$) for birth weight (40.6 vs. 37.7 kg), ADG (0.90 vs. 0.86 kg), 205ADJW (225 vs. 213 kg), and COWE (40 vs.38%) compared to heifer calves, and there were no interactions between sex of calf and lines for those traits. Correlations between COWE and BW, hip height, and frame scores of cows were negative ($P < 0.001$) and were -0.74, -0.49, and -0.26 for SM lines and -0.57, -0.40, and -0.30 for ML lines, respectively. Correlations between ADG and 205ADJW of calves and COWE of cows were positive (0.44 and 0.36; $P < 0.001$), indicating selection for COWE may lead to short frame cows with lighter mature weight with improvement in ADG and weaning weight of calves.

Key Words: Cow frame size, Cow efficiency, Calf growth

9 A comparison of milk production and milk composition traits for three breed types of dairy cattle. A. H. Brown, Jr., D. W. Kellogg*, Z. B. Johnson, C. F. Rosenkrans, Jr., and K. S. Anschutz, *University of Arkansas*, *Fayetteville*.

Lactation records (n = 148) of straight bred Holsteins (H) and crossbred Jersey × Holsteins (JH) and Brown Swiss x Holsteins (BSH) contemporaries were studied. Cows were produced in a commercial dairy herd. Cows were fed and maintained in free-stall housing conditions and milked thrice daily. Lifetime production for the 3 breed groups was analyzed by PROC GLM with only breed in the model. A repeated measure analysis for each trait using PROC MIXED of SAS

was conducted. The mathematical model used in the analysis included breed, cow within breed, lactation number and breed x lactation number interaction. Cow within breed was a random effect used to test for breed effects. There was no lactation or breed type effect ($P > 0.05$) in life time production for 305-d milk, 305-d fat, and 305-d protein. The breed x lactation number interaction was an important source of variation in 305-d milk ($P < 0.04$), and 305-d protein ($P < 0.01$). This interaction tended to be significant for projected protein ($P < 0.08$) and % protein ($P < 0.10$). The combination of BSH lactation 4 produced less ($P < 0.05$) mean milk production when compared to the H lactation 1, 2, 3, 4; BSH lactation 1, 2, 3; JH lactation 1, 2, 3, 4; combinations (3,600 ± 1,213 vs 9,557 ± 601, 9,235 ± 601, 7,939 ± 682, 7,608 ± 2,053; 8,325 ± 622, 9,432 ± 622, 7,486 ± 714; 8,048 ± 520, 9,338 ± 520, 8,704 ± 556, and 7,337 ± 763 kg, respectively). The combinations of H lactation 1, BSH lactation 1, H lactation 2, BSH lactation 2, JH lactation 2, and JH lactation 3 had greater ($P < 0.01$) average 305-d milk production than the other breed x lactation combinations. There was no difference ($P < 0.05$) in mean % protein for H and JH breed groups (3.35 ± 0.05 and 3.31 ± 0.04%, respectively); however, mean % protein for BSH was less ($P < 0.05$; 3.07 ± 0.06%). These data suggest that JH and BSH crossbred dairy cows compete favorably with straight bred H cows for milk production and milk composition traits.

Key Words: Breed type, Milk production, Milk composition traits

10 Milk yield and quality in cows sired by different beef breeds. M. A. Brown*[1], J. W. Holloway[2], and D. L. Lalman[3], [1]*USDA-ARS, Grazinglands Research Laboratory*, *El Reno, OK*, [2]*Texas AgriLife Research*, *Uvalde, TX*, [3]*Oklahoma State University*, *Stillwater*.

Maternal ability of beef cows, as indicated by milk yield and quality, influences both calf weaning weight and cow maintenance requirements. Three years of milk yield and quality data from 143 cows from Brangus dams and sired by 83 Bonsmara, Brangus, Charolais, Gelbvieh, Hereford, and Romosinuano bulls were used to estimate breed group differences in average daily milk yield and quality. Cows were milked by single-cow milking machine every 28 d each year starting in May and ending in October. Mixed model repeated measures analyses were performed including fixed effects of year, sire breed, age of cow, sample date, two- and three-factor interactions, days in lactation (linear and quadratic) and random effects of sire in sire breed. Bonsmara-sired cows were numerically greater in 24-hr milk yield (7.6 kg/d) than other breed groups while Romosinuano-sired cows were lesser ($P < 0.01$) in 24-hr milk yield (5.8 kg/d) than any of the other breed groups. Percent milk fat was greater ($P < 0.10$) in Hereford- and Romosinuano-sired cows (4.1 and 4.0%, respectively) than Brangus- , Charolais- , and Gelbvieh-sired cows (3.7, 3.7, and 3.6%, respectively). Natural logarithm-transformed somatic cell counts were greater ($P < 0.10$) in Gelbvieh- and Hereford-sired cows (3.6 and 3.6, respectively) than Brangus-, Charolais-, and Romosinuano-sired cows (2.9, 2.9, and 2.8, respectively). Least squares means for actual somatic cell counts for Gelbvieh- and Hereford-sired cows exceeded 200,000 cells. Results suggest that milk yields from the two non-Zebu tropically-adapted sire breeds were acceptable in Bonsmara-sired cows but low in Romosinuano-sired cows, although milk fat in Romosinuano-sired cows was high. Results also suggest the possibility of greater mastitis problems with Hereford- and Gelbvieh-sired cows.

Key Words: Tropically-adapted breeds, Milk yield, Milk quality

11 A case-study: Meta-analyses of performance data on meat goat kids gathered by producers in Alabama using an on-farm electronic record keeping software tool. K. Nadarajah*[1], R. D. Spencer[2], D. M. Gimenez[1,2], D. L. Kuhlers[1], and D. L. Rankins[1,2], [1]*Auburn University*, *Auburn, AL*, [2]*Alabama Cooperative Extension System*, *AU and Alabama A&M, AL*.

An on-farm record keeping software tool was introduced to meat goat producers to encourage them to keep and use objective data in managing their operations. Participants owned a home computer and expressed an interest in participating in this case-study. Two groups of producers (18 in 2007 and 19 in 2008) participated in a workshop that included hands-on training to get familiar with the software and its applications. Most participants agreed to submit performance records of kids for across-herds meta-analyses. The objective of this research was to use these records to study the effects of breed type and environment on kids performance. Data on 515 meat goat kids (2007 to 2008 kid crops) revealed that 74% of progeny had been sired by full-blood Boers and another 6% sired by other common purebred meat type bucks (Spanish, Nubian, and Kiko), while the rest (20%) were from crossbred sires that are predominantly Boer crosses combined with other meat type breeds. Over 55% of kids were from crossbred does that were mostly Boer crosses. Performance of kids for birth (BW) and weaning weights (WW), market weight (MKTW), age at weaning, ADG and adjusted 60-d weight were summarized by sex, birth type, doe's parity and parent's breed types (complete records were not available on all kids). Mean age at weaning of all kids was 96 days. Mean BW, WW, and MKTW for male kids were 3.7 ± 0.9, 20.7 ± 7.2, and 23.0 ± 7.5 kg, respectively. Corresponding mean weights for female kids were 3.5 ± 0.9, 19.4 ± 6.9, and 18.7 ± 3.9 kg, respectively. Mean ADG and adjusted 60-d weight were 185 ± 72g and 14.9 ± 4.5 kg, and 184 ± 84g and 14.4 ± 4.8 kg for male and female kids, respectively. Adjusted 60-d wt and ADG means for meat kids sired by purebred Boer (15.5 ± 4.8 kg and 198 ± 82.6g) and those out of purebred Boer does (16.9 ± 5.4 kg and 223 ± 98.1g), respectively were higher than kids from other breed types. Thus, goat producers contributing performance records to a database would benefit the meat goat industry in the development of suitable genetic improvement programs.

Key Words: Meat goats, Record keeping, Software

12 Detection of Alu of repetitive sequences in caprine DNA. L. Lane*, I. Hammid, and M. Worku, *North Carolina Agricultural and Technical State University*, *Greensboro*.

The Alu Family, the major family of interspersed repeats in human DNA, is useful for studying certain diseases and genetic variation using polymerase chain reaction (PCR). The Alu sequence consists of a DNA sequence about 300 bp long that is repeated, one copy at a time, almost 500,000 times in the human genome. The objective of this study was to determine the presence of the Alu family elements in caprine DNA. Blood samples were obtained from four Boar/Spanish goats and then added to FTA Elute cards (Whatman Inc) and dried. The DNA was eluted as recommended by the manufacturer (Whatman Inc).The eluted DNA was used for PCR using human Alu-1 primers (Bio-Rad) (μL eluted DNA in a PCR mixture). Primers that flank both the entire Alu insertion (300bp in length) and 641 base pairs of the PV92 locus were used to amplify a 941 base pair fragment (if the Alu element is present) or a 641 base pair fragment (if the Alu element is absent). Agarose gel electrophoresis was used to determine if the PCR products were homozygous (+/+) for the presence of the Alu repeat (941 bp), homozygous (-/-) for the absence

of the Alu repeat (641 bp), or heterozygous for having both the 641 and the 941 base pair products. The results indicated a similarity in markers in caprine and humans Alu-1 sequence. Goat 1 and Goat 2 were found to have two bands similar to the human heterozygous (Alu +/Alu-) controls. Goat 3 and Goat 4 were found to be homozygous (Alu-/Alu-). Alu- type repeats in goats are belived to maintain genetic diversity by inhibiting gene conversion. The Alu genotype may be useful in the study of genomic diversity associated with susceptibility and resistance of goats to parasitic and inflammatory diseases.

Key Words: Polymerase Chain Reaction, Alu-1 primers, Caprine

Extension

13 Integration of an internet-based hay directory into livestock extension programming. J. A. Parish* and J. D. Rhinehart, *Mississippi State University*, *Mississippi State*.

In July 2006, the Mississippi State University Extension Service (MSU-ES) launched an Internet-based statewide hay directory in response to producer requests. The objectives for establishing a Mississippi (MS) hay directory were to provide a needed service to MS cattle producers, collect addresses for Extension mailing lists, encourage use of the MSU-ES beef cattle website, monitor statewide hay production demographics and determine educational needs of MS hay producers. The directory listing submission form requested producer contact information, forage species, quantity of hay offered, bale type and size, services offered, pricing method and additional hay description. In the first 2 years of directory existence, 64 out of 82 MS counties were represented in the directory. In the first 15 months, it was downloaded 12,184 times. Directory listings more than doubled in Year 2. Large round bales were offered in 75.7 and 77.8% of listings in Years 1 and 2, respectively. The most common round bale size was 1.2 m x 1.5 m. Small square bales were offered in 32.0 and 34.0% of listings in Years 1 and 2, respectively. The most common square bale size was a 20.4 to 24.9 kg bale. Bale volume offered ranged from 10 to 3,300 (mean = 317) round bales and 23 to 25,000 (mean = 1,981) square bales. The most common service offered was loading (52.8% of listings). The average delivery range was 148 km. Bale price ranged from $10 to $60 (mean = $30.84) for round bales and $2 to $25 (mean = $4.81) for square bales. Bermudagrass, mixed grass, and bahiagrass accounted for the 32.7, 26.6, and 16.6% of listings, respectively. Major producer educational needs identified by listing analysis were in the areas of forage species, cultivars, and perceptions of quality. Forage species were often misspelled. Forage cultivars were infrequently noted (31.1% in Year 1, 34.5% in Year 2) and did not always match forage species. Subjective hay quality terminology was often used, but only 4.3% of listings offered forage analysis results to buyers. Results indicate that the directory was successful in achieving its objectives. Directory use exceeded expectations and continues to expand.

Key Words: Hay, Directory, Extension

14 Development of extension programming for feeder cattle marketing: assessment of need, demonstration and education. J. D. Rhinehart* and J. A. Parish, *Mississippi State University*, *Mississippi State*.

The need for education and assistance in marketing feeder cattle was expressed by commercial cattle producers across the state of Mississippi through Producer Advisory Meetings and personal communications. The objectives of this programming were to 1) assess and characterize the need, 2) determine the most appropriate type of programming to address the need and 3) implement programming that resulted in facilitation from Extension personnel but leadership from the beef cattle producers involved. The first objective was accomplished by electronically polling 164 representative beef cattle producers at 12 multi-county Cattlemen′s Association meetings. The polling results were used to accomplish the second objective of formulating programming to address the need. Of those responding, 40% expressed a willingness to participate in a state wide marketing program. On average, those willing to participate agreed to consign 24 calves each. A committee of representatives from 4 commodity groups and a panel of producers and marketing agents developed a sale customized to the specific needs. The final design was a board sale offering 21,772 to 22,680 kg. truck load lots of uniform calves with similar weaning and vaccination management. Cattle were sold August 4, 2008 and delivery dates, unique to each load, ranged from August 15 to October 31, 2008. This format accommodated a larger volume of cattle than would be ready to sell and ship on a single day. A total of 1,768 calves were represented in 26 lots of steers (n = 11), heifers (n = 10) and mixed gender (n = 5) loads. With the combination of value-added management and marketing practices applied through this sale, assessing the financial impact of each is not possible. However, the cumulative effect resulted in an average increase in calf value of $20.85 and $44.80 per head for steers and heifers, respectively, above the value of similar weight feeder calves at Mississippi markets that week. More importantly, oral evaluations provided by consigners and other beef cattle producers in the state indicated that the third objective was accomplished.

Key Words: Feeder cattle, Marketing, Extension programming

15 Ways for specialists to better serve county extension agents. T. R. Troxel*, *University of Arkansas*, *Little Rock*.

Animal Science conducted a survey to determine how agents preferred to receive information and what educational methods will be useful in the future. The top 55 livestock counties were telephone surveyed with a response rate of 96.4%. Communication methods were categorized into three forms: printed, electronic and personal. The agents selected from a scale from 1 = lowest preference, to 5 = highest preference. The intervening ratings were: 2 = slight preference, 3 = moderate preference and 4 = high preference. The most preferred forms of print media were miscellaneous publications (4.3 ± 0.80: mean ± SD) and fact sheets (4.1 ± 0.98). Trade publications were least preferred (2.63 ± 1.25). The agents in the SE region preferred fact sheets less than agents in the other regions ($P < 0.05$). For personal communication, agents preferred one-on-one (4.2 ± 0.97) and demonstrations (3.7 ± 0.97). Central AR agents preferred demonstrations more than agents in NW and SW ($P < 0.09$). Agents were least favorable toward tours (3.3 ± 1.04). For electronic media, agents preferred electronic newsletters (4.2 ± 1.12) and e-mails (4.1 ± 1.08). The agents showed little preference for blog sites and/or pod-casts (2.2 ± 1.26) but moderately preferred interactive/compressed video (2.8 ± 1.05). The NW agents were less inclined to prefer electronic newsletters ($P < 0.05$) and PowerPoint presentations ($P < 0.06$) than agents from the other regions. For future educational methods, electronic media garner the most support (66%) followed

by personal media (49%) and print media (43%). Many agents noted current clientele were not using computers but believe the producer of the future will. Electronic newsletters and email will be important in the future. Agents affirmed they will continue with one-on-one, meetings, field days and farm demonstrations. Newsletters and fact sheets will continue to be useful. Agents believe electronic and print material plus one-on-one, meetings, field days and farm demonstrations will be important educational methods in the future.

Key Words: County agents, Extension, Educational methods

16 Results of TTAR survey to determine attitudes of Tennessee beef produces on antimicrobial use and recommended animal health practices. C. D. Lane*[1], A. Green[2], M. Welborn[1], R. Carpenter[2], and J. Dunn[2], [1]*University of Tennessee*, *Knoxville*, [2]*Tennessee Department of Health*, *Nashville, TN*.

The Tennessee Team on Antimicrobial Resistance surveyed three thousand Tennessee beef producers from November 07 to April 08 to determine their attitudes toward the use of antimicrobials and their use of recommended health practices. The producers surveyed were randomly selected by the National Agricultural Statistics Service. All data were analyzed using the FREQ procedure of SAS . One thousand forty two (35%) producers completed the survey. For stastical analyses the producers were divided in two groups. The groups were small producers (SP) who owned 1 - 49 head of cattle while large producers (LP) owned 50+ head. The survey revealed LP were more interested ($P<0.05$) than SP (58.3% vs 46.6%) in educational programs related to health. More LP tested animals for disease before admitting to the herd than SP (18.5% vs 11.1%) ($P<0.05$). Placing animals in quarantine on arrival at the farm was practiced by more ($P<0.05$) LP than SP (67.2% vs 52.4%). A greater percentage ($P<0.05$) of LP compared to SP maintained a record of antibiotic purchases (52.6% vs 35.7%). The survey indicated that a greater number ($P<0.05$) of LP kept a record of antibiotic use compared to SP (39.2% vs 29.9%). Herd size had an influence on the administration of antibiotics in amounts greater than specified on the product label. Large producers were more likely ($P<0.05$) than SP to treat animals with antibiotics at a dosage higher than specified on the product label (18.6% vs 11.9%). The survey revealed that more ($P<0.05$) LP (88.8%) observed withdrawal times compared to smaller producers (81.2%).

Results of the survey reveal that most producers follow guidelines on antimicrobial use and follow recommended health practices. Educational efforts need to be continued until all producers follow antimicrobial use guidelines and recommended animal health practices.

Key Words: Antimicrobials, Antibiotics

17 Effect of age of cow-calf producers on application of nutrition practices. J. B. Neel*[1], B. T. Campbell[1], C. D. Lane[1], F. D. Kirkpatrick[1], and W. W. Gill[2], [1]*The University of Tennessee*, *Knoxville*, [2]*Middle Tennessee State University*, *Murfreesboro*.

"The Master Beef Producer Program" is a 12-week educational program of UT Extension to provide information to help Tennessee beef producers 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 resources, cattle inventory as well as breeding, nutrition, health, management, and marketing practices. Age of producers was grouped into three Groups: Group I. 39 yrs and younger, Group II. 40 to 59 yrs, and Group III. 60 yrs and older. Age of producers ranged from 14 to 90 yrs and was used to compare to their use of forage tests and mineral supplementation practices. Mineral supplementation practices were grouped into four categories: no minerals, salt only, a commercial mineral supplement only, or a commercial mineral supplement and salt. Overall, only 15% of producers who completed the survey had completed a forage test in the past year. The younger producers (Group I) were more likely to use forage testing, ($P<0.05$) and 19% of Group I had completed a forage test within the past yr while only 16% and 12% of Groups II and III completed forage tests. Most producers had some form of mineral program, with only 0.70% of producers that did not provide any form of mineral supplementation to their cattle. The youngest age (Group I) was most likely to feed both a commercial mineral and salt to their cattle ($P<0.004$) at 44% compared to 34% and 30% for Groups II and III, respectively. The data was analyzed with a chi-square table using proc freq of SAS 9.2. These results indicate that younger producers were more likely to apply recommended nutrition practices to their cow-calf operations than the "older" producers. This also shows that there is the need for continued educational efforts to emphasize the importance of forage testing and mineral supplementation to Tennessee cow-calf producers.

Key Words: Cow-calf producers, Age, Application of practices

18 Effect of age of beef producers on type of operation and use of computers. B. T. Campbell*[1], J. B. Neel[1], C. D. Lane[1], F. D. Kirkpatrick[1], and W. W. Gill[2], [1]*The 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 Tennessees 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. The age of participants was grouped into three categories: Group I. 39 yrs and younger, Group II. 40 and 59 yrs and Group III, 60 yrs and more. Age of producers ranged from 14 to 90 yrs and was used to compare the type of cattle operation they were involved, be it pure bred, commercial, or a mixture of both. The relationship of age was also compared to producer use of computers, for record keeping or ration balancing. Overall, 78% of producers were involved in commercial operations, while 28% were involved in both commercial and purebred operations, and 11% were only purebred producers. The producers that were 60 yrs old or more, were more likely to have a purebred operation than their younger counter parts ($P<0.004$) as 15% of Group III had purebred operations. The relationship of age was also compared to producer use of computers, for record keeping or ration balancing. The use of computers in the operation was more likely with the younger generation than the older groups ($P<0.001$), with 37% of Group I was currently using computers in their operation and 59% planned on implementing the use of computers in the future, while in Group III, 21% were currently using computers and 24% said they had no intention of incorporating computers into their operation. The data

was analyzed with a chi-square table using proc freq of SAS 9.2. Age of the producer has an effect on the type of operation, and on use of technology they are willing to implement.

Key Words: Cow-calf producers, Age, Cattle operations

19 Use of an audience response system in extension programs. B. L. Barham*, *University of Arkansas*, *Little Rock*.

Audience response systems have evolved to the point that use in traditional extension programs can be very productive and cost effective. Audience response systems are a method of collecting interactive data during an event. The systems usually consist of a method for each audience member to provide feedback and most modern systems are wireless. In 1966, audience response systems were used to evaluate the response of a theater audience to movies and TV shows. These early systems used hard wired controllers with a dial to rate the shows from dull to great. In 1972 an IBM executive developed the Consenor for use in meetings to gauge the level of agreement on a topic. In the late 90's, systems began to be used in classrooms with many of these systems being permanently installed in classrooms. The first example of these systems use in Extension programs is 2005 when specialists with the University of California evaluated their use in extension programs. There are several commercial versions of systems that offer portable systems that may be ideal for use in many Extension programs. The cost of these systems has dropped enough to make the adoption of the technology feasible. The main differences between these systems aside from cost are their ability to integrate into PowerPoint presentations. Several specialists have been incorporating the use of an audience response system to their PowerPoint presentations and trainings across the state of Arkansas. A total of 26 presentations have been given using the technology to over 500 producers and county agents across the state. Ninety eight percent of the producers in these audiences felt that the use of the audience response systems added to the educational value of the program. The use of this technology in Extension programs allows for the collection of data that may help in reporting and program improvement. In many cases the increased interactivity alone may increase the uptake of knowledge through keeping the audience members engaged in the presentation.

Key Words: Extension, Audience response system

20 Operation No Fences: Extension's response to beef cattle producers impacted by hurricane Ike. J. J. Cleere*[1], J. P. Banta[2], and M. C. Dozier[1], [1]*Texas AgriLife Extension, Texas A&M University System*, *College Station*, [2]*Texas AgriLife Extension, Texas A&M University System*, *Overton*.

On September 13, 2008, hurricane Ike made landfall on the upper Texas coast as a large Category 2 hurricane. Beef cattle producers in Chambers and Jefferson counties received storm surge that was 2.5-6 meters high and 24 kilometers inland. According to 2008 inventory estimates from the USDA-NASS, 51,000 cows and 15,000 calves were in the affected area when the storm made landfall. Estimated cattle losses were 20% of the cows and 80% of the calves with a total economic loss of $6 million. The estimated value of the cows and calves that survived the surge and required assistance was $22 million. As observed from previous hurricane events in neighboring states, it was essential to respond immediately by providing fresh water, hay, and feed to cattle in the affected region. Operation No Fences: Hurricane Ike Horse and Cattle Relief was organized by extension to respond to the disaster and supported by other governmental agencies and industry organizations. Within 48 hours after the storm had passed, water troughs, fresh water, feed and hay supplies made it to the affected region. Established in Anahuac, TX, operation headquarters served as the staging area for hay, water, feed, livestock equipment, communications and extension personnel housing. The response was divided into three phases. The initial response provided water, hay, and feed to stabilize cattle and prepare them for stage 2 of the operation. The second stage, involved moving cattle off of major roads and out of the affected area to market or suitable grazing outside the surge zone. This phase of the operation had to move rapidly because local and state transportation officials wanted to re-open major highways in the area. The third stage continues to focus on pasture and other long term recovery issues. After hurricane Ike, it was evident that in order for the livestock needs to be addressed immediately, extension would be the organization that addressed the situation. Initial funding to immediately begin the operation was one of the major obstacles faced and should be addressed in future planning.

Key Words: Hurricane, Extension, Response

21 Use of alternative funding sources to promote nontraditional educational programs for beef producers. J. Turner*[1] and C. Lane[2], [1]*North Carolina State University*, *Raleigh*, [2]*University of Tennessee*, *Knoxville*.

Non-traditional educational programs for livestock producers often face the challenge of shortages of funding from traditional sources. An educational program focused on improving cattle producer's practices in the transportation of cattle when using stock trailers was undertaken by state Beef Quality Assurance (BQA) coordinators from North Carolina and Tennessee. This program is being developed to initiate a change in producers' behavior in transporting cattle. The primary funding source for this project is the BQA pilot project program funded by the beef check off and administered by the National Cattlemen's Beef Association. However, additional sources are providing in- kind support to develop this project. Members of the National Association of Trailer Manufacturers have been instrumental in developing recommendations for stock trailer maintenance and usage. Featherlite Trailers is providing video production assistance and footage in the development of this project. East Tennessee Livestock Center provided resources for video production. This program will consist of a published fact sheet (50,000 copies) a bumper sticker (35,000 copies) and a video which will be distributed nationally by the National Cattlemen's Beef Association (NCBA). Segments of the video may appear on nationally broadcast television programs to help promote the program. Additionally the materials will be available on the NCBA BQA website and a state BQA coordinators website. Stage two of the project will include presentations and demonstrations at the National Association of Trailer Manufacturers and potentially regional and national farm shows where large numbers of beef producers will be in attendance. As funding becomes more difficult to secure, it will be important to seek non-traditional sources to support Extension educational programs.

Key Words: Funding, Programming

22 Efficacy of growth promoting implants during a simulated 45-d preconditioning period. J. Turner*, M. Poore, and G. Benson, *North Carolina State University*, *Raleigh*.

A study was undertaken determine the effect of growth promoting implants during a simulated 45 d preconditioning program. A common concern for many producers preconditioning cattle in the southeast is if implants are effective in this limited time and if there is a difference in performance based on implant. Steer calves (n=216, initial wt 258.5 kg), primarily Angus cross, obtained through state graded sales and video auctions sales were utilized in the study. The study consisted of three replications of six pens with two steers per treatment per pen. In the first replication steers were given a 14-d adjustment period after arrival at the station prior to initiation of the study, however in the second and third replications steers were started on trial the day after arrival at the station. Steers were housed in 6.6 x 20-m pens with concrete floors. The basal diet was composed of 68% corn silage , 5% soybean hulls, 14% cracked corn, 10% soybean meal, 3% trace minerals and vitamins (12.9% CP, and 72.69% TDN). Feed was provided on an ad libitum basis throughout the study. The amount of feed offered was adjusted on a daily basis using a slick bunk system. Fresh water was provided at all times. Steers were blocked by weight and randomly assigned to one of six treatments Ralgro (36 mg zeranol), Revalor-G(16 mg estradiol 17β/80 mg trenbolone acetate), Compudose (24 mg estradiol 17β), Encore (48 mg estradiol 17β), Synovex-S (20 mg estradiol benzoate/ 200 mg testosterone) and control. Weights were taken on subsequent days at the beginning and end of the 45-d period and at 14-d intervals during the remainder of the study. Data were analyzed using the PROC GLM procedure of SAS as a randomized block design. The ADG was significantly greater (*P*=0.0377) for the steers treated with Compudose, Encore, Ralgro, Revalor-G and Synovex-S (1.79, 1.82, 1.85, 1.80 and 1.76 kg/d) than those receiving the control (16.0 kg/d). Total gain during the trial followed a similar trend with steers receiving the Compudose, Encore, Ralgro, Revalor-G and Synovex-S (80, 82, 83, 81and 79 kg) having greater (*P*=0.0379) total gains than the steers in the control group (72 kg).

Key Words: Implants, Preconditioning

23 Carcass trait characterization of Alabama feeder calves fed in four regions of the United States. J. B. Elmore*, M. S. Hittle, W. C. Rutherford, L. A. Kriese-Anderson, and M. F. Elmore, *Auburn University*, *Auburn, AL*.

Alabama Beef Connection (ABC) cattle carcass traits were analyzed to assess the carcass quality of Alabama born cattle. The ABC database contained 11,485 records from 2003-2008 on Alabama feeder cattle finished in four regions (Midwest (MW), Northern High Plains (No HP), Southern High Plains (So HP), and West (W)) of the United States. All cattle were sold as feeder calves private treaty (PT) or through tele-auction (TA). Marketing option (MO), region (R) and their interaction was used in a general linear model in SAS to analyze data. Traits analyzed were hot carcass weight (HCW), longissimus dorsi area (REA), USDA yield grade (YG), 12th rib fat thickness (BF), and marbling score (MS). For marketing type TA, No HP differed significantly from MW, So HP, and W for all traits (P<0.05). For marketing type PT, MW differed from So HP differed from for all traits significantly (P<0.05). Regionally, the So HP was significantly different in HCW, REA and YG from the MW and the No HP (P<0.05). For MS and BF, the So HP was significantly different from the MW, No HP and W (P<0.05). With the differences in marketing types, carcass values for Alabama cattle fall within the accepted industry standards.

Key Words: Beef cattle, Carcass characteristics, Marketing option

24 Attitudinal survey of producers involved in a meat goat artificial insemination clinic. E. L. Walker*[1], W. D. Walker[2], S. R. Nusz[3], and C. Levesque-Bristol[1], [1]*Missouri State University*, *Springfield*, [2]*WalkerAgriServices*, *Dadevill, MO*, [3]*Redlands Community College*, *El Reno, OK*.

Extension educators and artificial insemination (AI) technicians have been at the forefront of teaching the AI procedure to producers. A meat goat AI clinic was conducted and a pre/post test survey tool composed of 3 sections was developed to assess basic meat goat knowledge, personal variables and current management skills (A-B) and a third section (C-G) designed to determine participants perceptions of constraints which may influence overall learning. Constraints (C-G) included interest and enjoyment, perceived confidence, effort and importance, pressure and tension, and value and usefulness (respectively). Sections B-G used a Likert-type scale. Section B was keyed as 1 being highly skilled and 5 indicating a low skill level while sections C-G were keyed as 1 being not true at all and 7 being very true. Data were analyzed through a series of paired sample t-tests and analysis of variance. Men (n=14) were older (41-50 yr) than women (n=8; ≤ 30 yr; P<0.05). Women tended to have a lower educational level (P=0.07). Mean pre-exam scores differed from post-exam scores (12.29 vs 21.90 ± 1.02;P<0.001). Pre and post survey results were different (P<0.05) for sections B, C and G. In section B (general management skills), respondents (n=17) felt less skilled (52.47 ± 6.6) at the initiation of the clinic than at the end (45.23 ± 6.7). There was also a pre/post test gender effect (P=0.004) as males (n=10) felt more confident in their skills than females (n=7). Pre/post test values differed in section C (interest) and section G (value) and values in both constraints increased (P=0.05). In section, C there was a significant gender effect as males had higher pre-test scores than females (P<0.05). It appears that women and men may learn differently, and different factors may influence learning abilities for the two genders. Males and females in agriculture may come into workshops and clinics with a different base level of knowledge and different learning constraints. Understanding these factors may influence extension clinic management and workshop design to best fit the needs of producers.

Key Words: AI, Survey, Meat goats

25 The efficiency of refrigerators in storing animal health products. T. R. Troxel* and B. L. Barham, *University of Arkansas*, *Little Rock*.

Biological products should be stored between 2° to 7°C unless specifically stated on the label. The objectives were to determine the refrigerator efficiency in storing biological products and to determine the percentage of products opened or expired. Watchdog data loggers (Spectrum Technologies, Inc.) recorded temperatures at 10- min intervals for 48 h in 191 refrigerators of producers (75.9%), retail stores (18.3%) and veterinarian clinics (5.8%). The most common refrigerators were freezer-on-top (45.5%), followed by side-by-side (20.4%) and mini-refrigerators (18.3%). The refrigerator′s ages were ≤ 5 yr = 22.0%, 6 to 10 yr = 35.1%, 11 to 15 yr = 22.5% and > 15 yr = 20.4%. The other category (54.4%) was the most common refrigerator location, followed

by kitchens (20.9%) and barns (14.1%). Of the 1,800 animal health products in producers′ refrigerators, 11.8% were expired and 29.3% were opened. The overall temperature was 3.4°± 3.82 C (mean ± SD). There were no differences (P > 0.10) in average temperatures across type and age but there was across locations (P < 0.01). Refrigerators located in barns (2.0° ± 0.73 C ; mean ± SE) were colder than those located in mud rooms (5.4° ± 1.14 C) and kitchens (4.9° ± 0.65 C). Fifty-one refrigerators (26.7%) recorded temperatures within 2° to 7° C greater than 95% of the time, whereas 19.9%, 17.8%, 12.0% and 23.6% recorded temperatures within 2° to 7° C 66 to 95%, 36 to 66%, 5 to 35% and < 5% of the time, respectively. Overall, 11.6% of the recorded temperatures were above 7° C, 34.4% were below 2° C and 54.0% were between 2° to 7° C. There were no differences (P > 0.10) in location, type or age in the number of recorded temperatures inside the acceptable range. In conclusion only 26.7% of the refrigerators kept the temperature within the acceptable range, no refrigerator type, location or age was superior, refrigerators storing animal health products should be carefully monitored and expired and opened products should be disposed of properly.

Key Words: Refrigerator, Temperature, BQA

26 Effect of trenbolone acetate on lot feedlot performance and *Certified Angus Beef*® acceptance rate of beef steers and heifers. G. D. Fike* and M. E. King, *Certified Angus Beef LLC*, *Manhattan, KS*.

Data from the 2000-2007 Certified Angus Beef LLC (CAB) Feedlot Licensing Program, representing 655 and 217 lots of beef steers and heifers, respectively, were used to quantify the effect of trenbolone acetate (TBA) on lot feedlot performance and CAB® acceptance rate (AR). Criteria for lots in the analyses were: all cattle were implanted, all cattle were black-hided, and lot size ≥ 20 head. Two analyses were performed based on the TBA implant status of the lot: (1) lots receiving at least one implant containing TBA (WTBA) vs. lots that did not receive an implant containing TBA (NOT); (2) lots implanted with a high-TBA implant (HTBA, 200 mg dose) vs. all other implants (COMB). Data for both TBA status groups were analyzed separately by gender. Lots of WTBA steers had 8.3% improvement in ADG, 6.7% improvement in F:G, 31.5% lower AR and 45.1% higher USDA Select rate (P<.0001) compared with NOT steers. Lot arrival weight for WTBA steers was 18.3 kg greater than NOT steers (P=.001). HCW was similar in both groups. In heifers, WTBA improved ADG by 10.7% (P=.009) and F:G by 9.4% (P=.0003). However, lot AR, lot USDA Select rate, lot arrival weight and HCW were similar in the WTBA and NOT groups. HTBA steers had 6.6% greater ADG (P=.0004), 6.1% lower F:G (P=.0009), 29.7% lower lot AR (P=.002), 34.2% more cattle grading USDA Select (P<.0001), 16.6 kg higher lot arrival weights (P=.04) and 15.9 kg heavier HCW (P<.0001) than COMB steers. Lots of HTBA heifers had 35.9% lower lot AR (P=.0002) and 39.1% higher lot USDA Select rate (P=.0007) compared with COMB heifers. Lot arrival weight, HCW, ADG and F:G were similar in HTBA and COMB heifers. The results of this study indicated that implants containing TBA improved ADG and F:G in steers and heifers. WTBA implants negatively affected lot AR in steers, but had no effect on this trait in heifers. High-dose TBA implants improved ADG and F:G in steers, but did not improve these traits in heifers. Lot AR was reduced in steers and heifers by implants containing high levels of TBA.

Key Words: Trenbolone acetate, Implants, Beef carcass

27 Ingestion of an osmolite included in a free choice mineral and its effect on body condition score, hair retention and temperature of beef cattle grazing fescue pastures. T. L. Perkins[1], R. K. Dew[2], A. B. Chestnut[2], A. M. McCorkill*[1], S. E. Cantrell[2], and L. P. Watkins[2], [1]*Missouri State University*, *Springfield*, [2]*Vigortone Ag Products*, *Hiawatha, IA*.

Cattle grazing endophyte infected tall fescue suffer from increased heat stress, poor reproductive performance and poor weight gain during the hot summer months. An osmolite compound has shown promise in reducing body temperature in dairy cows during hot weather, which may have potential in helping beef cattle deal with fescue toxicosis. The objectives of this study were to 1) determine if cattle consume adequate amounts of mineral free choice containing the compound in question and 2) to determine if the ingested compound in question favorably influences body temperature, body condition score and hair scores in cattle grazing endophyte infected tall fescue during the summer. In early July 2008, cows and heifers were stratified by age into a control (n=22) or treatment (n=23) group. Standard Grass Grazer® mineral was given free choice to the control group and the standard Grass Grazer® mineral with the added osmolite compound was provided free choice to the treatment group. Mean body condition scores (BCS) and hair scores (HS) were not different (P>.10) between control and treatment groups (5.80 vs. 5.91 and 1.27 vs. 1.35) at the midpoint of the trial. In mid August, twelve cows in each group were fitted with programmed thermochrons attached to CIDR sticks inserted into the vaginas for a four-day period. The mean hourly vaginal temperature between 10 am and 9 pm was greater (P<.001) for control cows compared to treatment cows (39.17ºC vs. 38.67ºC). Mean BCS and HS were not different (P>.10) between control and treatment groups (5.82 vs. 6.20 and 1.05 vs. 1.17) at the end of the trial. The mineral consumption goal was 113 g/hd/d. Actual mineral intakes of control and treatment groups averaged 137 g/hd/d and 124 g/hd/d, respectively. These data suggest that an ingested osmolite can lower the body temperature and may improve BCS score in beef cattle grazing fescue pastures.

Key Words: Beef, Fescue, Osmolite

28 Value of combustion ash from swine waste as a phosphorus supplement in swine diets. E. van Heugten*[1], N. Muley[2], J. Koger[1], P. Burnette[1], and T. van Kempen[1,3], [1]*North Carolina State University*, *Raleigh*, [2]*Venky's India Limited*, *Pune, India*, [3]*Provimi RIC*, *Brussels, Belgium*.

Two studies were conducted to evaluate the potential of recycling nutrients in swine waste by combustion to serve as a P source in swine diets. In Exp. 1, ash was obtained from incineration of finishing swine mortalities (INC), gasification of swine waste solids using the Brookes Gasification Process (BGP), or the Bud Klepper Technologies (BKT) gasifier, and gasification of turkey litter using the Energy Products of Idaho (EPI) gasifier. Analyzed P content (DM basis) in ash was 15.81, 12.72, 9.38, and 6.09% for INC, BGP, BKT, and EPI, respectively. Digestibility of P in ash sources, a positive control with dicalcium phosphate as P source (PC), and a negative control without added P (NC) was determined in 54 barrows (BW=15.4±0.7 kg). Apparent digestibility of P was greater (P<0.05) in PC (48.5%) than NC (40.8%) and BKT (40.4%), similar to INC (47.3%) and BGP (51.6%), and lower (P<0.05) than EPI (55.7%). In Exp. 2, 96 pigs (BW=21.1±0.02 kg; 24 pens) were fed a negative control diet (no supplemental P; NC), or a diet with either 0.1% P from dicalcium phosphate (DICAL) or ash from gasification of swine waste solids (ASH; 15.7% Ca, 12.3% P) for 110

d. After 4 wk, pigs fed DICAL or ASH had greater ADG (678 and 672 vs. 603 g/d), ADFI (1495 and 1560 vs. 1455 g/d; P<0.001) and gain/feed (456 and 433 vs. 418 g/kg; P=0.05) compared to NC. Serum P was greater (P<0.05) for DICAL (8.59 mg/dL) than ASH (7.93 mg/dL), which was greater (P<0.05) than NC (7.22 mg/dL). The NC diet was discontinued after 4 wk to avoid health problems. During the remainder of the trial, gain/feed was greater (418 vs. 399 g/kg; P=0.05) for the grower phase and tended to be greater (367 vs. 351 g/kg; P=0.07) overall for pigs fed DICAL, but ADG and ADFI were not affected (P>0.12). Bone ash at slaughter was not affected (P=0.90). Results indicate that P digestibility in combustion ash varies depending on source and that ash provides a viable and sustainable alternative to more expensive, traditional P sources.

Key Words: Ash, Digestibility, Phosphorus

Graduate Student Competition

29 Effect of nutraceutical grade colostrum on cell growth and transcription in E. coli. S. Schepis* and M. Worku, *North Carolina Agricultural & Technical State University*, *Greensboro*.

Colostrum is the first milk produced by the lactating mother and provides immune nutrients for protection of the newborn. Escherichia coli cause mastitis upon entry into the mammary gland where exposure to colostral components can occur and impact bacterial pathogenesis. The objective of this study was to evaluate the effect of host immune factors in colostrum on cell growth and RNA transcription in E. coli K-12. A mid-log culture of E. coli K-12 was used for RNA isolation. Samples of E. coli were incubated in plain Luria Bertani (LB) broth as a negative control, while the other samples of E. coli were incubated in a colostrum (Symbiotics) treated LB broth. RNA from control and treated samples was isolated using the RNeasy (Qiagen) kits. The integrity and size distribution of total purified RNA was checked using a bioanalyzer. Colostrum treated samples did not show any growth until 40 minutes. The rate of cell growth was inhibited for the first 20 minutes in colostrum treated samples. However, after 20 minutes the growth curve was slightly steeper than the growth curve for the control samples. Final optical density readings for both samples only differed by 0.011, the OD for the control samples being the highest. Colostrum seemed to interfere with the quality and quantity of RNA isolated. Thus, both controls and treated samples were washed with RNase-free LB broth before isolation. The average concentration of RNA was 1053.3 µg/µl for colostrum treated samples, and 702.7 µg/µl for controls. The purity of isolated RNA (rRNA ratio of 23s/16s) was higher for the control (1.5) than the Colostrum treated samples (1.3). The results showed that colostrum has a significant effect on the RNA concentration (P < 0.001). Exposure of E. coli to colostral components may impact both cell growth and transcription with implications for gene expression.

Key Words: Colostrum, Escherichia coli, Mastitis

30 Evaluation of a novel, non-toxic, endophyte-infected tall fescue cultivar, AGRFA-144, as a safe forage for pregnant mares. H. A. Al Rashed*, D. L. Christiansen, F. K. Walters, R. M. Hopper, A. Musselwhite, E. L. Schenck, and P. L. Ryan, *Mississippi State University*, *Mississippi State*.

Fescue toxicosis is a condition that afflicts livestock that graze on endophyte-infected tall fescue pastures and is particularly detrimental to pregnant mares. A novel endophtye-infected cultivar, AGRFA-144 (A-144), has been shown to be safe for cattle and sheep but there is no information on its suitability for horses. To this end, 20 mares were matched by stage of gestation (~280 d) and assigned to one of four fescue pastures in March 2008. Mares were exposed to; 1) endophyte-free (E-, n = 4), 2) toxic endophyte-infected (E+, n = 4), 3) non-toxic endophyte-infected (MaxQ, n = 6) or 4) novel, non-toxic endophyte-infected A-144 (n = 6). Mares were maintained on pastures (E+, MaxQ and A-144 were ≥ 88% endophyte +, E- was ≤ 8%) until delivery with the exception of E+ mares which were removed on d 335 of gestation. Mare blood was collected 3x /week for progesterone (P4) analysis and foal samples were collected at 0 and 48 h post-partum (pp) for P4, complete blood count and IgG values. Data were analyzed using GLM procedures of SAS, and values are expressed as mean ± SE. Serum P4 concentrations were similar among E-, MaxQ and A-144 mares (15.3 ± 3.2, 17.2 ± 5.1, 11.9 ± 1.3, respectively) but lower (P = 0.05) in E+ mares (3.6 ± 0.15) compared to E- and MaxQ mares. All mares delivered viable foals except in the E+ group where two viable foals, one stillborn-dystocia and one compromised foal, which was euthanized at 72 h pp, were delivered. Foal BW was similar for all groups (range from 45 to 47 kg) but placental weights were higher (P = 0.03) in E+ (6.0 ± 1.0 kg) compared with E-, MaxQ and A-144 foals (4.9 ± 0.5, 4.0 ± 0.4 and 3.8 ± 0.6, respectively). Neutrophil/lymphocyte ratios were similar (~4:1) in all foals at 0 h, but declined in E+ foals at 48 h (1.6:1; P = 0.07) compared with E-, MaxQ and A-144 foals (4:1, 7:1, 7:1, respectively). IgG values at 48 h were lower in E+ (757 mg/dl, P = 0.02) compared with E-, MaxQ and A-144 foals (2,683, 2,228 and 2203 mg/dl, respectively). These data suggest that grazing late-term pregnant mares on A-144 pastures is not detrimental to pregnancy outcome.

Key Words: Novel endophyte-infected fescue, Mares, Pregnancy outcome

31 Performance of Katahdin lambs is improved by strategic de-worming followed by grazing pastures with lower nematode parasite contamination. S. A. Bowdridge*, G. P. Smith, S. P. Greiner, A. M. Zajac, and D. R. Notter, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

This study evaluates the performance of Katahdin lambs under different de-worming strategies and differing pasture parasite load. Late spring-born 2008 Katahdin lambs were randomly divided into three groups, two weeks after weaning. Lambs in group-A (n=45) were strategically de-wormed and sent to a low worm-burden pasture, lambs in group-B (n=48) were strategically de-wormed and returned to a high worm-burden pasture, and lambs in group-C (n=44) were selectively de-wormed, based on FAMACHA eye color scores, and kept in a high worm-burden pasture throughout the trial. After six weeks, group-A lambs had a lower fecal egg count (FEC) (329.3 eggs/g; p=0.006) than group-C (962.5 egg/g) but no significant difference was detected with lambs in group-B (721.7eggs/g; p=0.2). To maintain a low FEC, lambs in group-B required more de-worming treatments (trmts) (1.38 trmts/

lamb; p=0.01) than lambs in group-A (1.06trmts/lamb) or group-C (1.02 trmts/lamb). Over six weeks group-A lambs gained a total of 6144.7g which is significantly higher (p<0.0001) than the gain of the B (1523.1g) or C (623.2g) groups. Pasture nutrient values were identical between the groups and all lambs were supplemented with 340.2g of 16% CP concentrate per day. The grain cost in combination with cost of anthelmintic treatment gives a total cost/g of gain for group-A lambs of $0.03/g, $0.14/g for group-B lambs and $0.31/g for group-C lambs. These data indicate that pasture-raised Katahdin lambs may require only one de-worming treatment two weeks after weaning to maintain adequate growth throughout the summer months when grazing low worm-burden fescue pastures.

Key Words: Katahdin, Anthelmintic treatment, Growth

32 The effects of season and milk source on pubertal development in doe kid goats. E. A. Aguirre*[1], K. Collard[1], R. A. Katchko[1], J. R. Wiles[1], M. D. Mahan[1], E. Gonzales[1], C. W. O'Gorman[1], E. J. Tilly[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*.

Season of birth and nutrient intake have been reported to influence pubertal development in sheep, but have not been determined in goats. Therefore, the effects of synthetic milk (SM) and season of birth (summer; S vs. winter; W) on pubertal development were determined in crossbred meat goat does. All newborn doe kids remained with their respective nanny for the first 24 h. After 24 h doe kids were randomly selected to continue nourishment from the nanny (NW; n=10; NS; n=7) or begin a SM regimen (SMW; n=7; SMS; n=4). All does had ad libitum access to pelleted feed and sudangrass hay throughout the study. At 45d of age doe kids were weaned. BW and ADG were recorded weekly. Blood samples were collected 2x/wk beginning 95d of age and analyzed for concentrations of serum progesterone, circulating metabolites, and metabolic hormones. The episodic profile of LH was characterized as puberty approached by collecting blood every 12 min for 8 h beginning at 150d of age (W) or 95d of age (S) and every 30d thereafter until confirmation of puberty. Effect of milk source and season on age at puberty were determined using the MIXED procedure of SAS. Effects on serum hormones and circulating metabolites from 8 wks prior to puberty until the week of pubertal ovulation were analyzed using the MIXED procedure of SAS for repeated measures. Puberty occurred earlier (P<0.01) in S does compared to W does (194.85 d±9.6d vs. 288.86 d±5.6d, respectively). Despite an increase (P<0.01) in BW as puberty approached, ADG did not differ by milk source nor season. However, W does were heavier (P<0.01) than S does at puberty. Episodic release of LH began at an earlier age (P<0.02) in S does than in W does (99.25 d±10.6d vs. 129.36 d±6.23d, respectively). Serum concentrations of total triglycerides were higher (P<0.01) in S does than W does. Serum concentrations of insulin, IGF-I, cholesterol and glucose did not differ 8 wks prior to puberty; however, leptin increased (P<0.05). These results suggest that synthetic milk does not necessarily delay age at which puberty occurs; however, season of birth will influence age of puberty in crossbred meat goat does.

Key Words: Puberty, Goats, Metabolic hormones

33 Influence of temperament on inflammatory cytokine responses of cattle to a lipopolysaccharide (LPS) challenge. L. H. Hulbert*[1,5], J. A. Carroll[1], N. C. Burdick[3], J. W. Dailey[1], L. C. Cadwell[3], R. C. Vann[4], M. A. Ballou[5], T. H. Welsh, Jr.[3], and R. D. Randel[2], [1]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [2]*Texas AgriLife Research, Texas A&M System*, *Overton*, [3]*Texas AgriLife Research, Texas A&M System*, *College Station*, [4]*MAFES, Mississippi State University*, *Raymond*, [5]*Texas Tech University*, *Lubbock*.

We previously reported that temperament influenced rectal temperature, sickness scores, and cortisol and epinephrine concentrations following an LPS challenge. Temperamental bulls displayed less sickness, fever and of an epinephrine response 1 h after an LPS challenge when compared to calm and intermediate bulls. Our objective was to evaluate the effect of temperament of bulls on serum concentrations of inflammatory cytokines IL-6, IL-4, TNF-α, and IFN-γ in response to an LPS challenge. Brahman bulls (10 mo of age) were selected from a pool of 60 bulls and categorized based upon an average of exit velocity (EV) and pen score (PS) determined at weaning. Bulls were ranked into 3 groups: calm (C; n=8; 0.87 m/s EV and 1 PS), intermediate (I; n=8; 1.59 m/s EV and 2.25 PS), and temperamental (T; (n=8; 3.70 m/s EV and 4.88 PS). Bulls were fitted with indwelling jugular catheters. Samples were collected at 0.5 h intervals from -2 to 8 h relative to an i.v. infusion of LPS (0.5 μ/Kg BW) at 0 h. Serum concentrations of TNF-α peaked 30 min post-LPS (P≤0.001). Overall, C bulls had less of a TNF-α response when compared to T bulls (Mean diff. = -170.0 ng/mL; P≤0.05).Two to 3 h post-LPS, a surge of IL-6 was observed (P ≤0.001). More (P≤0.05) IL-6 was observed among I (137.02 ng/mL) bull serum 3 h post-LPS when compared to C (110.99 ng/mL) and T (81.66 ng/mL) (SEM pooled = 14.63). Calm bulls displayed a biphasic IL-6 response with a decrease of IL-6 to 20 ng/mL at 3.5 h, followed by a sudden increase to 92.29 ng/mL at the 4 h period. Serum IFN-γ peaked between 4 and 5 h post-LPS (P≤0.001), but was not affected by temperament (P > 0.01). A peak in IL-4 between 5 and 6.5 h post-LPS (P≤0.001) was observed for all bulls. Overall, the greatest (P≤0.05) concentrations of IL-4 were observed among C bulls (Mean diff. = +3.73; P 0.05) when compared to T bulls. Calm bulls appear to have a different inflammatory response based upon concentrations and biphasic peaks of cytokines following an LPS challenge when compared to more temperamental bulls.

Key Words: Temperament, Cattle, Innate immunity

34 Effects of $PGF_{2\alpha}$ and 15-keto-$PGF_{2\alpha}$ in the presence of E_2 or P_4 on leptin and $PGF_{2\alpha}$ receptor gene expression in adipose tissue in cycling heifers. M. D. Mahan*[1], E. Gonzales[1], C. W. O'Gorman[1], E. A. Aguirre[1], E. J. Tilly[1], R. A. Katchko[1], J. R. Wiles[1], 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*.

Leptin gene expression changes throughout the estrous cycle in subcutaneous adipose tissue in heifers, specifically, leptin decreases during the late stage of the luteal phase. Changes in leptin gene expression relative to the different stages of the estrous cycle suggest that a reproductive hormone dominant during the late-luteal stage of the estrous cycle, such as prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) or its primary metabolite 15-keto-dihydroprostaglandin $F_{2\alpha}$ (15-keto-$PGF_{2\alpha}$) may be associated with these changes. Therefore, effects of $PGF_{2\alpha}$ and 15-keto-$PGF_{2\alpha}$ on adipocyte leptin gene expression in heifers were determined during different stages of the estrous cycle. Subcutaneous adipose tissue was collected lateral to the caudal vertebrae (No. 2 & 3) from mature crossbred heifers at estrus

(day 0; n=15) and the mid-luteal stage (day 10; n=15) of the estrous cycle. Isolated adipocytes were co-cultured with or without $PGF_{2\alpha}$ or 15-keto-$PGF_{2\alpha}$ (10^{-11}, 10^{-10}, 10^{-9}, 10^{-8} and 0 M; n=3 wells/dose/heifer) and with or without estrogen (10^{-11} M) or progesterone (P_4; 10^{-8} M) for 18 h at 37°C in an atmosphere of 5% CO_2 in air with 95% humidity. Leptin and $PGF_{2\alpha}$ receptor (PGFr) gene expression was quantitated using relative real-time RT- PCR. Values obtained from culture treatments are expressed as a percentage of 0M (0M = 100%). Effect of treatment on leptin gene expression was determined using the MIXED procedure of SAS. Physiological concentrations of 15-keto-$PGF_{2\alpha}$ (10^{-9} and 10^{-8} M) ($P<0.05$) increased leptin gene expression in adipocytes obtained at estrus. Neither leptin nor PGFr gene expression detected in adipocytes obtained during the mid-luteal stage of the estrous cycle was affected by $PGF_{2\alpha}$ or 15-keto-$PGF_{2\alpha}$ alone. However, mid-luteal adipocytes treated with $PGF_{2\alpha}$ and P_4 appeared to dose dependently ($P\leq0.05$) influence both leptin and PGFr gene expression. Hence, the changes in leptin gene expression reported in the late-luteal stage of the estrous cycle may be attributed to $PGF_{2\alpha}$; however, adipocytes must also be exposed to P_4 for the change to be initiated.

Key Words: Heifers, Leptin, $PGF_{2\alpha}$

35 Influence of forage characteristics on grazing behavior of weaned calves. S. Arriola*[1], G. Scaglia[2], B. F. Tracy[1], and A. O. Abaye[1], [1]*Virginia Polytechnic Institute and State University*, *Blacksburg*, [2]*LSU AgCenter Iberia Research Station*, *Jeanerette*.

For Virginia, the primary forage base is endophyte-infected tall fescue (*Lolium arundinaceum* (Schreb.) Darbysh). However, decreased animal performance by the presence of the fungal endophyte *Neotyphodium coenophialum* reduces its suitability for many forage-livestock systems. The present study evaluated four, forage combinations of mixtures and pure stands and their effect on performance and grazing behavior of newly weaned calves during 42 d of backgrounding. The study was initiated in September 2008. Forty-eight Angus crossbred calves were allotted randomly to four forage treatments with three replications. Each treatment had a combination of one of the following pure stands: 1) endophyte free tall fescue, 2) novel endophyte tall fescue; with one of the following forage mixtures: 1) orchardgrass (*Dactilys glomerata* L.) plus alfalfa (*Medicago sativa* L.), 2) orchardgrass plus white clover (*Trifolium repens* L.) with red clover (*Trifolium pratense* L.). Forage mixtures and pure stands were sown into 0.4 hectare plots that were established in fall 2006. Calves had free access to both pastures within respective treatments. In mid-October 2008, calf behavior was recorded every 5 minutes for 12 h over a 3 d period. We also collected data on ADG, forage species composition and yield. Forage yield at the start of the experiment was 1616±524 kg $DMha^{-1}$ and showed no difference among treatments ($P\geq0.05$). After the first four weeks of backgrounding, calves gained 1.35±0.31 kg d^{-1}, but there was no significant treatment effect ($P\geq0.05$). Analysis of animal behavior suggested that calves spent most of the grazing time in mixtures with alfalfa (66±19%) if paired with tall fescue plots. Calf preference was less clear for mixtures containing orchardgrass/clover when paired with tall fescue. Our preliminary conclusions suggest calf preference for different forage species mixtures has minimal influence on weight gain during backgrounding.

Key Words: Grazing behavior, Backgrounding, Tall fescue

36 Supplementation of dried distiller's grains with solubles to beef cows consuming low-quality forage during late gestation and early lactation. S. J. Winterholler*, C. P. McMurphy, G. L. Mourer, and D. L. Lalman, *Oklahoma State University*, *Stillwater*.

Two experiments were conducted to evaluate supplementation (SUP) of dried distiller's grains with solubles (DGS) to spring-calving beef cows (n = 120; 541 kg initial BW; 5.1 initial BCS) consuming low-quality forage during late gestation and early lactation. Supplementation of DGS was evaluated with respect to increasing feeding amounts of DGS compared to a positive and negative control and included (DM basis): 1) 0.77 kg/d DGS (DGSL); 1.54 kg/d DGS (DGSI); 2.31 kg/d DGS (DGSH); 1.54 kg/d of a blend of 49% wheat middlings and 51% cottonseed meal (POS) and 0.23 kg/d of a cottonseed-hull based pellet (NEG). Feeding rate and CP intake were similar for DGSI and POS. In Exp. 1, cows were individually fed 3 d/wk until calving and 4 d/wk during lactation; total SUP period was 119 d. Tall-grass prairie hay was provided ad libitum throughout the SUP period. Change in cow BW and BCS during gestation was similar for DGSI and POS (-4.8 kg and -0.12, respectively; $P > 0.10$), and was linearly related to increasing level of DGS ($P < 0.01$). Likewise, over the entire SUP period, change in BW and BCS was similar for DGSI and POS (-71 kg and -0.6, respectively; $P > 0.05$) and increased linearly with respect to increasing level of DGS ($P < 0.01$). For cows fed DGS, calf birth weight, BW in May and at weaning increased linearly as level DGS increased ($P < 0.01$). The percentage of cows exhibiting luteal activity at beginning of breeding season (56%; $P = 0.31$) was similar. In Exp. 2, cows (n = 16/trt) of similar d post-partum from Exp. 1 were machine-milked to evaluate the effect of SUP on milk composition, and a weigh-suckle-weigh procedure was conducted to determine effects on milk production. Butterfat (2.1%) and lactose (5.0%) were not different ($P > 0.10$). Protein and milk urea N were greatest for DGSI and DGSH (3.15% and 4.29 mg/dl, respectively; $P < 0.01$). Daily milk production was not influenced by SUP (6.34 kg/d; $P = 0.25$). Similar cow performance was achieved when cows were fed DGS at the same rate and level of crude protein as a traditional cottonseed meal-based supplement.

Key Words: Beef cow, Distiller's grains, Supplementation

Meat Science

37 Characterizing grass-fed enhanced steaks using modified atmosphere packaging. L. M. Sledge[1], C. R. Kerth[1], K. E. McMurtrie*[1], K. R. Willian[2], M. Singh[1], and C. L. Bratcher[1], [1]*Auburn University*, *Auburn, AL*, [2]*Tuskegee University*, *Tuskegee, AL*.

Fall-born Angus × Continental crossbred steers (n=18) were randomly assigned to six 1.4 ha paddocks with three head in each paddock. Each paddock was previously planted with Marshall Ryegrass, Wren's Abruzzi Rye or Harrison Oats. Grazing began in December 2006 and animals were humanely harvested in May of 2007. Boneless striploins from the left side of each carcass were collected at 48 h postmortem, vacuum-packaged and stored at 2°C until 14 d postmortem. Loins were cut in half and the posterior and anterior ends were randomly assigned to an injection treatment. The injection solution contained 0.6% salt, 0.4%

phosphate, 2.5% potassium lactate, and 0.055% beef stock. They were injected to 112% of their green weight and cut into four 2.54-cm-thick steaks. Packaging treatments used for this study were high oxygen (HO; 80% O2/20% CO2), low oxygen (LO; 65% N2/35% CO2), carbon monoxide (CO; 65% N2/34.6% CO2/0.4% CO), and vacuum packaging. Steaks were stored in dark storage for 21 d at 2°C then placed in a retail display case at 2°C for 5 d. L*a*b*color measurements were taken before packaging and on d 5 of retail display. A trained panel performed daily assessments of steak color, uniformity, surface discoloration and browning. Color was based on an 8 point hedonic scale. Post retail color measurements (L*a*b*) were taken on d 5 of the display for lean muscle and fat color. Sensory characteristics, cook loss and TBARS were also evaluated for each sample. Results indicated that the pumped steaks exhibited higher sensory scores for initial and sustained juiciness, initial and sustained tenderness, flavor intensity, and off flavor ($P<0.05$). The HO yielded the lowest scores for sensory characteristics ($P<0.05$) except for initial juiciness. Retail visual and instrumental scores were the highest for the CO which produced and maintained a bright, cherry red appearance ($P<0.05$). While the results indicate that color stability was adversely affected by injection treatments, the sensory characteristics were substantially improved. Furthermore, CO packaging helped maintain desirable color characteristics over the duration of the shelf life experiment.

Key Words: Forage fed, Injection, Packaging

38 Effects of Ractopamine HCL on growth and carcass traits fed to yearling heifers with different days on feed. M. S. Hittle*[1], J. K. Grubbs[1], S. P. Rodning[1], W. C. Rutherford[1], S. V. Free[1], A. L. Schroeder[2], D. G. McClary[2], and L. A. Kriese-Anderson[1], [1]*Auburn University*, *Auburn, AL*, [2]*Elanco Animal Health*, *Greenfield, IN*.

Commercial yearling heifers (n=71, age = 397 ± 34 days, initial BW = 433 ± 34.9 kg) were placed on ad libitum feed (DM = 89%, CP = 13.7%) for either 79 (n=16), 100 (n=16), 121 (n=16), 142 (n=16) or 163 (n=7) days. Days on feed (DOF) group assignments were stratified across initial weight and height. Individual birth dates and breed composition were known. Heifers were calan gate trained and individual daily feed intake and orts recorded. Body weight was recorded weekly. Thirty five days prior to harvest, half of each DOF group was fed 300 mg/hd/d of Ractopamine-HCL (RAC). Growth traits analyzed were gain, average daily gain (ADG), dry matter intake (DMI), and dry matter feed efficiency (DMFE). Carcass traits included hot carcass weight (HCW), longissimus dorsi area (REA), adjusted 12th rib fat (BF), kidney pelvic and heart fat (KPH), marbling score (MS), and USDA yield grade (YG). All traits were analyzed in SAS using a general linear model. Independent variables included DOF, RAC (control or fed RAC) and breed. Covariates in the model were either initial weight or age at slaughter. Using initial weight as a covariate, only DOF was a significant source of variation ($P<0.05$) for performance traits of gain, DMI and DMFE. Heifers on feed for 100, 121 or 142 days gained significantly more ($P<0.05$) than heifers fed 79 or 163 days. Heifers fed for 79 days had significantly less ($P<0.05$) DMI than other groups. Heifers fed 100 days were intermediate for DMI, while heifers fed 121, 142 or 163 days had the most DMI. Heifers fed 163 days had significantly higher ($P<0.05$) DMFE than all other DOF groups. Initial weight was significant as a covariate for HCW, BF and YG. DOF was significant for HCW, BF and YG ($P<0.05$). Heifers on feed for 121 and 142 days had significantly ($P<0.05$) heavier HCW, more BF and KPH than heifers fed 79, 100 or 163 days. Using age at slaughter as a covariate, results were similar to initial age. Feeding RAC had no effect on any growth or carcass traits across DOF or during the 35 day feeding period.

Key Words: Ractopamine, Days on feed, Heifers

39 Effect of ractopamine and days on feed on plasma leptin concentrations in crossbred yearling heifers. J. K. Grubbs*[1], D. H. Kiesler[2], J. L. Sartin[1], S. P. Rodning[1], M. H. Hittle[1], W. C. Rutherford[1], S. V. Free[1], A. L. Schroeder[3], D. G. McClary[3], D. R. Mulvaney[1], and L. A. Kriese-Anderson[1], [1]*Auburn University*, *Auburn, AL*, [2]*University of Missouri*, *Columbia*, [3]*Elanco Animal Health*, *Greenfield, IN*.

Seventy one crossbred yearling heifers (age=397 ±34d, wt=433 ± 34.9kg) were utilized to examine the effects of ractopamine hydrochloride (RAC) and days on feed (DOF) on plasma leptin concentrations (LC). Heifers were partitioned by BW and hip height into five groups, based on DOF, as such: DOF = 79 (n=16), 100 (n=16), 121 (n=16), 142 (n=16), or 163 (n=7). Half of each group were fed RAC at 300 mg/hd/d for 35 d prior to harvest (treatment phase). A Calan System® (American Calan, Northwood, NH) was used to allow animals ad libitum access to a ration containing 89% DM and 13.5% CP. Dry Matter Feed Efficiency (DMFE), ADG, and DMI were measured. Plasma from venipuncture blood samples taken at d 0, 14, 28, and 34 d of the treatment phase were assayed for LC via RIA. At harvest, carcass data collected included: 12th rib fat thickness (12thBF), USDA marbling score (USDA MS), USDA Yield Grade (USDA YG), HCW, and rib eye area (REA). Performance, carcass, and leptin data were analyzed using PROC MIXED in SAS with age as a covariate. Fixed effects included DOF, treatment, and breed composition. Leptin data were analyzed with a CONTRAST statement. No differences in LC were found across breed, age, DOF or treatment ($P>0.05$). A linear positive relationship of LC existed from d 0 to 34 regardless of treatment or DOF ($P<0.002$). Mean LC on d 34 of the treatment phase were 25.1 ± 3.1 and 24.5 ± 3.1 ng/ml across control and RAC treatments, respectively. USDA MS, HCW, REA, 12thBF, and USDA YG were not affected by LC. Dry Matter Intake, DMFE, ADG, and age at harvest were not affected by LC. While these data show no effects of RAC or DOF treatments on plasma leptin in yearling heifers, additional correlative analysis among measurements and LC may be warranted.

Key Words: Ractopamine, Leptin, Days on feed

40 Forage-type effects on carcass characteristics of fall-born forage-finished steers. C. W. Rowe*[1], C. R. Kerth[1], A. N. Crow[1], C. L. Bratcher[1], R. B. Muntifering[1], and K. R. Willian[2], [1]*Auburn University*, *Auburn, AL*, [2]*Tuskegee University*, *Tuskeegee, AL*.

Fall born steers (n=18, y 1; n= 17, y 2) were placed on cool season forages (y 1 and 2) and warm season forages (y 2 only) to examine carcass characteristics. Cool season forages included ryegrass, rye, and oats, whereas warm season forages consisted of a mix of bermuda grass and fescue. First y (Cool) steers were placed on cool-season forages in late fall at the approximate age of 12 mo and were allowed to graze for 152 d. Steers were then humanely harvested. Year two(Warm), steers were placed on cool-season forages in late fall and grazed for 133 d. Warm steers were then transported to warm season forages for 61 and 68 d, and then were harvested the same way as y one. Twenty-four h postmortem

carcass characteristics were taken. Measures included were: percent kidney, pelvic and heart fat (KPH), ribeye area, yield grade, marbling, lean and bone maturity, lean color, fat color, dressing percentage and average daily gain. Average daily gain (kg) for cool steers was 1.05 ± 0.03, and warm steers was -0.72 ± 0.05. There were no differences (P > 0.05) between forage types for live weight, ribeye area, yield grade, or lean maturity. There were also no differences (P > 0.05) for a* values for lean tissue. Moreover, fat color (L*, a*, b*) was not affected (P > 0.05) by forage type. Cool steers had higher (P < 0.05) dressing percentages, percent KPH, and 24 h pH. Additionally, Cool steers attained higher (P < 0.05) marbling scores, lighter lean tissue, and greater yellowness of lean tissue. However, Warm steers were found to have (P < 0.05) higher scores for skeletal and average maturity than cool steers, which was expected due steers being older at harvest. However, there were no differences (P > 0.05) between the two for lean maturity. This data suggest cool season forages allow for larger ribeye area and greater dressing percentages and greater amounts of marbling at a younger age.

Key Words: Forage-finished, Beef, Carcass characteristics

41 Winter annual forage species and year effects on fatty acid profile of forage- finished steers. A. N. Frank-Crow*[1], C. R. Kerth[1], K. R. Willian[2], M. Singh[1], and C. L. Bratcher[1], [1]*Auburn University*, *Auburn, AL*, [2]*Tuskegee University*, *Tuskegee, AL*.

Non-implanted Angus crossbred steers from Auburn University's Wiregrass Research and Extension Center resident herd in Headland, Alabama were used for a two-yr forage-finishing study. In January 2006 (n =18) and December 2006 (n = 18) steers were randomly assigned a forage treatment. Steers (n = 3) were grazed on duplicate 1. 42 ha paddocks of Wrenâ€™s Abruzzi Rye (Secale cereale L.), Harrison Oats (Avena sativa L.), or Marshall Ryegrass (Lolium multiflorum Lamarck). Pen served as experimental unit for the project. The steers were transported 24 h prior to harvest to Lambert Powell Meat Laboratory in Auburn, Alabama to be humanely harvested and USDA inspected after 85 and 95 d on feed for year 1 and 145 and 152 d on feed for year 2. Following harvest, WBS, sensory traits, fatty acid profile, and lipid oxidative stability were analyzed from the longissimus muscle. Warner- Bratzler shear force was not affected (P > 0.05) by forage * year, forage type, or year. Six people were trained to evaluate the Longmissimus muscle of strip steaks. Cookloss was not affected (P > 0.05) by forage * year, forage type, or year. Sensory traits was not affected (P > 0.05) by forage * year or forage type. Year 1 had higher (P < 0.05) sensory panel rating for juiciness, tenderness, and flavor intensity. Off-flavor descriptors were not affected (P > 0.05) by forage * year, forage type, or year. Ryegrass had higher (P < 0.05) C16:1t concentrations than other two forage types. Rye had the highest (P < 0.05) C18:2n6 concentrations of all the forage types. Year did not affect (P > 0.05) C8:0, C9:0, C11:0, C11:1, C12:0, C12:1, C13:0, C13:1, C14:0, C14:1, C16:1t, C20:3n3, C20:5n3, C22:0, C22:1, C22:4, C22:3, and C24:1 concentrations. Year affected (P < 0.05) saturated, mono, poly, omega-6, and omega-3 fatty acid concentrations. Forage * year affected (P < 0.05) C10:0 and C20:1n15 concentrations. Lipid oxidation was not significantly different (P > 0.05) among forage * year, forage type, or year.

Key Words: Forage- finishing, Sensory, Fatty acid

42 Characterizing grass-fed ground beef using modified atmosphere packaging. L. M. Sledge[1], C. R. Kerth[1], E. N. Hunter*[1], K. R. Willian[2], M Singh[1], and C. L. Bratcher[1], [1]*Auburn University*, *Auburn, AL*, [2]*Tuskegee University*, *Tuskegee, AL*.

Eighteen kg of grass-fed beef trim from fall born Angus x Continental crossbred steers and 18 kg of grain-fed beef trim were ground and resulted in approximately 20% fat content in each. Using these two batches of ground trim, six titrations were combined containing the following percentages of grass-fed to grain-fed beef: 0/100, 20/80, 40/60, 60/40, 80/20, and 100/0. A 454 g sample was then assigned to one of four different packaging treatments: high oxygen (HO; 80%O2/20%CO2), low oxygen (LO; 65% N2/35% CO2), carbon monoxide (CO; 65% N2/34.6% CO2/0.4% CO), or PVC overwrap (OV). A control group was established by using fresh samples and 18 hour samples consisting of 114 g from the OV packaging and then re-wrapped. Retail display, sensory, and TBARS analyses were conducted. Retail display measurements consisted of L*, a*, b*, and spectral reflectance values on d 1, 2, and 5 using a Hunter Miniscan XE Plus. Additionally, six trained panelists scored the packages for color, surface discoloration, and browning on d 1, 3 and 5. L*values showed LO to have the least values within all titrations by d 5. In a* and b* color measurements, 100/0 resulted in the greatest values among other titrations in all treatments by d 5. The CO packaging had the lowest metmyoglobin values (reflectance of 520 nm/525nm) from the beginning to the end of display. CO packaging maintained a constant chroma value throughout retail as other treatments decreased. Among the hue values, OV samples increased the most with 0/100 having the greatest values within OV. The 100/0 consistently had the least browning score among all treatments. Discoloration measurements showed a map*day interaction with CO maintaining the lowest discoloration values. The 100/0 showed the least discoloration values within OV. The CO maintained the highest visual lean color (bright, cherry red) values across all days of storage. Juiciness showed the only significant difference in sensory evaluation. There was no significant difference in any panel scores for packaging treatment. The HO had the greatest detectable level of lipid oxidation with no difference in titrations using TBARS.

Key Words: Modified atmosphere packaging, Grass-fed cattle

43 Forage type effects on beef cattle carcass traits. A. N. Frank[1], C. R. Kerth[1], D. F. Johns*[1], K. R. Willian[2], M. Singh[1], and C. L. Bratcher[1], [1]*Auburn University*, *Auburn, AL*, [2]*Tuskegee University*, *Tuskegee, AL*.

Fall born non-implanted Angus crossbred steers (n=36) from Auburn University's Wiregrass Research Station and Extension Center in Headland, Alabama were used in a two-year forage-finished study. In January 2006 (n=18) and December 2007 (n=18) steers were randomly assigned to three forage treatments consisting of oats, rye, and ryegrass. Steers (n=6) for each year were grazed on 1.42 ha paddocks of either Harrison Oats (Avena sativa L.), Wren's Abruzzi Rye (Secale cereal L.), or Marshall Ryegrass (Lolium multiflorum Lamarck). Steers were humanely harvested at 85 and 95 days on forage in year one and at 145 and 152 days on forage in year two. Carcass traits for kidney, heart and pelvic fat, marbling, yield grade, quality grade, lean maturity score, bone maturity score, or pH were evaluated at 24 h postmortem. Statistics were analyzed using the GLM procedure of SAS with grass as a fixed variable. Type of forage did not affect (P > 0.05) kidney, heart and pelvic fat, marbling, yield grade, quality grade, lean maturity score,

bone maturity score, or pH. Year did not affect (P > 0.05) live-weight, kidney, heart and pelvic fat, marbling, preliminary yield grade, quality grade, or bone maturity. Year one had greater (P < 0.05) average daily gain, but lower (P > 0.05) dressing percentage, adjusted yield grade, lean maturity score, and pH. Forage type and year had no effect (P > 0.05) on L*, a*, or b* values for fat or lean color. Data suggests that year one had greater average daily gain (P < 0.05). While forage type had no effect (P > 0.05) on carcass traits, data suggests that only environmental factors contribute to differences between years.

Key Words: Forage-finished, Carcass traits, Meat color

44 Fatty acid composition of commercial and organic ground beef. G. Davila-El Rassi* and V. Banskalieva, *Oklahoma State University*, *Stillwater*.

An increase in intake of the health beneficial ω-3 series of polyunsaturated fatty acids (PUFA) and the *cis*-9, *trans*-11 isomer of conjugated linoleic acid (CLA) is recommended by nutritionists for human diets: beef is considered to be an excellent source of these fatty acids. Current compositional information on these fatty acids in ground beef is limited. The aim of this study was to evaluate the fatty acid composition of commercial ground beef (NOGB) and organic ground beef (OGB). The samples (n=5) of NOGB were obtained from a local purveyor. The samples of OGB (n=3) were from calves raised in Fairview, Oklahoma (Cattle Tracks, LLC, certified organic). The total lipid content of NOGB samples varied from 10- 20 g/100g: NOGB samples were 60% higher than that of OGB. The contents of the total saturated and monounsaturated fatty acids in the lipids of the NOGB ranged from 43 to 48%, and between 38 and 40%, respectively. NOGB samples did not differ from those of the OGB in terms of saturated and monounsaturated fatty acids. The concentrations of the total ω-6 fatty acids of NOGB varied from 2.4 to 4.2%: whereas in the OGB, ω-6 fatty acids ranged from 2.1 to 2.6%. In the NOGB the concentration of ω-3 linolenic acid was lower ($p < 0.05$), compared to the concentration in the OGB (0.24 and 0.63%, respectively). The ratio between ω-6 PUFA and ω-3 PUFA in four samples of the NOGB ranged from 10.2 and 17.9, whereas in the OGB this ratio was lower ($p < 0.05$), between 1.9 and 3.7. The lipids of the NOGB contained between 4.2 and 7.1 mg/g fat of CLA, while the concentrations of CLA in the OGB were greater (6.9 and 8.8 mg/g fat). The data indicates a possible increase in the lipid content in the NOGB is accompanied with a higher ω-6 PUFA/ω-3 PUFA ratio, much greater than the recommended beneficial ratio of 4 or less. Hence, more information not only for the total fat content, but also for the contents of health desirable fatty acids (ω-3 PUFA and CLA), is needed for the commonly consumed ground beef.

Key Words: Ground beef, Fatty acids, ω-6 PUFA/ω-3 PUFA

Pasture and Forages

45 Productivity and nutritive quality of tall fescue (*Festuca arundinacea*) spring growth as influenced by fertilizer source, application schedule and harvest frequency. M. K. Cline*, E. J. Bungenstab, J. L. Holliman, A. C. Pereira, S. L. Dillard, and R. B. Muntifering, *Auburn University*, *Auburn, AL*.

Tall fescue (*Festuca arundinacea*) is well adapted to the Black Belt region of the southeastern US; however, low soil fertility can be a major limitation to forage production in this region. In 2007, an existing KY-31 tall fescue pasture was subdivided into 32 cells (9.3 m^2), and each cell received the equivalent of 68 kg N/ha in a single (March 7) or split application (March 7 and April 13) of commercial fertilizer (CF; NH_4NO_3) or broiler litter (BL). Forage in half of the cells within each fertilizer × application treatment was harvested on April 10 (H1) and again on May 10 (H2). Forage in remaining cells was allowed to accumulate and was harvested on May 10. Data for each harvest were analyzed separately by linear model procedures for a completely randomized design with a 2 × 2 factorial arrangement of treatments. Forage DM yield was greater ($P < 0.0001$) for CF than BL treatments in H1 (676 vs. 294 kg/ha) and H2 (1,254 vs. 907 kg/ha). Yield of CF forage was greater ($P < 0.001$) for the single- than split-application treatment in H1, but lower ($P < 0.01$) for the single-application treatment in H2. Yield of BL-amended forage was greater ($P < 0.08$) for the single- than split-application treatment in H1, but not in H2. Concentration of CP was greater ($P < 0.001$) for CF than BL forage in H1 (15.3 vs. 13.2%), and concentration of ADF was lower ($P < 0.03$) for CF than BL forage in H2 (30.4 vs. 32.5%). Forage DM yield differed ($P < 0.0001$) between CF and BL treatments by 1,300 kg DM/ha in accumulated-forage cells, and by 729 kg DM/ha ($P < 0.0001$) in twice-harvested cells. Yield of DM from the accumulated-forage harvest was greater for CF than BL forages ($P < 0.0001$) and for single- than split-application treatments ($P < 0.02$). Concentrations of NDF ($P < 0.01$) and ADF ($P < 0.08$) were lower in accumulated forage amended with CF than BL (59.2 vs. 61.5% and 31.9 vs. 33.5%, respectively). Results indicate that CF was superior to BL for supporting tall fescue spring growth and quality when applied at a N equivalency rate of 68 kg/ha in either a single or split application.

Key Words: Fescue, Broiler litter, Nutritive quality

46 Productivity and nutritive quality of tall fescue spring growth as influenced by interseeded ladino clover and fertilization with commercial fertilizer or broiler litter. S. L. Dillard*, L. E. Sturgeon, C. W. Wood, J. L. Holliman, R. B. Muntifering, and W. F. Owsley, *Auburn University*, *Auburn, AL*.

Tall fescue (*Festuca arundinacea*) is the predominant cool-season pasture grass in the southeastern US, where there is a continuous supply of broiler litter (BL) available for use as fertilizer. Continuous land-application of BL based on crop N requirement for maximum yield results in over-application of P relative to crop P requirement, which over time can lead to P accumulation in the soil. In recognition of this problem, an experiment was conducted to evaluate productivity and nutritive quality of tall fescue to which diammonium phosphate (DAP) or BL was applied on the basis of soil test P, and supplemented as necessary with ammonium nitrate (AN) to meet crop N requirement. In November 2006, Max Q (MQ) and AU Triumph (AU) tall fescue were planted in 96 field plots (18 m^2), with (+CLO) or without (–CLO) Regal Graze ladino clover (*Trifolium repens*), and fertilized with DAP+AN, pressure-compacted (0.69 g/cm^3) BL+AN, or non-compacted (0.41 g/cm^3) BL+AN. Baseline extractable P was 56 kg/ha, and N and P_2O_5 applications rates were 67 and 45 kg/ha, respectively. Plots were har-

vested in May 2007, and data were analyzed by GLM procedures for a completely randomized design with a 2 × 2 × 3 factorial arrangement of treatments (n = 8). There were no differences in DM yield between fescue varieties, +CLO and –CLO forages, or among fertilizers. Concentrations of NDF and ADF were lower ($P < 0.0001$) for MQ than AU (55.8 vs. 59.2% and 29.6 vs. 31.6%, respectively), and CP concentration was greater ($P < 0.001$) for MQ than AU (10.4 vs. 9.4%). Forage concentration of NDF was lower (56.4 vs. 58.6%; $P < 0.0001$) and concentration of CP was higher (10.3% vs. 9.4%; $P < 0.001$) for +CLO than –CLO. Fertilizer treatments did not affect foliar concentrations of NDF, ADF, CP or P. A cultivar × clover interaction ($P < 0.01$) was observed such that MQ –CLO had higher foliar P concentration than AU +CLO (0.13 vs. 0.12%). Results indicate that BL+AN was comparable to DAP+AN for supporting productivity and nutritive quality of tall fescue spring growth when applied on the basis of soil test P.

Key Words: Fescue, Broiler litter, Nutritive quality

47 Productivity and nutritive quality of dallisgrass as influenced by rate of fertilization with broiler litter or commercial fertilizer. E. J. Bungenstab*, J. C. Lin, J. L. Holliman, A. C. Pereira, and R. B. Muntifering, *Auburn University*, *Auburn, AL*.

Dallisgrass (*Paspalum dilatatum*) is well adapted to the Black Belt region of the southeastern US, but poor soil fertility is a major limitation to forage production in the region. In a 2-yr study, an existing dallisgrass pasture was clipped to a height of 10 cm on July 17, 2006 and subdivided into 48 plots of 9.3 m^2 each. Each plot received the equivalent of 34 (34N), 67 (67N), 101 (101N) or 134 (134N) kg N/ha from broiler litter (BL) or commercial fertilizer (CF; NH_4NO_3), and forage was clipped on August 21 and September 25. In 2007, forage in each plot was clipped to a height of 10 cm on April 23, amended with the same fertilization treatments as applied in 2006, and clipped on August 16 and September 27. Data were analyzed using linear model procedures for a completely randomized design with a 2 × 4 factorial arrangement of treatments (6 plots/treatment) in which harvest was treated as a repeated measure. Forage DM yields (kg/ha) were not different between CF and BL treatments across years and fertilization rates for first (1,037 vs. 974, respectively) and second (567 vs. 534, respectively) harvests. Forage DM yields from the first harvests were greater ($P < 0.03$) for the 134N (1,236) than 34N (889) and 67N (853) rates, and from the second harvests were greater ($P < 0.10$) for the 134N (598) than 67N (508) rate. Forage concentrations of CP were greater for CF than BL treatments in the first (9.1 vs. 8.3%, respectively; $P < 0.0001$) and second (11.2 vs. 10.4%, respectively; $P < 0.0002$) harvests, and increased for both fertilizer sources in both harvests with increasing rates of N application. Forage concentrations of cell-wall constituents were not different between CF and BL treatments, but both harvests had higher concentrations of NDF ($P < 0.001$) in 2006 than 2007. The treatment 134N resulted in forage with the lowest ADF concentration in the first harvests; however, there was no difference in ADF concentration among treatments in the second harvests. Results indicate that BL and CF were comparable for supporting productivity and nutritive quality of dallisgrass on Black Belt soils.

Key Words: Dallisgrass, Nutritive quality, Broiler litter

48 Soluble carbohydrate concentrations in annual cool-season forages in north Florida. R. O. Myer*, C. L. Mackowiak, A. R. Blount, and R. D. Barnett, *University of Florida*, *Marianna*.

A 2-yr study was conducted to evaluate the influence of species, cultivar within species, and harvest date on water (WSC) and ethanol (ESC) soluble carbohydrate concentrations of annual cool-season grass forages grown in north Florida (31 N) of the SE USA. Four common or recommended cultivars of oat and four of annual ryegrass (RG) were grown in small field plots the first year (2006-07), and four of oat, four of RG, four of rye and two of triticale the second year (2007-08). Two plots of each cultivar were planted late Oct. of each year and were harvested every 4 wk from Jan. to May. Hand clipped samples were taken from each plot at 1400 hr, frozen immediately and kept frozen until analyzed. After sampling, the remaining forage was mechanically harvested to a stubble height of 8 to 10 cm. Forages were grown under dry land conditions. Data were analyzed as a CRD split plot design within year. Overall mean WSC and ESC concentrations (% DM), respectively, for yr 1 oat and RG, respectively, were 24.1 and 21.5, and 23.1 and 18.4 (SE=0.3 for both WSC and ESC; P=0.05 for WSC and P=0.01 for ESC); and for yr 2 oat, RG, rye and triticale were 22.3 and 17.4, 22.6 and 14.6, 21.6 and 15.5, and 21.4 and 14.4 (SE=0.4 for both: P=0.20 for WSC and P=0.02 for ESC). Differences due to cultivar within species within year were noted (P<0.01 to P>0.1); however, the differences were small and not consistent. Harvest time affected both WSC and ESC within all species within year (P<0.001 for all); concentrations were highest early and lowest late in the season. Ryegrass initially had the highest concentrations but declined rapidity; oat had the highest concentrations late in the season. As expected, WSC was correlated to ESC (r=0.78; P<0.001) and both were negatively correlated to NDF (r= -0.66 and -0.63; P<0.001). Concentrations of non-fiber carbohydrates, such as soluble sugars, in annual cool-season grass forages, as measured by WSC and ESC, were found to vary by species and cultivar within species, but the greatest variation was due to harvest time during the winter-spring season.

Key Words: Forages, Non-fiber carbohydrates, Soluble sugars

49 Selection of perennial peanut, annual peanut, and alfalfa hays by horses. J. V. Eckert*, R. O. Myer, L. K. Warren, J. H. Brendmuhl, and J. L. Foster, *University of Florida*, *Gainesville*.

A 12-d CRD split plot study was conducted to ascertain the preference of horses for alfalfa (A), perennial peanut (PP; Arachis glabrata), or annual peanut (AP; Arachis hypogaea) hays. Six mature horses (Thoroughbred or Quarter) were used. Horses were maintained on bahiagrass pasture and free-choice bermudagrass hay plus a limited amount of grain. Every evening during each of two 6-d periods, each of the six horses were given a choice between two of the three hays (randomized combinations) in buckets positioned approximately 0.5 m apart for 10 min. Each horse received each of the three possible combinations twice (once left bucket and once right) within period. Time spent eating each of the hays and amount of intake were recorded. Total time spent eating and amount consumed were averaged by horse by period to minimize any side preferences. Perennial peanut and AP hays were harvested from adjacent fields in July of 2006 (Marianna, FL; no rain damage), and A was purchased locally (shipped in from Iowa; 2006 crop; no rain damage; early to mid-bloom). The PP, AP and A analyzed, respectively, 16, 17, and 21% CP, 45, 50, 40% NDF, and 34, 40, and 32% ADF (DM basis). Data were analyzed using PROC MIXED of SAS; comparisons were

PP vs. AP, PP vs. A and AP vs. A. Horses consumed more PP within 10 min than AP (0.32 vs. 0.15 kg; P < 0.001; SE = 0.03; n = 12) and more A than AP (0.30 vs. 0.12 kg; P < 0.001). Horses tended to eat more A than PP (0.30 vs. 0.21 kg; P = 0.06). Horses also spent more time eating PP than AP (5.9 vs. 2.0 min; P = 0.004; SE = 0.7; n = 12) and more A than AP (6.3 vs. 1.3 min; P < 0.001). Horses tended to spend more time eating A than PP (4.8 vs. 2.6 min; P = 0.06). The lack of preference for AP hay may be due its texture (not as leafy, higher fiber content). Results indicate that PP hay, but not AP hay, is well accepted by horses.

Key Words: Horse, Legume hays, Preference

50 Intake, digestibility and passage of sericea lespedeza hay in wether goats. V. Wolc*, S. Solaiman, and N. Gurung, *Tuskegee University*, *Tuskegee, AL*.

Four mature wether goats were randomly assigned to 4 treatments in a 4 × 4 Latin-square arrangement of treatments to measure apparent digestion and passage rates of diets containing different levels of sericea lespedeza (SL) in a total collection digestion trial. Ten d of adjustment period followed by 5 d of collection. Animals were offered 30% of their ration as bermudagrass hay (BGH). Treatments were, A) 0% SL-30% alfalfa (ALF; control), B) 10% SL-20% ALF, C) 20% SL-10% ALF and D) 30% SL-0% ALF where SL replaced ALF in a 60: 40 forage: concentrate ration. Feed offered, orts, urine, and fecal output were recorded. Rumen was dosed via esophagus by gelatin capsule containing 200 mg Yb as Yb acetate to measure total tract passage. Blood samples were collected at the end of each period to monitor serum metabolites. Data was analyzed by GLM procedure of SAS and means were separated by orthogonal contrasts for equally spaced treatments. Dry matter intake did not change; however, CP intake was higher (quadratic, $P = 0.03$) when SL replaced ALF in B and C diets. Acid detergent fiber (linear, $P = 0.005$), NDF (linear, $P = 0.01$), and ether extract (linear, $P = 0.004$) intake reduced where as ash (linear, $P = 0.005$) and NFC (linear, $P = 0.002$) intake increased as SL increased in the diets. Dry matter (linear, $P = 0.08$), CP (linear, $P = 0.008$), ADF (linear, $P = 0.0004$), NDF (linear, $P = 0.001$), and ash (linear, $P = 0.006$) digestibility decreased whereas NFC (linear, $P = 0.04$) digestibility increased as SL replaced ALF in the diets. Nitrogen intake, and fecal N were higher (quadratic, $P = 0.047$) when SL replaced ALF and resulted in higher absorbed N; however, blood urea N, urinary N and N balance did not change. No differences were observed in serum parameters except for triglyceride (linear, $P = 0.05$), red blood cells (linear, $P = 0.04$) and pack cell volume (linear, $P = 0.04$) that were reduced with increasing levels of SL. Replacing SL with ALF had no effect on total tract passage kinetics of the goats. Nutrient intake and digestibility were reduced with no effect on passage, when SL replaced ALF in a 60: 40 forage: concentrate ration.

Key Words: Digestion, Goats, Sericea Lespedeza

51 Effect of wheat forage maturity and preservation on the performance of and digestion kinetics in growing beef calves fed 40% roughage diets. P. Beck*[1], B. Stewart[1], and S. A. Gunter[2], [1]*University of Arkansas*, *Hope*, [2]*USDA/ARS SPRRS*, *Woodward, OK*.

Wheat (Triticum aestivum L.) forage was harvested at the boot or dough stage of maturity, preserved as hay or round-bale silage, and fed to calves in 40% (DM basis) roughage diets. Growing beef steers (n=48, BW=199 ± 6.8 kg) were fed for ad libitum consumption for 49 d in a 2 x 2 factorial arrangement with 3 pens/treatment. Also, to determine digestion kinetics and digestibility of the diets, 16 calves (BW=160 ± 8.2 kg) were individually fed 2.0% of BW (DM basis) of experimental diets for 10 d followed by a 5-d fecal collection period in a completely randomized design. Fecal excretion curves were analyzed by nonlinear regression procedures in SAS using a one-compartment model (Marquardt method) for determination of ruminal passage kinetics. Acid detergent insoluble ash was used as an internal marker to determine diet DM and NDF digestibilities. Animal performance data were analyzed as a completely randomized design using the mixed procedure in SAS. Pen within forage maturity by preservation method was used in the random statement. Feed intake, G:F, digestibility, and digestion kinetics were analyzed using the GLM procedure of SAS. Average daily gain (1.8 ± 0.05 kg) was unaffected ($P \geq 0.22$) by maturity, preservation method, or their interaction. Maturity at harvest did not impact ($P \geq 0.26$) DMI (2.93% of BW, DM basis) or G:F (0.25 kg gain/kg feed). Calves fed hay consumed more feed ($P = 0.04$) than calves fed silage as a percentage of BW (3.1 vs 2.8%, respectively), but tended ($P = 0.09$) to utilize feed less efficiently (0.24 vs. 0.26 kg feed/kg gain, respectively). Diets containing dough-silage were less digestible ($P \leq 0.05$) than hay diets and tended ($P = 0.07$) to be less digestible than boot-silage diets. These results indicate that wheat forage harvested at these 2 stages and preservation method has no affect on gain of growing beef steers when fed in a 60% concentrate diets, but may affect DMI, G:F, and digestibility.

Key Words: Cattle, Hay, Silage

52 Management strategies to improve development of replacement heifers on tall fescue-based systems. M. Miller*, J. Andrae, J. Schmidt, S. Duckett, and S. Pratt, *Clemson University*, *Clemson, SC*.

This research was conducted to determine the effect of tall fescue and alternative feeding regimens on estrous behavior and reproductive performance in replacement beef heifers. Angus × Simmental heifers (n=48; 318±80kg initial BW) were stratified by weight and pubertal status determined by serum progesterone (P4) levels and assigned to one of three grazing treatments (2 reps; 8 heifers/pasture): (1) endophyte infected tall fescue (TF); (2) endophyte infected tall fescue with a soybean oil supplement (TFO); or (3) mixed winter annual forages (M). Tall fescue endophyte infection level was between 74 and 94%. Annuals were drilled into a prepared seedbed at a rate of 112, 22.4, 4.5 and 7.25 for the cereal rye, annual ryegrass, crimson clover and hybrid turnip respectively. Pastures were grazed from December 12 to April 24. Oil was supplemented daily at a rate of 1 g/kg BW with a soy hull (4 g/kg BW) carrier. Serum was collected on d 27, 86 and 134 for fatty acid and cholesterol analysis. Estrous behavior was monitored using the Heatwatch® II Estrus Detection System. Heifers were bred via timed AI initially and subsequently on visual heat detection. Conception was determined via manual palpation and transrectal ultrasound 120d post-synchronization. Data were analyzed using the GLM procedure of SAS. Heifers on M exhibited higher ADG than TFO which was higher than TF ($P<0.01$). ADG was 0.50, 0.75 and 0.95kg/d for TF, TFO and M respectively. Total standing heats and mounts per standing heat did not differ among treatments ($P=0.73$ and $P=0.30$). Conception rate did not differ among treatments and was 80, 63 and 69% for TF, TFO and M respectively. Serum cholesterol ($P<.01$) and total fatty acids ($P<.01$) were greater in TFO than in TF and M heifers. Serum concentrations of 16:0, 18:0, 18:1, 18:2 and 20:4 were greater in the oil supplemented

heifers than in the grass only treatments (P<0.01) whereas the 18:3 concentration was greatest in the M heifers (P<.01). While diet did affect serum fatty acid and cholesterol concentrations, no differences were observed in heifer estrus or conception rates.

Key Words: Tall fescue, Beef heifer, Reproduction

53 Performance of forage-finished beef cattle grazing ryegrass, rye, or oats pastures. A. C. Pereira*, E. J. Bungenstab, S. P. Schmidt, C. R. Kerth, J. C. Lin, B. Gamble, and R. B. Muntifering, *Auburn University*, *Auburn, AL*.

A 3-yr grazing trial was conducted with ryegrass (RG; *Lolium perenne*), rye (R; *Secale cereale*) and oats (O; *Avena sativa*) as winter pasture for forage-finished beef. Replicate 1.42-ha paddocks (2 per forage) were established and stocked with 3 Angus x Continental crossbred steers per paddock in a completely randomized design. Initial weights were 374 ± 5.5, 410 ± 7.0 and 400 ± 9.5 kg in yr 1,2 and 3, respectively. Steers had free-choice access to salt-mineral mix and water. Grazing was initiated Jan 19 (84 d grazing yr 1), Nov 27 (145 d grazing yr 2) and Dec 18 (124 d grazing yr 3) when average forage mass reached 1000 kg/ha. Forage mass and nutrient composition were determined by clipping 0.25-m^2 quadrats (8 per paddock) prior to the beginning of grazing and every 2 wk during the trial. Put-and-take steers were used to maintain forage in the vegetative stage. Grazing was terminated when steers reached 530 kg. Average daily gain differed ($P < 0.05$) among years, but there was no treatment effect or animal × yr interaction. Overall mean ADG was 1.32 ± 0.12 kg/d. In yr 1, seasonal-mean ADG (1.81 ± 0.05 kg/d) was higher ($P < 0.0001$) than the others, but yr 2 (1.05 ± 0.05 kg/d) did not differ from yr 3 (1.11 ± 0.05 kg/d). There was a yr effect but no yr × treatment interaction for forage concentrations of CP. Year 3 had a lower percent CP than the others. Rye contained more CP (19.5 ± 0.6%) than RG (16.1 ± 0.6%) and O (17.0 ± 0.6%), but percent CP did not differ between RG and O. There was no yr effect or yr × treatment interaction for NDF and ADF. Ryegrass had lower NDF (39.8% ± 1.1) and ADF (20.6 ± 0.6) than O (46.0% ± 1.1 and 24.3 ± 0.6) and R (46.2 % ± 1.1 and 24.4 ± 0.6). Total gain per area differed ($P < 0.05$) among years and forage type, but there were no yr × treatment interactions. Year 2 had greater ($P < 0.05$) gain per ha (556 ± 15.4 kg/ha) than yr 1 (372 ± 15.4 kg/ha) and yr 3 (410 ± 15.4 kg/ha). Oats had a greater ($P < 0.05$) gain per ha (504 ± 15.4 kg/ha) than R (425 ± 15.4 kg/ha) and RG (408 ± 15.4 kg/ha). In conclusion, all the cool-season annual pasture did not differ in terms of ADG but oats was superior in total gain per area.

Key Words: Grazing, Finishing, Pasture

54 Evaluation of two warm-season legumes for creep-grazing of beef calves. J. L. Foster*[1], A. T. Adesogan[1], J. N. Carter[2], L. E. Sollenberger[1], A. R. Blount[2], R. O. Myer[2], and M. K. Maddox[2], [1]*University of Florida*, *Gainesville*, [2]*University of Florida*, *Marianna*.

This experiment examined effects of creep feeding cowpea [*Vigna unguiculata* (L.) Walp. cv. Iron clay], concentrate, or perennial peanut (*Arachis glabrata* Benth. cv. Florigraze) to cow-calf pairs on bahiagrass (*Paspalum notatum* Flügge) pasture in each of 2 yr. Two Brangus cow-calf pairs were continuously stocked on bahiagrass pastures (1.2 ha) and calves had no creep access (Control; 4 pastures) or continuous access to creep areas (0.12 ha) consisting of cowpea (4 pastures) or either perennial peanut (2 pastures) or concentrate (2 pastures; pelleted corn and cotton seed meal; 83.5 ± 7.3% in vitro true digestibility (IVTD); 25.2 ± 5.7% NDF; 11.3 ± 0.46% CP) creep access. Forage yield (FY) and nutritive value were measured and cattle were weighed before to grazing. Forages were sampled every 2 wk and cattle weighed every 4 wk thereafter. The mean FY of the 3 forage species were similar in yr 1 ($P = 0.12$; 2,200 ± 1,000; 1,560 ± 540; and 1,670 ± 740 kg DM/ha for cowpea, perennial peanut, and bahiagrass, respectively), but bahiagrass (2,901 ± 700 kg DM/ha) had greater ($P = 0.03$) mean FY than perennial peanut (1,970 ± 580) in yr 2. Nutritive value was not different between years or experiments. Perennial peanut (78.4 ± 5.6% IVTD; 35.0 ± 3.6% NDF; 16.2 ± 2.2% CP) and cowpea (89.6 ± 5.0% IVTD; 28.4 ± 5.2% NDF; 30.8 ± 3.9% CP) had greater ($P < 0.01$) IVTD and CP, and less NDF than bahiagrass (61.0 ± 13.2% IVTD; 64.9 ± 4.9% NDF: 11.2 ± 2.9% CP) throughout the grazing season. Creep grazing perennial peanut did not affect ADG, but creep grazing cowpea or creep-feeding concentrate tended ($P = 0.08$) to increase (0.19 and 0.22 kg increase, respectively) ADG in both yr. Cowpea can be used strategically to improve the ADG of suckling calves.

Key Words: Creep-grazing, Legumes, cow-calf

55 Response of summer stockers grazing bermudagrass to distillers grains supplementation. M. S. Gadberry*[1], M. Morgan[2], P. A. Beck[3], D. S. Hubbell[4], T. Hess[4], J. W. Butterbaugh[5], B. C. Rudolph[5], and M. Smith[5], [1]*University of Arkansas*, *Little Rock*, [2]*University of Arkansas*, *Fayetteville*, [3]*University of Arkansas,*, *Hope*, [4]*University of Arkansas*, *Batesville*, [5]*Furst-McNess Company*, *Freeport, IL*.

Thirty-six steers (262 ± 2.6 kg) were randomly assigned to one of 9, 0.81-ha bermudagrass paddocks to determine their 84-d BW gain response to 0, 0.9, or 1.8 kg/d (as-fed) dried distillers grains (86.7% DM, 31.9% CP, 31.1% NDF, 14.3% ADF, and 15.7% EE) supplementation. Paddocks were stocked at 5 calves/ha. Grazing and supplementation were initiated on June 19. Herbage mass was estimated using the rising plate meter methodology. Data were analyzed as a completely randomized design (JMP 7.0; SAS Inst., Cary, NC) with pasture (3/trt) as the experimental unit and contrasts were made between non-supplemented versus supplemented pastures and between the 0.9 and 1.8 kg/d supplementation rate. Initial BW did not differ among treatments ($P = 0.87$). Forage mass did not differ among treatments ($P \geq 0.84$) but there was a linear ($P < 0.001$) increase from d 0 to d 84. Average daily gain was 0.7, 1.0, and 1.1 kg for the 0, 0.9, and 1.8 kg/d supplementation rates, respectively. Daily gain was greater for supplemented pastures compared to non-supplemented pastures ($P = 0.02$) but did not differ between the 0.9 and 1.8 kg/d supplementation rate ($P = 0.54$). Supplemented pastures had greater gain/ha (99 kg/ha) than non-supplemented pastures ($P = 0.02$). Total BW gain/ha did not differ ($P = 0.54$) between the 0.9 or 1.8 kg/d supplementation rate, 415 and 438 kg/ha, respectively. Supplementation efficiency, defined as the ratio of additional gain above control to the amount of supplement fed, did not differ ($P = 0.15$) between the two supplementation rates and averaged 0.32 and 0.20 kg gain per kg feed for the 0.9 and 1.8 kg/d rates, respectively. Distillers dried grains can be used to efficiently increase the BW gain of summer stockers grazing bermudagrass when offered at 0.9 kg/d (as-fed).

Key Words: Bermudagrass, Stocker cattle, Distillers grains

56 Influence of a single-dose, moderate term implant and supplementation type on performance of stocker cattle grazing summer grass. C. P. McMurphy*, E. D. Sharman, S. J. Winterholler, D. A. Cox, G. W. Horn, and D. L. Lalman, *Oklahoma State University*, *Stillwater*.

This study was designed to investigate the effect of a single-dose, moderate term implant and supplementation type on performance of steers grazing summer grass. Fifteen pastures were utilized, twelve consisting primarily of old world bluestem and three native range pastures. For implantation, Crossbred steers (n=196; average initial BW of 215 kg) were stratified by weight, randomly assigned to pasture and then to one of three treatments, 1) Control (no implant); 2) Ralgro; and 3) Component TE-G. Shrunk weights were obtained on d 0, 56, 98 and 126. For supplementation, a completely randomized design was used to assign pasture to one of three treatments, 1) Control (no supplement); 2) distillers dried grains with solubles (DDGS; 30% CP); and 3) cottonseed meal (CSM; 30% CP). Supplementation began after d 56 and feed was delivered three times per wk at a level of 0.45 kg/hd/d (1.06 kgs/hd/feeding). Forage samples were collected bi-weekly for analysis of DM, ADF, NDF, Ash, CP and DIP. No implant by supplementation or implant by pasture interaction was observed for BW or ADG (P>0.10) and there was no effect on ADG by pasture type. There was also no difference in BW with regards to implantation at d 156 (P=0.49). However, implantation did increase ADG 6.8% (0.82 vs 0.88 kg/d; P<0.01), but implant type had no bearing on performance. Supplementation with CSM had no affect on BW, but DDGS did have a positive affect on BW as compared to control (317 vs 331 kg; P=0.04). Supplementation resulted in increased (P<0.01) ADG (0.80, 0.93 and 1.01 kg/d for control, CSM and DDGS respectively). Cattle supplemented with DDGS had greater (P=0.03) ADG compared to cattle supplemented with CSM. This difference implies that steers fed DDGS were able to utilize increased energy from DDGS as compared to CSM (0.61 Mcal/d vs 0.49 Mcal/d NEg, respectively), resulting in a conversion rate of 2.16 vs 3.49 kg/kg of additional ADG for DDGS and CSM, respectively. Implantation and supplementation increased performance of steers grazing summer pasture.

Key Words: Grazing steers, Implants, Supplementation

57 Interaction of hay nutritive value and byproduct supplement in growing heifers. J. K. Evans and R. R. Reuter*, *The Noble Foundation, Agricultural Division*, *Ardmore, OK*.

The effect of two byproduct supplements on ADG of heifers fed hay of differing crude protein concentration was determined. Treatments were arranged in a 2 × 3 factorial. Factor 1 was ad-libitum-fed hay type (levels were rye hay: [11.9% CP, 54% TDN]; and bermudagrass hay [7.6% CP, 54% TDN]). The second factor was supplement (levels were: dried corn distillers grains [**DDG**], soybean hulls [**SBH**], and control [no supplement]). Supplements were fed 3 times per week at the rate of 0.75% of BW per day (approximately 4.4 kg • animal^{-1} • feeding^{-1}). Treatments were randomized to 12 dirt-surfaced pens, each containing 9 or 10 crossbred heifers (250 ± 16.6 kg initial BW). Pens were equipped with water fountains, 20 m^2 of shade, a 1.8–m diameter hay ring, and a 3.7 by 0.7–m feed trough. Heifers were weighed individually on d 0, 30, and 58 on calibrated scales after a 16-h shrink in dry lot. Data were analyzed with PROC MIXED of SAS as a completely random design with pen as the experimental unit. The interaction of supplement type and hay type for 58-d ADG was not significant ($P = 0.52$). Contrary to our expectation, bermudagrass hay produced greater ADG than rye hay (0.53 and 0.43 kg / d, respectively; $P= 0.001$). Heifers supplemented with DDG gained more than those supplemented with SBH (0.67 and 0.55 kg / d, respectively; $P = 0.001$). Both supplements produced ADG greater than the hay alone (0.22 kg / d; $P = 0.001$). Supplement conversion ratios for DDG and SBH were 4.2:1 and 5.6:1, respectively. Hay type did not affect response to supplementation with the two byproducts investigated in this experiment. Under similar feeding conditions, producers may use these supplement conversion ratios to formulate a least-cost supplementation program.

Key Words: Distillers grains, Soybean hulls, Forage quality

58 Two-year performance of steers finished on ryegrass pastures with supplemental corn oil. V. A. Corriher*, G. M. Hill, and B. G. Mullinix, Jr., *University of Georgia*, *Tifton*.

Beef steers were finished on ryegrass (*Lolium multiflorum*) pasture with corn oil supplementation in a 2-yr, 2 × 2 factorial experiment to determine effects on conjugated linoleic acid (CLA) tissue concentration. Steers were implanted with Component on d 1, initial and final BW were means of 2 consecutive daily unshrunk BW. Rib steak (LM) samples from carcass, and samples of subcutaneous fat over the rib were analyzed for fatty acid composition. Steers (2-yr mean initial BW 366.8 ± 16.8 kg; Angus and Angus-X) were backgrounded on rye (*Secale cereale*) pasture both years for 71 and 48d prior to experimental period (ADG 1.05 ± 0.07 kg, 2-yr mean). Following rye grazing, beef steers (n=16, n=28; 2-yr mean initial BW 403.2 ± 30.7 kg) were fed ground corn supplement (SUP: 1% BW; Rumensin 200 mg/d) without and with corn oil (0.075% BW) while grazing ryegrass (cultivar "Big Daddy," Yr 1: 4 total pastures, 1.62 ha each; Yr 2: 6 total pastures, 1.46 ha each), for 83 d in Yr 1 and 112 d in Yr 2. Intake, gain, carcass variables and long chain fatty acid analyses were statistically analyzed as a completely randomized design. There was a significant year by treatment interaction for ADG, HCW and quality grades (QG; 10 = USDA Select; 12 = USDA Choice -; Table). The interaction resulted from steer age, and higher initial BW for Yr 1. Supplemental DMI was higher for corn SUP treatment in Yr 1, and corn + oil treatment in Yr 2. During Yr 2, steers grazing ryegrass without supplementation had lowest ADG, HCW, QG and YG (1.07 kg, 288.1 kg, 9.78, and 1.89, respectively) despite having highest initial BW (414.2 kg) compared with supplementation treatments. Main effect interactions occurred for several long chain fatty acids. Concentration of CLA *cis* 9, *trans* 11 (c9t11) was higher in Yr 2 for both treatments in SQ and LM. In Yr 2, concentration of c9t11 and CLA *trans* 10, *cis* 12 (t10c12) were not different for steers grazing ryegrass only.

Table 1.

Item	Corn		Corn + Oil		SE	Yr X Trt
Yr	1	2	1	2		*P*<
HCW	347.2	321.4	355.1	326.0	9.69	0.003
QG	12.2	10.6	12.6	10.3	0.45	0.0001
SUP DMI, kg	4.63	4.40	4.33	4.43	0.002	0.0001
LM: c9t11	0.49	0.71	0.63	0.85	0.08	0.0001
SQ: c9t11	0.77	1.05	1.15	1.26	0.12	0.0009
SQ: t10c12	0.04	0.007	0.05	0.009	0.007	0.0001

Key Words: Beef, Forage, Fatty acids

59 Influence of tropical adaptation on plasma insulin-like growth factor-I and residual feed intake in purebred and crossbred beef cattle. L. C. Caldwell*[1,4], C. C. Chase, Jr.[2], D. G. Riley[2], S. W. Coleman[2], W. A. Phillips[3], T. H. Welsh, Jr.[1], and R. D. Randel[4], [1]*Texas AgriLife Research*, *College Station, TX*, [2]*USDA-ARS, Subtropical Agricultural Research Station*, *Brooksville, FL*, [3]*UDSA-ARS, Grazinglands Research Laboratory*, *El Reno, OK*, [4]*Texas AgriLife Research*, *Overton, TX*.

The objective of this study was to determine if plasma concentrations of insulin-like growth factor-I (IGF-I) differed among heifers and steers produced from three-breed diallel matings using temperate and tropically adapted breeds of cattle in Brooksville, FL. Additionally, for steers only, body weight and feed intake data were collected during individual finishing phase feeding trials, at El Reno, OK. The data were used to calculate residual feed intake (RFI) and then compared to concentrations of IGF-I to test whether IGF-I could be used as a predictor of RFI, as suggested by Johnson et al (2002). The breeds consisted of temperate Bos taurus (A; Angus), tropical Bos indicus (B; Brahman), and tropical Bos taurus (R; Romosinuano). Purebreds (AA, BB, RR) and crossbreds (ABX, ARX, BRX) from the 2003 and 2004 calf crops were evaluated. Blood samples were obtained from 10 heifers and 10 steers of each breed-type. Steer samples were taken at weaning and d0 and 60 of the finishing phase. Heifer samples were taken at weaning and d0 and 84 of each trial. Concentrations of IGF-I were determined by RIA. Breed differences in concentration of IGF-I among heifers and steers were observed ($P < 0.05$), with AA exhibiting the lowest values. Correlations between concentrations of IGF-I and RFI, pooled over all steer breeds, were weak for all sample dates, with r values ranging from -0.136 to 0.066 ($P > 0.05$). Results suggest that RFI is unrelated to plasma concentration of IGF-I in these breed-types; however, relative to the temperate Bos taurus breed, plasma concentrations of IGF-I were greater in male and female tropically-adapted breed-types.

Table 1. Least Square Means for Plasma IGF-I Concentrations

Steers	AA	BB	RR	ABX	ARX	BRX	P-value
Wean IGF-I, ng/mL	86.9	171.4	167	134.2	120.9	161.9	< 0.007
d0 IGF-I, ng/mL	176.2	200	188.1	182.4	186	197.3	> 0.05
d60 IGF-I, ng/mL	154.9	184	193.1	168	176.8	202.7	< 0.05
Heifers	AA	BB	RR	ABX	ARX	BRX	P-value
Wean IGF-I, ng/mL	76.2	118.4	119.2	101.5	95.5	125.4	< 0.003
d0 IGF-I, ng/mL	49.8	71.3	64.7	67.8	53.6	74.6	< 0.001
d84 IGF-I, ng/mL	62.4	71.6	77.6	93.4	78.1	87.4	< 0.001

Key Words: Tropical adaptation, IGF-I, Residual feed intake

60 Evaluation of residual feed intake, insulin-like growth factor-I, and puberty in Brahman bulls. K. J. Matheney*[1,2], A. W. Lewis[1], D .A. Neuendorff[1], L. C. Caldwell[2], A. N. Loyd[1,2], T. D. A. Forbes[3], T. H. Welsh, Jr.[2], and R. D. Randel[1], [1]*Texas AgriLife Research*, *Overton, TX*, [2]*Texas AgriLife Research*, *College Station, TX*, [3]*Texas AgriLife Research*, *Uvalde, TX*.

Residual feed intake (RFI) is a measure of feed efficiency used to identify cattle that are more economically feasible to produce. Insulin-like growth factor-I (IGF-I) has been reported to be a predictor of RFI. This study evaluated the relationship between IGF-I and RFI as well as the relationship between RFI and puberty in Brahman bulls (n=41). Bulls were individually fed for 70 days using Calan gate feeders. Body weight and scrotal circumference (SC) were measured weekly. Daily feed intake was adjusted weekly to 2.65% of BW. After reaching a SC ≥ 25 cm bulls were electroejaculated and semen was evaluated for motility, morphology, and total concentration of sperm cells. A concentration of 50 million sperm cells per ejaculate was considered pubertal. Blood samples were collected at the weekly intervals via tail venipuncture. Serum IGF-I concentration on d0 and d70 of the feeding trial were determined by radioimmunoassay. Bulls were classified based on RFI, with bulls 0.5 SD below the mean classified as efficient (E; n=16), bulls 0.5 SD above the mean classified as inefficient (N; n=13), and all remaining classified as intermediate (I; n=12). The Correlations and GLM procedures of SAS were used to analyze the data. Serum IGF-I concentration did not differ among RFI groups on d0 ($P>0.70$) or d70 ($P>0.70$). Correlations were determined between RFI and IGF-I on d0 ($r=0.19$; $P<0.22$) and on d70 ($r= -0.16$; $P<0.33$). Age at puberty did not differ by RFI group ($P>.70$); E (454.1 ± 9.1 d), I (446.5 ± 11.0 d), N (444.3 ± 10.1 d). BW at puberty also did not differ by RFI group ($P>0.80$); E (376.5 ± 11.4 kg), I (373.5 ± 13.7 kg), N (384.7 ± 12.6 kg). These data suggest that serum IGF-1 concentration at either the beginning or at the end of the feeding period was neither predictive nor reflective, respectively, of RFI. Additionally these data suggest that age at puberty and BW at puberty are not different in efficient and inefficient bulls. Brahman bulls can be selected using RFI as a criterion without affecting age or BW at puberty.

Key Words: Residual feed intake, Insulin-like growth factor-I, Puberty

61 Residual feed intake of beef heifers and ovulation during acute nutritional restriction. C. A. Lents[1], A. M. Stelzleni[1], R. D. Randel[2], A. W. Lewis[2], N. L. Heidorn*[1], C. J. Rogers[1], and M. W. Overton[1], [1]*University of Georgia*, *Athens*, [2]*Texas A&M University*, *Overton*.

Angus heifers (n=42, Age=12.3 ± 0.1 mo, BW=316.1 ± 5 kg) were assigned to pens (n=5, 8-9 per pen) equipped with Calan-gate feeders to determine if residual feed intake (RFI) of heifers can predict their ovulatory response to acute nutritional restriction. Heifers were individually fed twice daily a 13.2% CP (NEm=1.86 and NEg=1.13 Mcal/kg DM) total mixed ration for 70 d at 2.2% of BW to maintain 0.68 kg/d ADG. RFI was calculated as the difference between actual DMI and expected DMI from linear regression of DMI on mid-test $BW^{0.75}$ and ADG. At d 71, each animal was fed 40% of their individual maintenance energy requirement for 22 d. Fat thickness (FT), rib-eye area (REA), and intramuscular fat (IMF) were determined by ultrasound at the beginning, middle, and end of the RFI period and at the end of restriction. All heifers received 25 mg of PG on d 60, 71 and 81 to synchronize estrous cycles and induce ovulation. Progesterone in plasma was quantified by RIA and ovulation was defined as concentrations of progesterone ≥ 1 ng/mL on d 14 to 22 of restriction. Overall RFI, ADG, and ADFI were 0 ± 0.08, 0.83 ± 0.12, and 7.37 ± 0.67 kg/d, respectively. Initial BW was correlated with ADFI ($r=0.99$, $P<0.0001$) and ADG ($r=0.35$, $P<0.05$) but not RFI. Feed efficiency (g gain/kg DMI) was similar ($P>0.1$) for low (<0.5 SD) and high (>0.5 SD) RFI heifers (116.5 ± 5.6 and 112.4 ± 4.5 g/kg, respectively). There was a tendency for RFI to be correlated

(r=0.29, P<0.07) with IMF at mid-test, however RFI was not correlated with any other measure of ultrasound carcass composition at any other time. Initial BW was correlated with REA (r=0.62, P<0.001) and FT (r=0.49, P<0.001) at d 70 which were also correlated with ADFI at this time period (REA, r=0.42, P<0.01; FT, r=0.64, P<0.0001, respectively). The number of animals that ovulated during nutritional restriction was not (P>0.1) affected by RFI. Two heifers became anovulatory during restriction with 2 other heifers exhibiting short luteal phases (≤8 d). Variance in RFI was minimal and indicative of the unvarying response to restriction. Further work is needed to determine the relationship between RFI and reproductive measures.

Key Words: RFI, Reproduction

62 Utilization of cottonseed products in bull development programs. R. C. Vann*[1], S. T. Willard[2], and M. K. Dowd[3], [1]*MAFES-Brown Loam Experiment Station*, *Raymond, MS*, [2]*Department of Biochemistry & Molecular Biology*, *Starkville, MS*, [3]*SRRC-ARS-USDA*, *New Orleans, LA*.

The objective of this study was to examine effects on reproductive performance of inclusion of three cottonseed products in a maintenance ration for mature beef bulls. Ejaculate quality characteristics were evaluated to ascertain any influence of limited cottonseed feeding on semen quality (motility and morphology). Spring born Angus crossbred bull calves (> 18 mo, n=84) were randomly assigned to one of four treatment groups: control (no cottonseed feeding, diet was a corn gluten:soyhull (50:50) blended ration) vs. either pelleted cottonseed, cottonseed cake, or whole fuzzy cottonseed. Animals were fed these diets according to treatment groups at a rate of 2.27 kg/hd/d for 168 d with free access to bermuda-grass hay throughout the study. Bulls were allowed a diet adjustment period (14 d) in order to achieve desired intake of each treatment ration prior to initiation of the feeding trial. Blood samples for plasma gossypol determination and BW were obtained on d 0, 14, 28, 42, 56, 84, 112, 140, and 168. Breeding soundness exams (which included scrotal circumference, testis length, width and depth, and electro-ejaculation for assessment of semen quality) were completed on d 0, 84 and 168. Scrotal circumference, sperm motility, ejaculate volume, and total sperm concentration increased (P < 0.002) from d 0 to 168, but secondary sperm abnormalities decreased (P < 0.02). There was a day x treatment interaction (P < 0.001) for total gossypol concentrations, BW, ADG, and total testes volume (P < 0.008). Total gossypol concentrations peaked at d 56 of the feeding trial (P < 0.001), remained stable from d 84 to d 168 and by d 14 after removal from feed were back to similar concentrations at d 14 of the feeding period. Overall ADG was greatest (P < 0.005) for bulls in the control and pelleted cottonseed groups (0.50 and 0.54 kg, SEM 0.03, respectively), followed by cottonseed cake group (0.44 ± 0.03 kg) and then whole seed group (0.36 ± 0.03 kg). Bulls consuming cottonseed products derived primarily from upland cotton varieties and fed at a rate of 2.27 kg/hd/d had acceptable BW, ADG and semen quality.

Key Words: Cottonseed products, Beef bulls, Reproductive performance

63 Sexually dimorphic secretion of cortisol but not catecholamines in response to an endotoxin challenge in beef calves. N. C. Burdick*[1,2], J. A. Carroll[2], R. D. Randel[3], R. C. Vann[4], L. C. Caldwell[1], L. H. Hulbert[2], J. W. Dailey[2], M. A. Ballou[5], and T. H. Welsh, Jr.[1], [1]*Texas A&M System*, *College Station*, [2]*USDA-ARS Livestock Issues Research Unit*, *Lubbock, TX*, [3]*Texas A&M System*, *Overton*, [4]*Mississippi State University*, *Raymond*, [5]*Texas Tech University*, *Lubbock*.

This study was designed to determine the effect of endotoxin (lipopolysaccharide; LPS) challenge on secretion of the adrenal stress-related hormones cortisol, epinephrine and norepinephrine in bull and heifer calves. Brahman calves (n = 12; 269 ± 11.7 kg) were randomly selected from the fall 2007 calf crop at the Texas AgriLife Research Center in Overton, TX and transported 770 km to New Deal, TX. The following day calves were fitted with indwelling jugular catheters and allowed to rest overnight. Blood samples were collected the next day every 30 min beginning 4 h prior to and continuing 8 h after LPS administration (i.v., 0.25 μg/kg BW; 6 bulls and 6 heifers). Serum cortisol and plasma epinephrine and norepinephrine concentrations were determined by RIA and EIA, respectively. Data were analyzed using the ANOVA procedure of SAS specific for repeated measures as appropriate (SAS; Cary, NC). During the 4-h period prior to LPS administration, heifers tended ($P = 0.10$) to have greater concentrations of cortisol than bulls. Serum concentration of cortisol was increased from time 0 through 2.5 h after administration of LPS before declining ($P < 0.01$). During this time period heifers had greater concentrations of cortisol than bulls ($P = 0.05$). Following peak values, cortisol concentrations declined through 8 h and were not affected by sex ($P > 0.05$). Epinephrine and norepinephrine concentrations were not affected by sex prior to LPS administration ($P > 0.05$). Following LPS administration epinephrine concentrations increased and peaked at 0.5 h ($P < 0.01$) before returning to baseline values and were not affected by sex ($P > 0.05$). Norepinephrine concentrations increased and peaked at 1 h in heifers and at 1.5 h in bulls post-LPS administration. However, concentrations of norepinephrine post-LPS administration were not affected by sex ($P > 0.05$). These data suggest a sexually dimorphic response of the adrenal cortex, but not the medulla, to an endotoxin challenge in beef calves.

Key Words: Calves, Stress, Sexually dimorphic

64 Bovine exhibit a sexually dimorphic innate immune response following an endotoxin challenge. J. A. Carroll*[1], L. H. Hulbert[1], N. C. Burdick[1,2], L. C. Caldwell[2,3], J. W. Dailey[1], M. A. Ballou[4], R. C. Vann[5], T. H. Welsh, Jr.[2], and R. D. Randel[3], [1]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [2]*Texas A&M University System*, *College Station*, [3]*Texas A&M University System*, *Overton*, [4]*Texas Tech University*, *Lubbock*, [5]*Mississippi State University*, *Raymond*.

Sexually dimorphic responses to various stressors have been previously reported for rodents and humans. However, limited research has addressed whether innate immune responses are sexually dimorphic in cattle. The objective of this study was to investigate whether beef cattle exhibit a sexually dimorphic innate immune response following an endotoxin challenge. Twelve purebred Brahman calves (6 bulls and 6 heifers; 269±11.7 kg) were fitted with a) rectal temperature (RT) devices that recorded RT at 1-min intervals for 24 h; and b) indwelling jugular catheters. The next day blood samples were collected at 30-min intervals

from -4 to 8 h relative to an i.v. infusion of lipopolysaccharide (LPS; 0.25 μg/kg BW) at 0 h. Serum was stored at -80°C until analyzed for tumor necrosis factor-alpha (TNF-α), interleukin 6 (IL-6) and interferon gamma (IFN-γ). RT data were summed into 12-min intervals prior to statistical analysis. As expected, RT increased rapidly in both groups; however, a Time X Sex interaction *(P<0.04)* was observed such that RT peaked sooner in heifers (40.7±0.22 ºC at 216 min) as compared to bulls (40.3±0.6 °C at 252 min) following the LPS challenge. Following peak values, RT continued to decline in both groups; however, RT returned to baseline values earlier in heifers as compared to bulls (768 min and 1152 min post-LPS, respectively). For each of the cytokines, a Time X Sex interaction was evident *(P<0.01)*. Peak TNF-α concentrations were observed at 1 and 1.5 h post-LPS for bulls and heifers, respectively, with heifers having a lower TNF-α response post-LPS *(P<0.01)*. Peak IL-6 concentrations occurred at 3 and 3.5 h post-LPS for bulls and heifers, respectively, with heifers having a lower IL-6 response post-LPS. For IFN-γ, post-LPS concentrations tended to be lower in heifers as compared to bulls *(P<0.07)*. Collectively, these data suggest that heifers may be more adept at coping with and recovering from an immune challenge as compared to bull calves. To our knowledge, these are the first data to demonstrate a sexually dimorphic innate immune response in the bovine following an endotoxin challenge.

Key Words: Innate immunity, Bovine, Sexually dimorphic

65 Temporal effects on bovine neutrophil function following an intravenous endotoxin challenge. M. A. Ballou*[1], L. R. Schwertner[1], J. A. Carroll[2], L. H. Hulbert[2], J. W. Dailey[2], N. C. Burdick[2,3], R. C. Vann[4], T. H. Welsh, Jr.[3], and R. D. Randel[5], [1]*Texas Tech University*, *Lubbock*, [2]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [3]*Texas A&M System*, *College Station*, [4]*Mississippi State University*, *Raymond*, [5]*Texas A&M System*, *Overton*.

Neutrophils possess a large array of antimicrobial effector functions. The acute phase response is a complex series of events including a period of inflammation followed by a counter anti-inflammatory state. This study was performed to elucidate any temporal effect of an endotoxin challenge on bovine neutrophil function. Six Brahman bull calves (283 ± 39.9 kg) were fitted with jugular catheters. The next day, all calves were challenged with an intravenous infusion of lipopolysaccharide (LPS; 0.25 μg/kg BW). Four hours before and at 0.5, 1.5, 5.5 and 24 h relative to the LPS challenge, peripheral blood was collected and analyzed to determine the percentage of neutrophils phagocytosing *Mannheimia haemolytica* and producing an oxidative burst. Since phagocytosis and oxidative burst are dynamic processes we evaluated 2 previously determined incubation times that represented the maximal percentage of neutrophils phagocytosing and producing an oxidative burst as well as the rate to reach that maximum. There was a tendency *(P = 0.08)* for an interaction between time following the LPS challenge and incubation time for the percentage of neutrophils phagocytosing. Both the rate and maximal percentage of neutrophils increased following the LPS challenge peaking at 1.5 h; however, at 5.5 h after the challenge, the maximal neutrophils phagocytosing had returned to baseline levels; whereas the rate did not completely return to baseline levels until 24 h following the LPS challenge. Similarly, there was an interaction *(P < 0.01)* between time following LPS and incubation time for the percentage of neutrophils producing an oxidative burst. The rate increased within 0.5 h *(P < 0.05)*, plateaued at 1.5 h, and remained elevated at 24 h; whereas the maximal percentage of neutrophils producing an oxidative burst was not elevated until 24 h *(P < 0.01)*. These data indicate that that the acute phase response to LPS increases the percentage of neutrophils phagocytosing *Mannheimia haemolytica* and producing an oxidative burst. Furthermore, the rate to reach the maximum rather than the maximal percentage of neutrophils is more responsive to the effects of LPS.

Key Words: Calves, Endotoxin, Neutrophil

66 Evaluation of immunological and physiological parameters associated with an infectious bovine rhinotracheitis viral challenge in beef steers. S. M. Behrends*[1], J. A. Carroll[2], J. O. Buntyn[1], K. M. Cooley[1], D. J Sykes[1], L. H. Hulbert[2], J. W. Daily[2], M. A. Ballou[3], and T. B. Schmidt[1], [1]*Mississippi State University*, *Mississippi State*, [2]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [3]*Texas Tech University*, *Lubbock*.

To evaluate the effects infectious bovine rhinotracheitis virus (IBRV) has on immunological and physiological parameters of cattle; 12 Angus crossbred steers (228.82 ± 22.15 kg) were randomly assigned to either a Control group or an IBRV challenged group. Prior to the challenge steers were fitted with an indwelling rectal probe, weights were recorded, and a blood sample was obtained. On day 0, IBRV steers received an intra-nasal dose of IBRV (2 ml/nostril; Cooper strain, 1 X 10^{6-7} PFU) and Control steers received an intra-nasal dose of saline (2 ml/nostril). After the challenge steers were returned to their isolated paddocks for approximately 73 h. Challenged steers were placed in a paddock that was isolated from the Control cattle as well as all other cattle located on the research farm. During the first 48 h post-challenge blood was collected via a single venipuncture of the jugular vein. At 72 h post-challenge steers were fitted with temporary indwelling jugular catheters and heart rate monitors, and then moved to individual metabolism stanchions. Blood samples were obtained on d –1 thru 28 and intensively collected on d 4, 5, 6, 7, and 8 post–challenge. Serum was analyzed for interleukin–1β (IL–1), IL–2, IL–4, IL–6, interferon–γ (IFN–γ), tumor necrosis factor–α (TNF–α) and cortisol. Interleukin–1, IL–2, and IL–4 concentrations were extremely low (less than 20 pg/ml) in all animals. Cortisol, IFN–γ, TNF–α and IL–6 all increased in challenged animals. Cortisol and IFN–γ had similar response patterns ($r = 0.11$, $p < 0.05$) in IBRV steers. All IBRV steers had increased concentrations of cortisol and IFN–γ starting around d 2, peaking on d 4, and tapering off around d 6. Only half of the IBRV cattle (n = 4) had increased concentrations of TNF–α starting around d 5 and tapering off around d 7 and half of those IBRV steers (n = 2) had increased concentrations of IL–6. Interpretation of this data suggests that IFN–γ and cortisol could potentially play important roles in the febrile response associated with cattle infected with IBRV.

Key Words: Cattle, Cortisol, Cytokines

67 In vitro characterization and detection of photonic emissions of Staphylococcus aureus in inoculated bovine milk. J. Curbelo*, K. Moulton, and S. Willard, *Mississippi State University*, *Starkville*.

Staphylococcus aureus (*S. aureus*) is an important mastitis pathogen in the dairy industry. The objectives of this study were to characterize photonic properties of a stably transformed bioluminescent *S.aureus*-lux (Xen8.1) and to evaluate photonic detection of *S. aureus*-lux in inoculated bovine milk. *S. aureus*-lux was grown for 24 h in LB broth with or

without Kanamycin (KAN; 200 µg/ml) at 37°C. Inoculums were placed in black 96-well plates for imaging (100 µl; n=24 replicates) using an acquisition time of 2 s and emissions quantified (RLU/sec). Following imaging, inoculums were plated and colonies counted. Inoculums were sub-cultured from d 0 to 7, imaged, and re-plated to determine colony forming units (CFU/ml). For our second objective, *S. aureus*-lux was grown for 24 h in LB broth and raw milk at 37°C in an incubated shaker. Serial 7-fold dilutions were made from 1 ml aliquot into broth or milk (500 µl). Aliquots were placed in black 96-well plates for imaging (100 µl; n=6 replicates; 3 min) and emissions quantified (Ph/pix/s). Inoculums were then plated and CFU counted. Repeated measure analysis was used for photonic and CFU comparisons over time, and a *t*-test was used to compare photonic emissions and CFU between inoculums in LB vs. milk. Bacterial counts did not differ ($P > 0.05$) between KAN and LB alone (i.e., day 7; $6.1\times10^7 \pm 1.0\times10^7$ vs. $8.7\times10^7 \pm 1.0\times10^7$ CFU/ml), while photonic emissions were lower ($P < 0.05$) between KAN and LB alone (i.e., 54.1 ± 87.2 vs. 293.9 ± 87.2 RLU/s). Photonic emissions of *S.aureus*-lux were higher ($P < 0.05$) in milk than in LB (141.1 ± 12.3 vs. 89.1 ± 10.3 Ph/pix/sec) while bacterial counts did not differ ($P > 0.05$) between milk and LB ($7.6\times10^7 \pm 1.7\times10^7$ vs. $9.6\times10^7 \pm 2.2\times10^7$ CFU). In summary, this study indicates that *S.aureus*-lux is very stable without KAN, however, light intensity is decreased by KAN. Further studies are needed to evaluate the effects of KAN on photonic emissions of *S.aureus*-lux. This study also suggests that it may be possible to develop models that may facilitate real-time monitoring of pathogens present in milk or in the mammary gland *in vivo*.

Key Words: *S. aureus*, Biophotonics, Milk

68 Relationships between heat shock protein 70 promoter polymorphisms and bull immune responses. D. G. Holtz*[1], M. L. Looper[2], J. M. Demotto[1], S. T. Reiter[1], D. M. Hallford[3], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*ARS/USDA*, *Booneville, AR*, [3]*New Mexico State University*, *Las Cruces*.

Previously, we demonstrated that single nucleotide polymorphisms (SNP) in upstream elements of bovine heat shock protein 70 (HSP) gene were related to cow endocrine and reproductive responses. Our objective was to determine if HSP promoter SNP were related to bull immune responses. Angus-sired Brahman-influenced bulls (n = 19) were developed on common bermudagrass [Cynodon dactylon (L.) Pers.] pastures overseeded with Elbon rye (Secule cereale L.) for 160 d postweaning. At d 160, each bull was administered an intraperitoneal injection of *Salmonella typhimirium* lipopolysaccharide (0.7 ug/kg of body weight). Blood samples were collected at 0, 3, 6, 9, and 24 h post-injection (hpi). Blood cell differentials, and serum concentrations of cortisol, prolactin, testosterone, and IGF-I were determined at each time point. Bulls were genotyped based on our previously published HSP primers, and bulls were classified as yes or no they had a SNP in our 500 bp sequence. Haptoglobin and cortisol concentrations increased ($P < 0.05$), and IGF-I and prolactin concentrations decreased ($P < 0.05$) during the 24 hpi. Blood cell differentials were affected ($P < 0.05$) by time, but were not affected ($P > 0.05$) by interactions between time and HSP SNP. Bulls with a HSP SNP had decreased ($P < 0.05$) numbers of monocytes, and erythrocytes with lower ($P < 0.05$) volumes and hemoglobin concentrations. These results demonstrate that SNP in the HSP promoter were associated with bull blood cell differentials in response to an immune challenge; however, hormone release by the hypophyseal-adrenal-gonad axes was not related to HSP genotypes.

Key Words: HSP-70, Endotoxin, Bull

69 Relationships between follicle stimulating hormone promoter polymorphisms and bull immune responses. C. F. Rosenkrans, Jr.*[1], M. L. Looper[2], S. T. Reiter[1], D. L. Kreider[1], and D. M. Hallford[3], [1]*University of Arkansas*, *Fayetteville*, [2]*ARS/USDA*, *Booneville, AR*, [3]*New Mexico State University*, *Las Cruses*.

Previously, we demonstrated that single nucleotide polymorphisms (SNP) in upstream elements of bovine follicle stimulating hormone (FSH) gene were related to cow endocrine and reproductive responses. Our objective was to determine if FSH promoter SNP were related to bull immune responses. Angus-sired Brahman-influenced bulls (n = 19) were developed on common bermudagrass [Cynodon dactylon (L.) Pers.] pastures overseeded with Elbon rye (Secule cereale L.) for 160 d postweaning. At d 160, each bull was administered an intraperitoneal injection of *Salmonella typhimirium* lipopolysaccharide (0.7 ug/kg of body weight). Blood samples were collected at 0, 3, 6, 9, and 24 h post-injection (hpi). Blood cell differentials, and serum concentrations of cortisol, prolactin, testosterone, and IGF-I were determined at each time point. Bulls were genotyped based on our previously published FSH primers, and bulls were classified as yes or no they had a SNP in our 600 bp sequence. Haptoglobin concentrations increased ($P < 0.05$) and IGF-I concentrations decreased ($P < 0.05$) during the 24 hpi. Serum concentrations of cortisol increased ($P < 0.05$) during the first 6 hpi and returned to baseline. Testosterone concentrations were decreased ($P < 0.05$) at 3, 6, and 24 hpi. The FSH SNP interacted with time to alter serum prolactin concentrations. Bulls with FSH SNP had higher ($P < 0.05$) prolactin concentrations at 0 and 24 hpi; however, at 3, 6, and 9 hpi there were no differences between bulls with and without an FSH SNP. Blood cell differentials were affected ($P < 0.05$) by time, but were not affected ($P > 0.05$) by interactions between time and FSH SNP. Bulls with a FSH SNP had increased ($P < 0.05$) numbers of neutrophils, and platelets, and greater ($P > 0.05$) corpuscular volume and hemoglobin content. These results demonstrate that SNP in the FSH promoter are associated with bull immune responses.

Key Words: FSH, Endotoxin, Bull

70 Using stable isotope analysis of hair samples to differentiate between pre-weaning and post-weaning states in dairy calves. K. Cooley*[1], T. Beck[1], D. Moore[1], B. Rude[1], S. Brookes[2], A. Kouba[3], R. Hansen[3], and S. Willard[1], [1]*Mississippi State University*, *Mississippi State*, [2]*Iso-Analytical Limited*, *Sandbach, Chesire, UK*, [3]*Memphis Zoo*, *Memphis, TN*.

Dairy calves undergo various degrees of physiological and nutritional stress during the transition from pre-weaning to post-weaning diets. As calves gain nutritional independence (i.e. transition from a milk-based diet, to a weaning ration, and finally to supplementation of a primarily forage-based diet) there are certain physiological shifts that may occur. Hair samples were collected from 23 dairy calves at four different periods (d 6, 34, 83, and 124 ± 5 after birth) to determine differences between pre-weaning and post-weaning isotopes at the time of nutritional shifts; stable isotope signatures (C^{13} and N^{15}) change during the transition of weaning as an animal's diet is altered from a milk-based diet (higher trophic level feedstuff) to a forage-based diet (lower trophic level feedstuff). Because organisms will integrate varying amounts of naturally occurring carbon and nitrogen isotopes over others, the increase in trophic level will skew the ratio of the isotopes from that of the surrounding environment. Collection periods were as follows: d 6 = 100% milk-based diet; d 34 = 50% milk-based 50% grain-based diet; d

83 = 100% grain-based diet; d 124 ± 5 = 100% forage-based diet. Hair samples were collected from over the shoulders, cleaned in acetone, and C^{13} and N^{15} were analyzed using isotope ratio mass spectrometry to measure very small changes in isotope ratios. Delta notation compares the isotope ratio of the sample to the isotope ratio of an internal standard and then expresses the difference in permil ($^0/_{00}$). Hair sample C^{13}content pre-weaning (d 6 & 34) was greater ($p < 0.0001$; -16.7 $^0/_{00}$ ± 0.21$^0/_{00}$) than post-weaning (d 83 & 124 ± 5; -18.0 $^0/_{00}$ ± 0.07 $^0/_{00}$). Hair sample N^{15} content also decreased ($p< 0.0001$) from pre-weaning (8.1 $^0/_{00}$ ± 0.11 $^0/_{00}$) to post-weaning (5.3 $^0/_{00}$ ± 0.05 $^0/_{00}$). Based on the results observed from our study it is evident that transitional shifts can be observed in isotopes of pre-weaned vs. post-weaned dairy calves. These data may have value in determining nutritional status and/or shifts in the consumption of feedstuffs during weaning or other periods of nutritional stress.

Key Words: Hair, Isotopes, Weaning

71 Pharmacokinetics of steer liver cytochrome P450 3A metabolism of ergot alkaloids. A. S. Moubarak*[1], S. Nabhan[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*.

We have reported the presence and involvement of cytochrome P450 3A (CYP3A) subfamily in the metabolism of ergotamine (ET) in beef liver microsomes. The objective of this study was to investigate the involvement of beef liver microsomal CYP3A in the metabolism of selected ergot alkaloids (ergocryptine, bromocryptine, ergocornine, ergonovine and lysergol) and the possible influence of such alkaloids on the CYP3A metabolism of ergotamine. Liver microsomes were prepared from steers (n = 3; 600 kg) by sequential centrifugation at 800 g for 10 min, at 13,500 g for 20 min collecting the supernatant, and then at 105,000 g for 60 min collecting the pellet which contained the microsomal fraction. The CYP3A activity was evaluated using ET as a substrate in medium containing liver microsomes and NADPH at 37°C for 30 min. The disappearance of ET and the appearance of metabolites (M1 and M2) were measured using HPLC. Each ergot alkaloid was evaluated between 0 and 5 nM and analyzed using ANOVA to determine dose effects. Ergotamine was converted at rates of 0.85 nM/Î¼g protein/min when incubated with beef liver microsomes. All selected ergopeptide alkaloids showed some inhibition of the CYP3A conversion of ET to its metabolites. Bromocryptine (3 nM) inhibited ($P < 0.05$) CYP3A activity by 48%; whereas, ergocryptine (5 nM) inhibited ($P < 0.05$) the conversion of ET to its metabolites by 34%. Of the ergopeptides, ergocornine (5 nM) had the lowest amount of inhibition (20.0%). Ergonovine and lysergol, which represent the lysergic acid amide alkaloids, had no significant effects on CYP3A activity under our experimental conditions. Ergotamine and ergocryptine were metabolized in a dose dependent manner. These results confirm the complexity of the interactive effects of ergot alkaloids on the detoxification and clearance of multiple ergot alkaloids presented to the beef liver via endophyte-infected tall fescue.

Key Words: Ergot alkaloids, CYP3A4, Microsomes

72 Responses of captive elephants to changes in environmental conditions. S. Dray*[1], C. Johnson[1], A. Smith[2], D. Barkle[2], A. Fisher[2], A. Kouba[2], and S. Willard[1], [1]*Mississippi State University*, *Mississippi State*, [2]*Memphis Zoo*, *Memphis, TN*.

Digital Infrared Thermal Imaging (DITI) is a non-invasive technique that identifies thermal asymmetry of body surface temperature gradients. Elephants face thermoregulatory issues and ear flapping aids in reducing heat load. The objective was to observe African elephants (n=2) and investigate heat exchange by the elephant in relation to ear flapping. Thermal images were acquired at numerous times on each sampling day with measures of ambient temperature (AMBT), relative humidity (RH), temperature-humidity index (THI), wind speed (WIND), and the number of ear flaps (10 min observations) over 12 independent days. These data were categorized into AM, Early PM (EPM; 1200-1500 h) and Late PM (LPM; 1600 to 1900 h) measures for data analysis. Elephant subjects were as follows: ASALI: pregnant female, 22 yr old, 3,347.51 kg, 2.51 m, and TY: non-pregnant female, 44 yr old, 4,599.43 kg, 2.67 m. AMBT increased ($P<0.0001$) from AM to EPM/LPM (25 °C and 30.8/30.6 °C, respectively), but did not differ ($P>0.10$) between EPM and LPM, whereas RH decreased throughout the day (67.3%, 53.6% and 49.6% for AM, EPM and LPM, respectively). THI increased ($P<0.001$) from AM to EPM/LPM and tended to differ ($P<0.10$) between EPM and LPM. WIND varied during the day but differed between AM and EPM/LPM ($P<0.05/0.07$) and between EPM and LPM ($P<0.05$). Ear flapping frequency differed ($P<0.0001$) between elephants with ASALI exhibiting a greater number of ear flaps than TY (26.2 ±1.2 vs. 7.9±0.49 ear flaps/min) at AM, EPM and LPM periods. Both elephants increased ear flapping from AM to EPM/LPM, however within elephant EPM and LPM ear flap frequencies did not differ ($P>0.10$). For both elephants, AMBT, RH and THI were highly correlated with ear flapping (R=0.65, -0.71, 0.50 and 0.56, -0.44, 0.49 for ASALI and TY, respectively), whereas WIND exhibited no relationship ($P>0.10$) to ear flapping (R=0.16 and 0.08 for ASALI and TY, respectively). These data show variations in ear flapping responses to environmental temperatures (higher for ASALI than for TY), however a response between elephants to time of day and a lack of a response to WIND was noted. [NIH #5T35RR007071 and Biophtonics Initiative: #58-6402-3-0120]

Key Words: Thermography, Elephant

73 Pregnancy rates following fixed-time AI in Brahman cows after administration of CIDR-based estrous synchronization protocols. K. J. Stutts*[1], D. W. Forrest[1], and C. R. Looney[2], [1]*Texas AgriLife Research*, *College Station, TX*, [2]*OvaGenix, Inc.*, *Bryan, TX*.

The objective of this study was to compare the effects of estradiol-17β (E17) or GnRH in combination with a CIDR insert on pregnancy rate to fixed-time AI (FTAI) in Brahman cows. Lactating and non-lactating cows (n=138) were assigned to treatment groups based on days postpartum and lactation status. Cows in the E17 treatment group received a CIDR insert (1.38 g progesterone) in addition to an injection (i.m.) of E17 (2.5 mg) and progesterone (50 mg) at the initiation of treatment (d 0). The CIDR insert was removed and prostaglandin $F_{2\alpha}$ (PG, 25 mg, i.m. Prostamate) was administered on d 7. A second injection of E17 (1 mg, i.m.) was administered on d 8, and cows were inseminated 30 h later. Cows in the GnRH treatment group received a CIDR insert in addition to an injection of GnRH (100 μg, i.m. OvaCyst) at the initiation

of treatment (d 0). An injection of PG (25 mg, i.m.) was administered on d 6, and the CIDR insert was removed on d 7. Cows received a second injection of GnRH (100 μg, i.m.) at the time of insemination, 48 h after CIDR removal. Detection of estrus was conducted by application of paint to the tailhead at CIDR removal. Absence of the paint at the time of insemination indicated the cow had been mounted in association with estrus. Pregnancy rate to FTAI was higher ($P < 0.01$) for cows treated with E17 (47.22%) than for cows treated with GnRH (22.73%). The percentage of cows detected in estrus prior to insemination did not differ between E17 (80.56%) and GnRH (69.70%) treatment groups. There was no difference ($P = 0.28$) in pregnancy rate to FTAI between lactating (41.2%) and non-lactating (32.2%) cows. Results of this study indicate that acceptable pregnancy rates to FTAI can be achieved in postpartum, suckled and non-lactating Brahman cows using CIDR inserts in combination with estradiol-17β.

Key Words: Estrous synchronization, Timed AI, Brahman cows

74 Comparison of timed AI pregnancy rates in south Texas beef heifers following the CO -Synch+CIDR protocol. S. P. Pothula*[1], J. Ramirez[2], S. Moore[2], R. Silguero[2], K. D. Arnold[1], and R. L. Stanko[1,3], [1]*Texas A & M University*, *Kingsville*, [2]*King Ranch, Inc.*, *Kingsville, TX*, [3]*Texas AgriLife Research*, *Beeville, TX*.

We compared pregnancy rates in beef heifers (n=133) typical to south Texas following administration of the CO-Synch + CIDR protocol and timed AI (TAI). Heifers were compared based on four breed types: Santa Gertrudis (SG, n=42), SG × English F1 (SGE, n=49), SG × Brahman F1 (SGBr, n= 12), and 3/4 Red Angus × 1/4 SG (RAx, n= 17). Heifers (n=13, 10%) were removed from data set due to lost CIDR or absence at TAI or pregnancy determination. Age was determined from recorded birth date, and BCS and BW was recorded at CIDR insertion. All heifers were administered GnRH (100 μg, i.m.) at CIDR insert (1.38 g progesterone, d 0). CIDR inserts were removed and prostaglandin $F_{2\alpha}$ (PG, 25 mg, i.m.) administered on d 7. TAI was performed 55 to 58 h after PG and all heifers were administered GnRH (100 mg, i.m.) following TAI. Pregnancy was diagnosed by rectal ultrasound 34 or 35 d after TAI. Overall, heifer age, BW, BCS, and pregnancy rate was 412.5 ± 2.4 d, 340.0 ± 3.6 kg, 5.9 ± 0.06, and 43.3%, respectively. There was no relationship ($P>0.10$) between breed type and pregnancy rate. However, RAx (312 ± 9 kg) heifers were lighter ($P<0.01$) than SGE (357 ± 5 kg) heifers, with SG (333 ± 6 kg) and SGBr (334 ± 11 kg) heifers being intermediate. Age was greater ($P<0.05$) in RAx (427 ± 6 d) than both SG (408 ± 4 d) and SGBr (403 ± 7 d), but similar ($P>0.10$) to SGE (414 ± 4 d) at CIDR insertion. Pregnancy rate was similar ($P >0.10$), <50% in SG (18/42, 42.8%) and SGE (21/49, 43.8%) heifers. Statistically, heifers with greatest Brahman influence (>50%, SGBr) exhibited a lower than expected pregnancy rate (3/12, 25%) and heifers with lowest Brahman influence (<10%, RAx) exhibited a greater than expected pregnancy rate (10/17, 59%). There was no difference between the pregnancy rates based on BW, BCS, or age within the breed groups. In summary, the CO-Synch + CIDR + TAI protocol resulted in better and acceptable pregnancy rates in heifers with less than 10% Brahman influence. Alternative synchronization of estrus protocols are needed to enhance success rate of TAI in cattle adapted to the gulf coast region.

Key Words: Heifer, CO-Synch, CIDR

75 Comparison of a Select Synch/CIDR + timed-AI (TAI) to a modified Co-Synch/CIDR synchronization protocol in suckled *Bos indicus* × *Bos taurus* cows. R. D. Esterman*, B. R. Austin, E. M. McKinniss, and J. V. Yelich, *University of Florida*, *Gainesville*.

Multiparous suckled *Bos indicus* × *Bos taurus* cows were used to compare a Select Synch/CIDR + TAI protocol (SSC) to a modified Co-Synch/CIDR protocol (COS). Five groups of suckled *Bos indicus* × *Bos taurus* cows were utilized (n = 659) and allotted to treatments based on days postpartum (DPP) and body condition (BCS) on d 0 of the experiment. Blood samples were collected 10 d before the start of the experiment and on d 0 to evaluate progesterone concentrations to determine estrous cycling status. Cows in both treatments received GnRH (100 μg; Cystorelin) and a CIDR (Eazi-Breed CIDR) on d 0. On d 7, SSC cows had CIDR removed and received PG (25 mg; Lutalyse Sterile Solution); whereas, COS cows had CIDR removed and received PG on d 7.5. For SSC cows, estrus was detected for 3 d following PG and cows were AI 8 to 12 h after observed in estrus. Additionally, cows not exhibiting estrus by 72 h after PG received GnRH and TAI at 76 to 80 h. The COS cows received GnRH and TAI at 66 to 70 h after PG. The SSC cows had a 3 d estrous response of 50.6% (168/332), conception rate of 66.1% (111/168), and TAI pregnancy rate for non-responders of 32.3% (53/164). Synchronized pregnancy rates were similar ($P > 0.05$) for SSC (49.4%; n = 164/332) and COS (47.1%; n = 154/327). Estrous cycling status and BCS did not ($P > 0.05$) influence synchronized pregnancy rates. Synchronized pregnancy rates were influenced by days postpartum ($P < 0.05$), with longer postpartum cows achieving greater pregnancy rates. Although there were group differences ($P < 0.05$) for synchronized pregnancy rate, there were no ($P > 0.05$) treatment × group and treatment × estrous cycling effects on synchronized pregnancy rate. In summary, the modified COS TAI protocol yielded similar synchronized pregnancy rates compared to the SSC protocol and the COS appears to be an effective TAI synchronization protocol in suckled *Bos indicus* × *Bos taurus* cows.

Key Words: Artificial insemination, Bos indicus, Estrous synchronization

76 Effects of body condition and forage type on endocrine factors and calving rate of Brahman-influenced cows. M. L. Looper*[1], S. T. Reiter[2], D. M. Hallford[3], and C. F. Rosenkrans, Jr.[2], [1]*USDA, ARS*, *Booneville, AR*, [2]*University of Arkansas*, *Fayetteville*, [3]*New Mexico State University*, *Las Cruces*.

Multiparous Brahman-influenced cows were managed to achieve marginal (BCS = 4.9 ± 0.1; n = 55) or moderate (BCS = 6.5 ± 0.1; n = 55) body condition (BC) to determine the influence of forage type on serum concentrations of prolactin, cortisol, IGF-I, glucose, NEFA, and calving rate. Cows within each BC were randomly assigned to graze either common bermudagrass (CB) or endophyte-infected tall fescue (EI; >85% of stand) during a 60-d breeding period. Concentrations of progesterone in blood sera collected on d -10 and at initiation of the breeding season (d 0) were used to determine luteal status (cyclic vs anestrus). Blood samples were collected at d 0, 30 and 60 of the breeding season and serum concentrations of prolactin, cortisol, IGF-I, glucose, and NEFA were quantified. Twenty-two percent (24/110) of cows were anestrus at the initiation of the breeding season. Concentrations of prolactin were affected by a forage x luteal status ($P = 0.01$) interaction.

Prolactin was greatest in cyclic cows grazing CB (126 ± 10 ng/mL) and least in cows grazing EI with (38 ± 10 ng/mL) or without (39 ± 15 ng/mL) luteal activity at the initiation of the breeding season; anestrous cows grazing CB were intermediate (78 ± 13 ng/mL). Cyclic cows had greater (P < 0.05) cortisol, IGF-I, and glucose than anestrous cows. Concentrations of IGF-I tended (P = 0.08) to be influenced by a forage type x BC interaction; marginal BC cows grazing CB (67 ± 5 ng/mL) had increased IGF-I compared with cows grazing CB in moderate BC (55 ± 5 ng/mL). Cows in marginal BC grazing CB tended (P = 0.07) to increase in BC (+0.5 ± 0.2 units) during the breeding season while all other cows lost BC (mean BCS loss = -0.3 ± 0.2 units). Calving rates were similar (P > 0.10) among moderate (87%) and marginal (87%) BC cows grazing CB, and moderate BC cows grazing EI (80%); however, marginal BC cows grazing EI tended (P = 0.09) to have decreased calving rates (68%). Calving rates tended to be lower in marginal BC cows grazing EI. Cows in marginal BC and grazing CB tended to have increased BC, concentrations of IGF-I, and calving rates.

Key Words: Beef cows, Calving rate, Insulin-like growth factor-I

77 Evaluation of two progestogen based estrous synchronization protocols in yearling heifers of *Bos indicus* × *Bos taurus* breeding. E. N. McKinniss*, R. D. Esterman, S. A. Woodall, B. R. Austin, and J. V. Yelich, *University of Florida*, *Gainesville*.

Yearling *Bos indicus* × *Bos taurus* heifers (n = 410) at three locations, were synchronized with either the Select Synch + CIDR timed-AI (SSC+TAI) or 7–11 treatments with d 0 designated as the start of experiment. Heifers were equally distributed to treatment by reproductive tract score (RTS; Scale: 1 = immature tract to 5 = estrous cycling) and BCS (Scale 1-9) on d 0. The 7–11 treatment received a protein supplement (0.90 kg/head/d) containing melengestrol acetate (MGA; 0.5 mg/head/d) from d 0–7 with GnRH (Cystorelin; 100 g) on d 11 followed by PG (Lutalyse Sterile Solution; 25 mg) on d 17. The SSC+TAI received a CIDR® (Eazi-Breed CIDR) on d 11 concomitant with GnRH with CIDR removal and PG on d 17. The SSC+TAI heifers received the same supplement without MGA from d 0–7. For both treatments, estrus was detected twice daily for 72 h after PG and heifers were AI 6 to 12 h after detected estrus. Non-responders were TAI + GnRH 72–76 h after PG. The 7–11 heifers (n= 212) had greater ($P < 0.05$) estrous response (ER; 55.2 vs. 41.9%), conception rate (CR; 47.0 vs. 31.3%), and synchronized pregnancy rate (SPR; 33.5 vs. 24.8%) compared to SSC+TAI heifers (n = 198), respectively. Timed-AI pregnancy rates were similar ($P > 0.05$) between 7–11 (16.8%) and SSC+TAI (20.0%). Across treatments, heifers exhibiting estrus at 60 h (n = 47; 61.7%) had a greater ($P < 0.05$) CR compared to ≤36 (n = 22; 35.3%), 48 (n = 57; 31.6%), and 72 h (n = 69; 36.2%), which were similar ($P > 0.05$) to each other. As RTS increased from ≤ 2 to ≥ 3, ER [(28.3%; n = 53); (51.8%; n = 357)], CR [(6.7%; n = 15); (43.2%; n = 185)], and SPR [(7.6%; n = 53); (32.5%; n = 357)] increased ($P < 0.05$), respectively. In summary, the 7–11 treatment had a greater ER, CR, and SPR compared to the SSC+TAI in yearling *Bos indicus* × *Bos taurus* heifers and synchronization treatment effectiveness was significantly affected by reproductive tract score.

Key Words: *Bos indicus*, Progestogen, Prostaglandin

78 Growth characteristics and age at puberty in female offspring are affected by the type of accommodations in which gestating sows are kept. M. J. Estienne* and A. F. Harper, *Virginia Polytechnic and State University*, *Blacksburg*.

Cortisol levels in serum of pregnant sows kept in individual crates were greater than levels in group-housed sows (Estienne et al., 2006; J. Swine Health Prod. 14:241-246), leading us to hypothesize that due to fetal programming, performance of offspring born to sows kept in different gestation accommodations may also be impacted. The objective was to determine the effects of sow gestation accommodations on growth performance and age at puberty in gilt offspring. Yorkshire × Landrace gilts (n = 81; 26.9 ± 0.8 kg) were placed in pens of three gilts each. Each pen had gilts farrowed exclusively by sows exposed to one of three gestation accommodations: I. individual crates throughout gestation (C), II. group pens throughout gestation (G), or III. crates for 30 d post-AI and then group pens for the remainder of gestation (C/G) (n = 9 pens/group). The grow-finish trial ended at a BW of 108.9 ± 0.8 kg and ADG (0.97 ± 0.02 kg) was not affected (P = 0.13) by treatment. BW was affected by accommodation type x time (P = 0.04), with C gilts being heaviest during the last four wk. There was no effect of treatment on ADFI (2.59 ± 0.07 kg; P = 0.54), however, feed per unit of gain was less (P < 0.05) in C gilts (2.60 ± 0.04) and C/G gilts (2.62 ± 0.04) compared with G gilts (2.73 ± 0.04). C gilts had less (P < 0.09) backfat (10.9 ± 0.5 mm) than G gilts (12.5 ± 0.5 mm), with C/G gilts having an intermediate value (12.1 ± 0.5 mm) not different from the other groups. After the grow-finish trial, gilts were checked for estrus daily. Age at puberty (171.9 ± 4.4 d) did not differ among groups (P = 0.61), but fewer C gilts (P = 0.03) showed estrus by 165 d of age (13%) compared with the other groups (44%). The keeping of pregnant sows in crates is a contentious welfare issue facing pork producers. We suggest that the type of gestation accommodation affects not only the sow but the production performance of gilt offspring as well. These findings could impact the design of future gestation housing systems, particularly for those producers contemplating a switch from individual to group accommodations.

Key Words: Gestation crate, Puberty, Gilt

Ruminant Animal Production

79 Effects of Megalac-R® supplementation on measures of performance and the acute phase reaction in transported beef heifers. D. B. Araujo*, R. F. Cooke, and J. D. Arthington, *University of Florida*, *Ona*.

The objective of this experiment was to evaluate the acute-phase response and growth of yearling, transported beef heifers supplemented with a rumen-inert source of polyunsaturated fatty acids (Megalac-R®; Church & Dwight Co., Inc. Princeton, NJ). Prior to shipping (d -30 to d 0), 48 Brahman-crossbred heifers were stratified by initial BW and randomly allocated to 6 bahiagrass (*Paspalum notatum*) pastures. Each pasture was randomly assigned to 1 of 2 daily supplement treatments (3 pastures/treatment; 8 heifers/pasture), which consisted of iso-caloric and iso-nitrogenous grain-based supplements, with (MG) or without (CO) Megalac-R® (150g daily). On d 0, heifers were loaded onto a commercial livestock trailer and transported for approximately 1,600 km over a 24 h period. Upon arrival (d 1), 24 of the 48 heifers were stratified by BW and assigned to individual pens in a research feedlot facility (12 pens/

treatment). Pre-shipping treatment allocation continued in the post-shipping phase. Heifer shrunk BW was recorded on d -30, d 1 and d 28 to determine ADG. Voluntary hay intake was recorded daily during the post-shipping period. Blood samples were collected on d 0, 1, 4, 8, 15, 22 and 29 for determination of plasma ceruloplasmin, haptoglobin and cortisol concentrations. Supplement treatment had no effect (P > 0.98) on heifer performance prior to shipping. A treatment x time interaction was detected for haptogobin (P < 0.01) because MG-fed heifers had decreased (P < 0.05) haptoglobin concentrations on d 1, 3 and 5 compared to CO-fed heifers. No treatment effects were detected for ADG, forage DMI, feed efficiency, ceruloplasmin and cortisol concentrations. In this experiment, supplementation of Megalac-R® to yearling heifers decreased transport-induced plasma haptoglobin concentrations.

Key Words: Beef cattle, Transport, Megalac-R®

80 Supplemental trace minerals from injection (Inject-A-Min® vs. Mineral Max® II) for shipping-stressed cattle. J. T. Richeson*, E. B. Kegley, D. L. Galloway, Sr., and J. A. Hornsby, *University of Arkansas*, *Fayetteville*.

Crossbred heifer calves (n = 90, initial BW = 196 ± 9 kg) were blocked by BW and assigned randomly to 1 of 3 treatments: 1) Inject-A-Min® (Mineral Technology, Porterville, CA) trace mineral injection on d 0 (**ITM**; 1 mL/45 kg containing 20 mg Zn, 20 mg Mn, 10 mg Cu, and 5 mg Se/mL); 2) Mineral Max® II (RXVeterinary Products, Westlake, TX) trace mineral injection on d 0 (**MTM**; 1 mL/45 kg containing 48 mg Zn, 10 mg Mn, 16 mg Cu, and 5 mg Se/mL); or 3) negative control (**CON**). Calves were offered ad libitum access to a common receiving ration for the entire 51 d trial. Heifer BW were recorded on d 0, 14, 28, and 51 to determine performance, and animals were evaluated daily for clinical signs of bovine respiratory disease (**BRD**) and treated accordingly. Blood plasma samples were collected on d 0 and 28 and analyzed for Zn and Cu concentrations. From d 0 to 51, ADG was greater ($P \leq 0.006$) for calves receiving either of the trace mineral injections compared to CON; however, ADG did not differ ($P = 0.84$) among the 2 mineral treatments. Compared to CON, total feed intake was greater for ITM ($P = 0.05$) and tended to be greater for MTM ($P = 0.09$). Overall gain:feed was also greater for the 2 trace mineral treatments than CON ($P \leq 0.02$). Calves receiving MTM and ITM gained 0.19 and 0.18 kg BW respectively per kg of feed consumed with CON calves gaining 0.16 kg BW per kg of feed consumed. No differences ($P = 0.13$) were detected for the rate of BRD morbidity; however, antibiotic treatment cost was greater for CON treatment than ITM ($P = 0.04$) or MTM ($P = 0.07$). Plasma Zn and Cu on d 28 were not affected by trace mineral injection (day × treatment, ($P \geq 0.30$); however, both Zn and Cu concentrations increased from d 0 to 28 ($P \leq 0.002$). Providing a trace mineral injection with either Inject-A-Min® or Mineral Max® II during initial processing of shipping-stressed calves improved ADG and feed efficiency while reducing antibiotic treatment cost, compared to the negative control.

Key Words: Beef cattle, Trace minerals, Shipping-stressed

81 Evaluation of performance and immune response in steers of known background challenged with bovine viral diarrhea (BVD) virus. C. A. Runyan*[1], A. D. Herring[1], J. E. Sawyer[1], W. J. Horne[1], and J. F. Ridpath[2], [1]*Texas A&M University*, *College Station*, [2]*USDA-ARS*, *Ames, IA*.

Steers (n = 73; 250 kg) born in the spring of 2007 and produced from cows in the Texas A&M University McGregor Genomics project were evaluated for immune response to bovine viral diarrhea (BVD) challenge. Steers were not vaccinated for respiratory disease and verified to be BVD-free before the trial began. Steers were stratified by sire and cow family across vaccine treatments including a killed product (KV; n = 33), a modified live product (MLV; n = 32) and non-vaccinated (NON; n = 8). KV injections were administered at d -42 and -21, and a single MLV injection was administered on d -21. On d 0 (April 22, 2008), steers were given an intranasal viral challenge with BVDV strain CA0401186a, a BVDV type1b genotype obtained from the National Animal Disease Center. Cattle were weighed with blood drawn for IgG serum neutralizing titers for IBR, BVD type 1 and BVD type 2 on d -42, -21, 0, 14, 28 and 42. Rectal temperatures were obtained on these d, plus d 1, 3 and 9. Titers were transformed to a log-base of 2 for analyses. Mixed model procedures were used to study ADG and transformed titers with a model that included dam breed type, family nested within dam breed type and vaccination treatment. No obvious clinical symptoms or rectal temperatures above 40 C were observed following challenge. Differences in ADG due to vaccination treatment (P = 0.005) were observed for the first 14 d following challenge; KV averaged 0.45 kg/d, MLV averaged 0.01 kg/d, and NON averaged -0.50 kg/d. No differences in ADG due to treatment were observed from d 14 to 28 or from d 28 to 42. No differences in ADG were observed due to cow breed type or family. Large treatment differences existed for IBR titers on d 14, 28 and 42, with KV having higher (P < 0.001) titers on each day. KV also had higher (P < 0.001) titers to BVD type 1 on d 14, 28 and 42. MLV had higher BVD type 1 titers than NON on d 14 (P = 0.005), but became more similar on d 28 (P = 0.083) and d 42 (P = 0.163). Family difference approached significance for BVD type 1 on d 14 (P = 0.12) and d 28 (P = 0.11). Large variation in titers among individuals was observed each d.

Key Words: BVD challenge, Immune response, ADG

82 Effects of Mannheima haemolytica vaccination (One Shot®) on feed intake, feed efficiency, and the acute-phase protein response of heifers. J. D. Arthington*[1], T. D. Maddock[2], and G. C. Lamb[2], [1]*University of Florida*, *Ona*, [2]*University of Florida*, *Marianna*.

Twenty-three weaned heifer calves (Brahman x British) were used in a completely randomized design with two treatments, 1) vaccinated (One Shot®; Mannheima haemolytica, Pfizer Inc.; n = 12), and 2) saline-injected control (n = 11). Injections were administered s.c. at a volume of 2 mL. Heifers were allowed free choice access to a complete diet using an automated feed intake measuring system (GrowSafe®; Model 4000E). Prior to vaccination, heifers were allowed to acclimate to the pens and feeding system for 21 d. Following vaccination, blood samples were collected for determination of the acute phase reaction on d 0, 3, 6, 9, 12, and 15. Individual BW was determined following a 12 h feed and water withdrawal on d 0 (d of vaccination) and d 16 (end of study). Initial and final BW did not differ (P > 0.36) among control

and vaccinated heifers (average BW = 229 and 245 kg on d 0 and 16, respectively; SEM = 9.8). On d 1, plasma ceruloplasmin concentrations increased sharply in vaccinated heifers, but not saline-injected control heifers. Plasma ceruloplasmin concentrations were greater ($P < 0.05$) in vaccinated vs. control heifers on d 3, 6, 9, and 12 relative to injection. Daily DMI did not differ ($P = 0.66$) among treatments (9.3 vs. 8.8 kg/d for control and vaccinated heifers, respectively; SEM = 0.747); however, ADG and G:F was greater ($P \leq 0.05$) for control vs. vaccinated heifers (1.15 vs. 0.88 kg/d, and 0.14 and 0.10 kg for ADG and GF, respectively; SEM = 0.064 and 0.011). These data indicate that calves administered a Mannheima haemolytica vaccination (One Shot®) experience an acute phase protein reaction that is associated with reduced ADG and feed efficiency.

Key Words: Vaccination, Acute phase reaction, Feed efficiency

83 Evaluation of feed efficiency and carcass traits in Bos indicus composite and Angus finishing heifers. E. D. M. Mendes*, G. E. Carstens, L. O. Tedeschi, Z. D. Paddock, R. K. Miller, and B. Bennett, *Texas A&M University*, *College Station*.

Objectives of this study were to characterize feed efficiency traits and to examine phenotypic relationships with ultrasound and carcass traits in heifers fed a high-grain diet (ME = 3.08 Mcal/kg DM). Feed intake was measured in Angus (n = 35), Brangus (n = 44), Braford (n = 55) and Simbrah (n = 46) heifers in one of two pens equipped with a GrowSafe feed intake system for 70 d. Ultrasound measures of backfat thickness (BF), longissimus muscle area and intramuscular fat were obtained on days 0 and 70 of the study. Thereafter, heifers were fed in group pens and harvested in 2 groups at an average backfat thickness of 1 cm. Initial BW and age of heifers at the start of the study was not affected by breed and averaged 296 ± 30 kg and 362 ± 23 d, respectively. Residual feed intake (RFI) calculated as the residual from the linear regression of DMI on mid-test $BW^{0.75}$ and ADG with pen included as a random effect. Across all breeds, RFI was correlated ($P < 0.01$) with DMI (0.60) and feed:gain ratio (0.49), but not with initial BW, ADG, or carcass traits. Feed:gain ratio was strongly correlated ($P < 0.05$) with ADG (-0.63), and weakly correlated with DMI (0.24), initial BW (0.28) and initial ultrasound BF (0.28). Angus heifers gained more ($P < 0.01$) than Braford heifers, with Brangus and Simbrah heifers being intermediate (1.93, 1.37, 1.75 and 1.69 ± 0.07 kg/d, respectively). Angus and Simbrah heifers consumed more ($P < 0.01$) DMI than Braford, with Brangus heifers being intermediate (10.8, 10.4, 9.2 and 10.1 ± 0.3 kg/d, respectively). Feed:gain ratio was lower ($P < 0.01$) for Angus and Brangus heifers (5.64, 5.88) than Braford and Simbrah heifers (6.79, 6.28 ± 0.22). The affect of breedtype on feed:gain ratio was primarily due to breed differences in ADG. Braford and Brangus heifers had lower RFI (-0.20, -0.13) than Angus and Simbrah heifers (0.24, 0.20 ± 0.19 kg/d). Angus heifers had higher ($P < 0.01$) carcass marbling scores then the Bos indicus composite heifers. However, across all breeds, RFI was not significantly correlated with either carcass yield or quality grades.

Key Words: Residual feed intake, Heifers, Carcass

84 Effect of selection for residual feed intake on postpartum performance of Brahman cows. A. N. Loyd*[1,2], A. W. Lewis[1], D. A. Neuendorff[1], K. J. Matheney[1,2], T. D. A. Forbes[3], T. H. Welsh, Jr.[2], and R. D. Randel[1], [1]*Texas AgriLife Research*, *Overton, TX*, [2]*Texas AgriLife Research*, *College Station*, [3]*Texas AgriLife Research*, *Uvalde*.

With the rising cost of feedstuffs, reducing feed expenses is important for livestock producers. Residual feed intake (RFI) is a measure of feed efficiency developed to identify animals which may require less feed to achieve the same performance as their cohorts. Selection of efficient cattle based on RFI may alter subsequent reproductive performance of the cowherd. This study investigated the postpartum performance of Brahman first-calf heifers (n=16) and multiparous cows (n=38) which had been evaluated postweaning for RFI. Females were weighed and evaluated for body condition score (BCS) at 28-d intervals for 3 mo prior to the expected start of the 2008 calving season. Females were weighed and evaluated for BCS 24 h and 21 d after calving. Serum samples were collected weekly beginning 21 d after calving for progesterone analysis to determine corpus luteum (CL) formation and functionality. After calving, females were exposed to vasectomized bulls fitted with chin-ball markers and were visually observed at least once daily to detect estrus. Eight and 10 d following observed estrus, cows were examined using real-time ultrasonography to determine the presence of a CL. Females were assigned to an RFI group based on their postweaning RFI, where a negative RFI = efficient and a positive RFI = inefficient. Parity had a significant effect on all parameters evaluated ($P < 0.0001$), therefore cows and heifers were analyzed separately. Prepartum and postpartum BW and BCS did not differ by RFI group for either cows or heifers ($P > 0.07$). Efficient cows exhibited estrus sooner (42 ± 4.1 vs. 55 ± 3.7d; $P = 0.02$), developed a CL sooner (40 ± 4.1 vs. 53 ± 3.7d; $P = 0.02$), and exhibited estrus in conjunction with CL formation sooner (42 ± 4.1 vs. 54 ± 3.9d; $P = 0.04$) than inefficient cows. However, no difference was detected between efficient and inefficient heifers for estrus ($P = 0.32$), CL formation ($P = 0.24$) or estrus with CL formation ($P = 0.24$). These data suggest that selection for efficient cattle using RFI as a selection tool may result in a shorter postpartum interval in multiparous Brahman cows.

Key Words: Cattle, Residual feed intake, Reproduction

85 Comparison of poured protein block, liquid supplement, and whole cottonseed fed with hay to beef cows during winter. G. M. Hill*[1], M. H. Poore[3], M. E. Pence[2], D. J. Renney[1], K. C. Halbig[1], and B. G. Mullinix, Jr.[1], [1]*University of Georgia*, *Tifton*, [2]*University of Georgia Vet. Diagnostic Center*, *Tifton*, [3]*North Carolina State University*, *Raleigh*.

A poured molasses-protein product (PMP; Sweetlix 24% Poured Block, Sweetlix, Mankato, MN; 76.1% DM, CP as-fed 25.9%), a liquid molasses product (LMP; Forage-Mate Plus CFE 32%, B. Haskins Co., Alachua, FL; DM 68.6%, CP as-fed 32.9%), and whole cottonseed (WCS; DM 93.1%, as-fed 21.5% CP) were fed to winter-calving beef cows for 92 d beginning two wk before calving began. Cows (n=88; initial BW 577.0 ± 63.8 kg; Brangus, Angus X Polled Hereford breeding) were assigned by BW, cow age (mean, 5.9 ± 2.7 yr), and breeding to groups that were randomly assigned to eight dormant pastures. Dietary treatments beginning December 18, 2007, were: 1) Hay only (H); 2) Hay

plus PMP (HPMP); 3) Hay plus WCS (HWCS; WCS at 0.5% of cow BW daily); 4) Hay plus LMP (HLMP). Bermudagrass hay (92.9% DM, as-fed 9.5% CP) was fed free-choice in hay rings. Consecutive daily cow BW were recorded initially, on d 92, and on d 213. Cows were body condition scored (BCS; scale 1 to 9), and ultrasound rib (URB) and rump fat (URU) were measured on d -13, d 92, and d 213. Cows were exposed to fertile bulls, and pregnancy rates were determined 45 d after the 72-d breeding interval ended on June 18, 2008. Calf birth weight (36.0 ± 5.6 kg) and calf age at d 92 (51.8 ± 18.3 d) were similar for treatments. Supplement DMI (kg/d) of PMP, WCS, and LMP, for respective HPMP, HWCS and HLMP treatments were: 0.352, 2.69, and 1.15. At d 92, cows fed HWCS had higher ADG and URB than cows on H or HPMP (Table). Cow pregnancy rates were lower for H than other treatments, but calf 92-d BW and 205-d weaning BW were similar for treatments. Cows retained more BW, and had higher URB and pregnancy rates when fed WCS before the breeding interval.

Table 1.

Item	Hay	HPMP	HWCS	HLMP	SE	*P* <
Hay disappearance, kg	11.75^{b}	13.96^{a}	12.07^{b}	12.69^{ab}	0.63	0.10
Cow 92-d ADG , kg	-0.37^{b}	-0.32^{ab}	-0.02^{a}	-0.29^{ab}	0.06	0.08
Cow ADG d 1 to d 213, kg	-0.18	-0.22	-0.10	-0.13	0.04	0.23
Cow d 92 BCS	4.94	4.82	5.27	5.01	0.12	0.23
Cow d 92 URB, cm	0.38^{bc}	0.32^{c}	0.48^{ab}	0.43^{ab}	0.04	0.01
Cow d 92 URU, cm	0.17	0.17	0.22	0.28	0.04	0.17
Cows pregnant, %	81.8^{b}	100.0^{a}	100.0^{a}	95.5^{a}	4.82	0.03
Calf d 92 BW, kg	85.5	87.1	86.1	80.4	2.25	0.16
Calf ADG d 92 to d 213, kg	1.02	1.07	1.03	1.04	0.03	0.73
Calf 205-d wean BW, kg	230.0	238.1	235.6	230.8	4.88	0.60

Key Words: Cottonseed, Cow, Protein

86 The effect of high-starch diets fed to beef cows during late gestation on the feedlot performance and carcass characteristics of offspring. S. A. Gunter*[1], J. R. Jaeger[2], and P. A. Beck[3], [1]*USDA-ARS-SPRRS*, *Woodward, OK*, [2]*KSU Agricultural Research Center*, *Hay*, [3]*University of Arkansas*, *Hope*.

The fetus requires glucose as an energy source; hence, it was hypothesized that diets rich in glycogenic substrates during late gestation would yield offspring that have a greater potential to produce a high quality carcass. In November of 2005 and 2006, 54 and 59, respectively, non-lactating cows of mostly Angus breeding were stratified by BCS, parity, BW, and distributed randomly into four 0.81-ha drylots (Hope, AR); the cows were bred to calve in February. Cows in 2 pens were program fed a high-concentrate diet (67.8% hominy, 12.1% chopped corn stalks, 1.5% cottonseed meal, 2.3% minerals, and 15.9% water as fed; 79% DM, 13% CP, 2.1 Mcal of NEm/kg [DM basis]) the last 84 d of gestation meeting requirements for NEm. Cows in the other drylots were fed bermudagrass hay (9% CP, 1.1 Mcal of NEm/kg [DM basis]) plus a hominy-based supplement. In both years after wintering, pairs grazed a bermudagrass pasture and calves were weaned in September, calves grazed on winter-annual pasture until mid-March, then were shipped to a feedlot (Hays, KS) and finished on a high-concentrate diet (195 or 200 d, respectively). Beginning (254 vs. 245 kg), mid (132 d on feed; 442 vs. 436 kg), and ending (517 vs. 513 kg) BW did not differ ($P \geq 0.25$) between calves from hay and program fed cows, respectively. Feedlot ADG (kg/d), daily DMI (kg/d), and G:F did not differ ($P \geq 0.51$) between calves from hay (1.36, 10.7, 0.125) and program (1.33, 11.0, 0.123) fed cows. Hot carcass weight (318 vs. 321 kg), yield grade (2.3 vs. 2.4), USDA marbling score (407 vs. 394), LM area (79.4 vs. 80.0 cm2), and fat cover over the 12th rib (1.14 vs. 1.14 cm) did not differ ($P \geq 0.52$) for calves from hay and program fed cows, respectively. These results indicate that supplying additional glycogenic substrates to cows the last 84 d of gestation did not augment carcass quality of offspring after finishing compared to cows fed hay plus a supplement.

Key Words: Beef cattle, Carcass quality, Programmed feeding

87 Supplementation interval effects on development of yearling *Bos indicus x Bos taurus (Brangus)* and *Bos taurus (Angus)* beef heifers. I. Performance response and plasma metabolites. B. R. Austin*, M. J. Hersom, and J. V. Yelich, *University of Florida*, *Gainesville, FL*.

The objective of this study was to examine the effects of daily versus three d/wk supplementation on plasma metabolites and BW gain of yearling Brangus and Angus heifers consuming Tifton 85 bermudagrass round bale silage (RBS, CP = 12.9%, IVDMD = 55%). Sixty heifers (n=30, Angus; n= 30, Brangus) were stratified by initial BW, breed, and age and randomly allocated to 12 pens. Pens were randomly assigned to one of two treatments 1) dried distillers grains (DDG) and soybean meal (SBM) supplemented daily (D) or 2) DDG and SBM supplemented three d/wk (3X). Heifers were provided supplement to gain 0.75 kg/d. A shrunk BW and hip height (HH) were obtained before (d -7) and after (d 147) the trial. Blood samples were collected monthly from all heifers to determine plasma NEFA concentrations (d 0 to140). Blood samples were also collected from twenty heifers (5 Angus; 5 Brangus/treatment) every 28 d (6 periods) at 11 timed intervals (0, 2, 4,8,12, 24, 26, 28, 32, 36, and 48 h after supplement was offered to determine plasma urea nitrogen (PUN) and glucose concentrations. Data were analyzed using the MIXED procedure of SAS. Shrunk ADG and change in HH were similar ($P > 0.1$) between D (0.83 kg/d; 9.40 cm) and 3X (0.81 kg/d; 9.40 cm), respectively. Monthly mean NEFA concentrations (0.20 mEq/L) were similar ($P = 0.97$) between treatments. A time (period) ($P < 0.001$) effect was observed for both PUN and glucose concentrations as they increased after supplementation on the day of supplementation. A treatment x time (period) effect was detected ($P < 0.0001$) for PUN. During periods 2, 3, and 4, 3X heifers had greater ($P < 0.05$) PUN concentrations compared to D heifers at 12, 24, and 26 h, respectively. Although blood metabolite concentrations differed slightly between treatments, heifer ADG, and HH were not affected. In conclusion, yearling heifers fed RBS and supplemented with DDG + SBM either three d/wk or daily had similar growth patterns.

Key Words: Beef heifers, Supplementation, Growth

88 Supplementation interval effects on development of yearling *Bos indicus x Bos taurus (Brangus)* and *Bos taurus (Angus)* beef heifers. II. Puberty and reproductive performance. B. R. Austin*, M. J. Hersom, and J. V. Yelich, *University of Florida*, *Gainesville*.

The objective of this study was to examine the effects of daily versus three d/wk supplementation on onset of puberty, estrous synchronization response, and 28 d AI breeding season pregnancy rates of yearling

Brangus and Angus heifers consuming Tifton 85 bermudagrass large round bale silage (RBS, CP = 12.9%, IVDMD = 55%). Sixty heifers (30 Angus, 30 Brangus) were stratified by initial BW, breed, and age and randomly allocated to 12 pens. Pens were randomly assigned to one of two treatments 1) dried distillers grains and soybean meal supplemented daily (D) or 2) dried distillers grains and soybean meal supplemented three d/wk (3X). Blood samples were collected weekly from d 0 to 140 to determine onset of puberty as determined by plasma progesterone concentrations. Heifers were synchronized for AI on d 145 with a CIDR concomitant with GnRH (Cystorelin; 100 µg) with CIDR removal and PG (Lutalyse; 25 mg) 7 days later. Estrus was detected using HeatWatch for 72 h after PG, and heifers were inseminated 8-12 h after the onset of estrus by a single AI technician. Heifers not exhibiting estrus by 72 h were timed-AI + GnRH. Estrous detection and AI continued for 27 d after synchronization while heifers remained in their respective pens and continued to receive supplement treatments. Pregnancy was diagnosed by ultrasonography 31 and 62 d after PG. There were no breed effects on attainment of puberty at the start of the breeding, synchronized pregnancy rates, and 28 d pregnancy rates so data were combined. Attainment of puberty at initiation of breeding tended to be greater ($P = 0.09$) for D (n=18; 60%) compared to 3X (n=12; 40%). Synchronized pregnancy rates (D=43%, 3X=53%) and 28 d AI pregnancy rates (D=63%, 3X= 70%) were similar ($P > 0.10$) for both treatments. Heifers supplemented daily with DDG + SBM tended to have greater attainment of puberty at the start of the breeding season compared to three d/wk supplemented heifers, but AI pregnancy rates were similar for both.

Key Words: Beef heifers, Supplementation, Reproduction

89 Influence of ivermectin and long-acting moxidectin on the growth, reproductive efficiency, and offspring performance in replacement beef heifers. J. G. Powell*, A. H. Brown, Jr., T. A. Yazwinski, Z. B. Johnson, and E. B. Kegley, *University of Arkansas*, *Fayetteville*.

Beef replacement heifers (n=105; BW = 217 ± 21.6 kg) carrying naturally-acquired internal parasite infections were evaluated during a 686 d study. Heifers were randomly allocated to one of three treatments: Ivomec® Plus injectable (IVO), Cydectin® Long-Acting injectable (MXD), and a negative control (CON). Treatments were administered on study days 0 and 149. Heifers were exposed to fertile bulls from d 175 to 259. Mean BW was greater ($P < 0.05$) for MXD and IVO-treated animals on d 175, 238, 287, 369, and 433 compared to CON group. ADG was greater ($P < 0.01$) for MXD and IVO compared to CON from d 0 to d 433. The calving season occurred from d 438 to 541. Birth weights for calves born to the study heifers were similar ($P > 0.25$) among all three treatment groups. Calves were weaned on d 686, and weaning BW was greater ($P = 0.002$) for MXD and IVO groups compared to CON measuring 202, 192, and 175 kg, respectively. Calves born to MXD-treated cows exhibited heavier ($P < 0.05$) adjusted-205 d BW compared to calves born to CON group while calves born to IVO-treated cows were similar ($P > 0.10$) compared to both the MXD-treated and the CON group. Calves from MXD-treated cows had higher ($P < 0.05$) ADG compared to calves from CON cows while calves from IVO-treated cows were similar to calves born to CON-cows. Measurements for calf muscle score, hip height, and BW:hip height ratio were conducted at weaning. Muscle score was greater ($P = 0.0004$) for MXD and IVO group calves compared to CON calves. Hip height was generally higher for calves born to MXD-treated cows, intermediate for calves born to IVO-treated cows and lowest for calves from CON-cows. BW:hip height ratio was greater ($P < 0.01$) for calves weaned from MXD and IVO-treated cows compared to calves weaned from CON-cows (1.85, 1.79, and 1.68, respectively). These data clearly illustrate the importance of anthelmintic treatment in the management of beef heifer replacements.

Key Words: Moxidectin, Ivermectin, Heifers

90 Utilization of dried distillers grains for developing beef heifers grazing ryegrass-bermudagrass pastures. R. C. Vann*[1], E. L. Schenck[2], S. T. Willard[3], and J. D. Rhinehart[2], [1]*MAFES-Brown Loam Experiment Station*, *Raymond, MS*, [2]*Department of Animal & Dairy Science*, *Starkville, MS*, [3]*Department of Biochemistry & Molecular Biology*, *Starkville, MS*.

The objective was to evaluate the management practice of supplementing heifers, developed on ryegrass pasture, with dried distillers™ grains with solubles (DDGS) and its effect on response to estrus synchronization and pregnancy rates. Angus based crossbred heifers (10-12 mo.; n=102) were assigned to one of two treatment groups either 1) a negative control group (Control) maintained on ryegrass pastures with no additional supplement or 2) heifers maintained on ryegrass pastures for 120 d and supplemented with DDGS (2.27 kg/hd/d; DDGS). The supplemented group was fed a diet of DDGS for 40 d prior to AI and 15 d post AI and were gradually conditioned to the DDGS diet over a 7 d period to allow adjustment to the desired feed intake. Estrus synchronization was accomplished by GnRH injection and CIDR insert on D30 then CIDR removal and two injections of prostaglandin (12 h interval) on D35. Heifers were mass artificially inseminated at 72 h post CIDR removal. Throughout the grazing period and 45 d post insemination, heifers were monitored twice daily for signs of behavioral estrus to determine puberty and estrus return rates. Heifers that did not conceive to AI were exposed to natural service for 45 d post insemination. Pregnancy was determined 115 d post insemination via transrectal ultrasonography. Pregnancy rates to mass AI were as follows: Control 38.5% (20/52) and DDGS 50% (25/50; $P = 0.37$). Heifers in the DDGS group were heavier ($P < 0.041$) at pregnancy diagnosis compared to Control (384 and 367 ± 5.8 kg BW, respectively). However, BW at other time points did not differ. Heifers in the DDGS group had greater ADG ($P < 0.001$) during the first 28 d of the feeding trial compared to the control heifers (1.53 and 1.07 ± 0.06 kg/d, respectively). Heifers in the DDGS group had a greater ($P < 0.04$) vaginal conductivity measurement (indicative of ionic-balance or cyclicity) than control heifers at AI. The goal was to provide above-maintenance nutrition for both groups, however, the fact that BW and ADG differed for at least one collection period would indicate a difference in nutrient availability.

Key Words: Dried distillers grains, Reproductive management, Heifer development

91 Feedlot performance, carcass merit, and conception rates of Brahman influenced heifer calves wintered on corn silage. W. A. Storer*, F. M. LeMieux, T. H. Shields, and C. E. Ferguson, *McNeese State University*, *Lake Charles, LA*.

This experiment was conducted to evaluate the effects of temperature, temperament, and Brahman influence on ADG, carcass merit, and conception rates of heifer calves. Spring born heifer calves (n=126,

180-300 kg) were received in October and acclimated to feedlot conditions for 2 wk before the start of the experiment. Heifers were assigned temperament scores (individually in a squeeze chute) by two independent observers and denoted as 1: calm, no movement 2: restless shifting, 3: squirming, and 4: continuous, vigorous movement. Percentage Brahman influence was determined by pedigree and/or phenotype. Heifers were classified as 0, 25, 50, 75, or 100 approximating the percentage of Brahman influence. Weight and ADG were determined on d 0, 14, 28, 63, 89, and 119 relative to the start of the trial. Daily climate data, attained from the National Weather Service, was used to calculate average low temperature for each weigh period for comparison with ADG. Heifers were scanned by ultrasound for rib-eye area (REA), intramuscular fat (IMF), and rib fat (RF) on d 119. Select heifers (n=29) were bred by timed artificial insemination on d 123. Pregnancy was determined by transrectal ultrasound 28 d after insemination. Heifers scored as temperament 3 gained less ($P < 0.05$) than other temperament groups. Heifers classified as greater than 25 % Brahman influence gained less ($P < 0.05$) than other classifications. Weight gain decreased ($P < 0.05$) in all groups as temperature decreased with slightly lower ($P < 0.05$) gains in Brahman cattle during cooler months. Cattle with less Brahman influence had greater ($P < 0.05$) REA and RF. Heifers receiving lower temperament scores had greater ($P < 0.05$) REA, RF, and IMF. Conception rates were greater ($P < 0.05$) in non-Brahman heifers and those with temperament scores 2 or less. These data suggest that degree of Brahman influence and temperament influence feed lot performance and conception rates in heifer calves.

Key Words: Temperament, Brahman, Carcass

92 Effect of time of supplementation on grazing behavior of beef calves grazing annual ryegrass. G. Scaglia*[1], W. E. Wyatt[1], and H. T. Boland[2], [1]*Lousiana State University*, *Jeanerette*, [2]*Virginia Polytechnic Institute and State University*, *Blacksburg*.

Time of supplementation may affect the time grazing cattle devote to grazing activities. Calves grazed annual ryegrass (*Lolium multiflorum*) for 134 d and were supplemented daily with corn gluten feed at a rate of 0.5% BW (as fed). Amount fed was adjusted every 15 d when steers were weighed. Seventy two steers (initial BW = 220 ± 3.3 kg) were randomly assigned to three daily times of supplementation treatments (n=6; three replicates): 0800, 1200, and 1600 supplementation, and a non-supplemented control group. Calves were continuously stocked on 12-1.25 ha paddocks. Grazing behavior was determined in 2-14 d periods (PER 1 and 2, starting on d 58 and 120 of the grazing period, respectively). In each PER, an IceTag pedometer was placed on one steer (different steer each time) per pasture. Daily and sections of time within a day (SEC) data were analyzed using Proc Mixed. These SEC were: 0600 to 1000 (SEC-A), 1000 to 1400 (SEC-B), and 1400 to 1800 (SEC-C). Each period includes a time of supplementation as previously defined. At the beginning of PER 1 and 2, forage mass determined by double sampling technique was 711 and 825 kg DM/ha (33 and 27 %DM). Calves spent more time standing (65.8 vs. 56.1%), were more active (11.5 vs. 8.3%), spent less time lying (22.8 vs. 35.7%), and took more steps (1,290 vs. 917) in PER 1 compared to PER 2 ($P < 0.0001$). Within a day, calves spent more time standing (68.3 vs. 56.9 and 57.5%), active (12.6 vs. 7 and 10%), and less time lying (19.1 vs. 36.1 and 32.5%) in SEC-C ($P < 0.0001$) compared to SEC-A and SEC-B, respectively. There was a PER x SEC interaction ($P < 0.0001$) in number of steps taken. No difference ($P = 0.139$) was observed in SEC-A (828 vs. 721 steps for PER 1 and 2, respectively) but a difference ($P < 0.0001$) was observed in SEC-B (1,349 vs. 881 steps), and SEC-C (1,697 vs. 1,150 steps) for PER 1 and 2, respectively. There was a higher activity of calves when less forage mass was available with no treatment effect in any of the periods. Regardless of treatment, steers were more active in the afternoon, probably coinciding with higher concentration of sugars in ryegrass at this time of the day.

Key Words: Calves, Grazing behavior, Supplementation

94 Comparison of four different methods of calf birth weight data collection. T. Smith*[1], J. A. Parish[1], J. R. Parish[1], T. F. Best[3], and J. T. Best[4], [1]*Mississippi State University*, *Mississippi State*, [2]*Mississippi State University*, *Mississippi State, MS, USA*, [3]*Prairie Research Unit, Mississippi Agricultural and Forestry Experiment Station*, *MS*, [4]*Leveck Animal Research Station, Mississippi Agricultural and Forestry Experiment Station*, *MS*.

Reporting accurate calf birth weight (BW) is important for the calculation of BW and calving ease expected progeny differences. Birth weight information is used by many cow-calf producers in animal selection and culling decisions to minimize dystocia risk. The objectives of this study were to 1) evaluate different BW collection methods: visual appraisal, hoof circumference tape, spring scales, and digital scales and 2) determine if visual BW estimations change in accuracy as a calving season progresses. Birth weight measurements were collected on 587 spring- and fall-born purebred and crossbred calves located at the Mississippi Agricultural and Forestry Experiment Station Leveck Animal Research Center, Mississippi State, MS and Prairie Research Unit, Prairie, MS. Birth weight measurements were collected on each calf within the first 24 h after birth by visual appraisal, hoof circumference tape, spring scales, and digital scales during routine calf tagging and processing. Calf breed composition consisted of Angus (AN), Charolais (CH), and Hereford (HP=Polled Hereford, HH=Horned Hereford) purebred calves and crossbred calves sired by AN, HP, HH, Brangus (BN), Braford (BO) and Gelbvieh (GV) bulls. Least square means were estimated by using a GLM model that included sex, age of dam, calving season, timing of birth during the calving season, breed of calf, and BW method as independent effects with BW measurements as the response variable. Bulls were heavier at birth than heifers ($P < .01$), while spring-born calves were heavier than fall-born calves ($P < .01$). Charolais, HH, and HH- and BN-cross calves were the heaviest at birth, while calves sired by HP were the lightest ($P < .05$). Hoof tape estimates of BW were higher than measurements from digital scales and estimates from visual appraisals ($P < .05$). There was no significant difference ($P > .15$) between visual estimates and digital scale estimates from the beginning to the end of the calving season. These results suggest that BW estimates vary depending on the method being used and that inaccurate data could be submitted to breed associations for calculations of BW predictors.

Key Words: Cattle, Birth weight, Methods

93 Performance of suckling kids and their dams control-grazed on three tall fescue cultivars. J-M. Luginbuhl*, J. P. Mueller, and H.M. Glennon, *North Carolina State University*, *Raleigh*.

A 3-year (YR) grazing study evaluated the performance of nursing does (*Capra hircus*) and their suckling kids (7/8 to fullblood Boer) strip-grazed on Kentucky 31 infected ($K31^+$), Jessup non infected (J^-) and MaxQ novel endophyte (MQ) fescue (*Fescuca arundinacea*) pastures fertilized with 112 kg N/ha/yr. The experimental area consisted of 9, 0.19 ha plots in a randomized complete block design with 3 replications. Starting and ending grazing dates, number of does and kids grazed, and initial age and weight of kids were, respectively: 16 April and 26 May, 45 does, 70 kids, 56 d, 12.5 kg for YR1; 29 March and 25 May, 36 does, 63 kids, 18 d, 7.4 kg for YR2; 4 April and 25 May, 36 does, 72 kids, 24 d, 8.5 kg for YR3. The CP and NDF values of forage samples hand-plucked periodically from experimental pastures averaged 21 and 56, 20 and 56, and 21 and 56% for MQ, J^- and $K31^+$, respectively. Suckling kids gained more weight (g/d) on MQ and J^- than on $K31^+$ in YR1 (136, 133, 99; $P < 0.01$) and YR3 (173, 165, 134; $P < 0.04$) whereas gains were similar in YR2 (138, 133, 113). Nursing does gained more weight (g/d) on MQ and J^- than on $K31^+$ in YR 1 (46, 39, -66; $P < 0.02$), and lost less weight on MQ and J^- than on $K31^+$ in YR 2 (-4, -7, -62; $P < 0.01$) and YR3 (-62, -19, -144; $P < 0.01$). Does serum urea N were similar regardless of forage and grazing year (avg: 26.2 mg/dL). Serum prolactin levels (ng/mL) were higher in does on MQ and J^- than on $K31^+$ in YR1 (174, 145, 47; $P < 0.01$), YR2 (139, 136, 62; $P < 0.01$) and YR3 (149, 148, 45; $P < 0.01$). Percent of tillers producing alkaloids averaged 1, 2 and 96% for MQ, J^- and $K31^+$. Results indicated that suckling kids performed well although those on $K31^+$ gained less weight. Nursing does grazing $K31^+$ were unable to maintain their body weight and the dramatic decrease in serum prolactin levels observed in those does could have important reproductive implications that warrant further research.

Key Words: Fescue, Goat, Grazing

95 The effect of weaning age on lamb growth and ewe productivity in an accelerated lambing system in the tropics. R. W. Godfrey* and A. J. Weis, *University of the Virgin Islands*, *St Croix, VI*.

In the accelerated lambing system that has been used for the past 20 years lambs were weaned at 63 days of age. This study was designed to evaluate the impact of late weaning of hair sheep lambs on ewe productivity and lamb growth in an accelerated lambing system. St. Croix White (n = 34) and Dorper x St Croix White (n = 37) lambs were assigned at birth to be weaned at 63 (CONTROL) or 90 d of age (LATE) based on breed, sex and litter size. After weaning lambs were weighed weekly and fed a concentration ration (3% BW/d) while grazing guinea grass pasture. Ewes were weighed weekly and grazed guinea grass pastures. Ewe weight at breeding prior to this lambing was not different ($P > 0.10$) than at the subsequent breeding (41.7 ± 0.4 vs. 40.9 ± 0.4 kg, respectively). At the start of the subsequent breeding 80% of LATE ewes were nursing lambs while none of the CONTORL ewes were ($P < 0.0001$). Pregnancy rate at the subsequent breeding, determined by ultrasound, was not different ($P > 0.10$) between LATE and CONTROL ewes (85 vs. 90.9%, respectively). The ratio of litter weaning weight to ewe weight was greater ($P < 0.002$) for dams of LATE lambs than dams of CONTROL lambs (56.7 ± 3.0 vs. 42.6 ± 2.9%, respectively). At weaning LATE lambs were heavier ($P < 0.0001$) than CONTROL lambs (14.8 ± 0.6 vs. 10.7 ± 0.6 kg, respectively). At 90 d age there was no difference ($P > 0.10$) in weight between LATE and CONTROL lambs (14.9 ± 0.7 vs. 13.9 ± 0.6 kg, respectively) even though the CONTROL lambs had been on feed for 27 d since being weaned. The ADG from birth to 90 days of age was not different ($P > 0.10$) between LATE and CONTROL lambs (131.2 ± 6.9 vs. 119.9 ± 6.7 g/d, respectively). Weaning at 90 days of age can be done in an accelerated lambing system with no detrimental effect on ewe productivity. The later weaning led to a decrease in the amount of time that lambs received high cost, imported feed without a reduction in their growth and would have a positive impact on the economics of producing hair sheep in the tropics.

Key Words: Hair sheep, Lambs, Weaning

96 Intake and growth of hair sheep and goats pen-fed in single and mixed species groups of different sizes. S. Wildeus, R. A. Stein, and J. R. Collins*, *Virginia State University*, *Petersburg*.

Social environment has a significant impact on feeding behavior, and group size and social hierarchy have been shown to influence animal performance. This experiment evaluated the effect of species composition and group size on intake and growth of hair sheep and goats in confinement. For the experiment yearling rams and bucks were housed indoors in 3 × 2.5 m pens with concrete floors and a single (key hole) feeding station. Animals were fed a complete ration of chopped grass hay mixed with cracked corn and soybean (~14% CP) at >140% of estimated intake and orts were recovered prior to daily feeding. In Phase 1, two animals were allocated to pens at random either as a single species or mixed species group, with 5 replications of each combination (15 bucks and 15 rams in 15 pens). In Phase 2, 2 or 4 animals were assigned to each pen, either as sheep only, or as equal numbers of sheep and goats, with 4 replications of each combination (36 rams and 12 bucks in 16 pens). In both phases animals were fed in pens for 17 days, and body weight was recorded at the beginning and end of each phase. Data were analyzed for the effect pen composition (Phase 1), and pen composition and stocking rate (Phase 2: 2x2 factorial), using pen as the experimental unit for intake, and animal as the experimental unit for growth. In Phase 1, dry matter intake (DMI) was 3.43, 3.70 and 4.01% BW in goat pens, mixed pens and sheep pens, respectively, and DMI as percent metabolic BW was higher ($P<0.01$) sheep than in goats. ADG tended to be higher in sheep-only pens than in mixed pens, with the opposite tendency for goats (interaction: $P<0.1$). In Phase 2, DMI was higher ($P<0.01$) in sheep-only pens than in mixed pens with two animals (4.15 vs. 3.63% BW), but there was no difference in pens with four animals regardless of species make-up (3.90 vs. 4.00 % BW; interaction $P<0.05$). In Phase 2, ADG was not affected by pen composition or stocking rate in sheep, or stocking rate in goats. These results indicate that pen composition and stocking rate impact intake in mixed species small ruminant feeding trials and should be considered in the experimental design.

Key Words: Sheep, Goats, Intake

97 The effects of free choice protein supplementation on growth of lambs and meat goat kids grazing warm season grasses. S. Nusz*[1,3], M. A. Brown[2], K. R. Weathers[3], and E. L. Walker[1], [1]*Missouri State University*, *Springfield, MO*, [2]*USDA Grazinglands Research Center*, *El Reno, OK*, [3]*Redlands Community College*, *El Reno, OK*.

Grazing provides most nutrients for growth in ruminants, however; there are times when nutritional needs of the animal exceed the nutritional quality of forages. Forages common to pastures in the South and Midwest, may be insufficient in crude protein to meet the demands of growing lambs and meat goat kids, particularly after late June when some forages have become mature. This study was an extension of a previous study conducted in 2007. The objective was to test the effects of protein supplementation via protein tubs on growth of lambs and kids grazing 1.22 ha bermudagrass/foxtail pastures. Boer influenced (BI) and Savanna × Spanish (SP) kids (n= 27 and 28; respectively) and Katahdin (KK), Katahdin x Suffolk (KS), Suffolk × Katahdin (SK), and Suffolk (SS) lambs (n=11, 15, 21, and 25; respectively) were grouped by weight, breed, and gender and randomly assigned to one of two treatments: 1) common bermudagrass/foxtail supplemented with a 21% protein block (n=2) and 2) common bermudagrass/foxtail with no supplement (n=2). Animals were weighed every two weeks for the 56 day study. Sheep had greater ADG than goats (45.4 ± 7 g/d vs 15 ± 7 g/d; $p<0.05$). Protein supplementation did not increase ADG of the BI or SP kids. However, the BI kids had a higher ADG than the SP kids (22.14 ± 7.5 g/d vs 7.7 ± 7.4 g/d; $p<0.05$). Protein supplementation did not increase ADG of the KK, KS, SK, or SS lambs. However, the SK had the greatest ADG (52.8 ± 7.7 g/d) and were heavier than SS (34.4 ± 8 g/d; p=0.006). Results of this study suggest that protein supplementation had no effect on ADG in 2008. In total, 44.4 kg of protein supplementation was consumed and on average, only 1.38 kg of supplementation per animal was consumed. It is possible that the kids and lambs met their protein requirements by forage protein this year whereas they may have met it by supplemental protein last year due to pasture and climate differences. Further research is needed to determine impact of low-level protein supplementation on lamb and meat goat kid productivity on warm-season pastures.

Key Words: Lambs, Kids, Protein supplement

98 Effects of feeding peanut skins on intake, digestibility and passage rates in meat goats. A. L. Kendricks*[1], N. K. Gurung[1], D. L. Rankins, Jr.[2], S. G. Solaiman[1], G. M. Abdrahim[3], and W. H. McElhenney[1], [1]*Tuskegee University*, *Tuskegee, AL*, [2]*Auburn University*, *Auburn, AL*, [3]*Alabama A & M University*, *Normal*.

Peanut skins (PS), a year-round by-product of the peanut blanching industry that is easily available in southeast Alabama and southwest Georgia, are typically used as animal feed but their feeding value has not been fully evaluated for goats.

Objectives were to evaluate effects of various dietary inclusion levels of PS on dry matter intake (DMI), particulate passage rates, and apparent nutrient digestibility in meat goats. In a 4 × 4 Latin square arrangement of treatments, four mature crossbred Boer wether goats (70.56 ± 0.82 kg BW) were fed once daily diets containing 45% bermudagrass hay (BGH) plus 55% concentrate with 0, 10, 20, and 30% of PS substituting soybean hulls in the concentrate portion of the diet. Concentrate mixes contained varying levels of PS, but no effort was made to make diets isonitrogenous. Each period had 2 weeks of adjustment followed by 5 days of total collection. Feed offered, refusals and fecal output were monitored. The ytterbium-marked BGH was used to determine the passage rate. The condensed tannin in PS was found to be 4.13% on dry matter basis.

No differences ($P>0.05$) were observed between dietary treatments with respect to DMI, dry matter digestibility, crude protein (CP) intake and CP digestibility and neutral detergent fiber (NDF) digestibility. However, there was a tendency for linear decrease in DMI ($P = 0.10$) and acid detergent fiber (ADF) digestibility ($P = 0.06$) as the level of PS increased. The ADF intake decreased linearly ($P = 0.02$) with increased level of PS. Ether extract (EE) intake showed a linear increase ($P = 0.001$) with higher levels of PS in the diet, but EE intake did not affect dry matter digestibility ($P = 0.42$). The EE digestibility also increased (Quadratic; $P = 0.04$) as PS inclusion increased. The nitrogen utilization and passage kinetics were not affected by PS inclusion. Overall, up to 30% of PS (on as fed basis) can be included in diets for meat goats without any compromise in nutrient intakes and digestibility.

Key Words: Goats, Peanut skins, Digestibility

99 Sire and dam breed effects on carcass characteristics of meat goat kids from a three-breed diallel. R. Browning, Jr.*[1], W. Getz[2], O. Phelps[3], and C. Chisley[4], [1]*Tennessee State University*, *Nashville*, [2]*Fort Valley State University*, *Fort Valley, GA*, [3]*USDA-AMS*, *Lakewood, CO*, [4]*Southern University*, *Baton Rouge, LA*.

Across three years, buck kids (n = 275) from a complete diallel of Boer (**B**), Kiko (**K**), and Spanish (**S**) sires and dams were harvested at 33 weeks of age to assess breed effects on carcass yield traits in meat goats. Kids had been weaned at 13 weeks of age and were raised after weaning on summer pasture supplemented with 0.4 g/d of 16% CP pelleted feed. Through visual procedures of USDA, live animal muscling grades favored ($P < 0.01$) kids of B and S sires over K sires. Chilled carcass muscling grades favored ($P < 0.01$) B-sired kids over K- and S-sired kids. Live grades of kids favored ($P < 0.01$) B dams over K and S dams. Dam breed did not affect carcass grades. Sire breed did not affect live, carcass or cut weights. Live kid and chilled carcass weights were heavier ($P < 0.01$) for kids of K dams (26.5 ± 0.6 kg; 11.1 ± 0.3 kg) than from S (24.4; 10.2) and B dams (23.7; 9.6). Chilled carcass dressing percent was lower ($P < 0.01$) for kids of B sires and dams (40.3 ± 0.4%; 40.4 ± 0.4%) than from K (41.8; 41.9) and S sires and dams (41.8; 41.5). Kids of K dam had heavier ($P < 0.01$) forelegs, hind legs, and combined boneless right fore- and hind legs (3.26 ± 0.08 kg; 3.67 ± 0.09 kg; 1.95 ± 0.05 kg) than S (2.91; 3.37; 1.75) and B dams (2.76; 3.24; 1.68). Parental breed did not affect lean content (69%) of leg cuts. Loins were lighter ($P < 0.01$) for kids of B dams (1.37 ± 0.05 kg) than from K (1.62) and S dams (1.52). Ribeye area was greater ($P < 0.01$) for kids from K dams (8.54 ± 0.25 cm^2) than from B dams (7.67), kids of S dams were intermediate (8.1 ± 0.25 cm^2). Sire and dam breeds interacted ($P = 0.01$) for kidney-pelvic fat weight as straightbred kids (74 ± 16 g) differed from all four crossbred kid groups (127 to 164) only within B matings. Breed of sire and dam influenced carcass yield traits in meat goat kids.

Key Words: Meat goats, Breeds, Carcass traits

100 Influence of cattle grazing alone and with goats on forage biomass, botanical composition and browse species. A. Abaye*[1], D. Schlueter[1], D. Webb[1], J. M. Luginbuhl[2], and G. Scaglia[3], [1]*Virginia Polytechnic and State University*, *Blacksburg*, [2]*North Carolina State University*, *Raleigh*, [3]*Louisiana State University*, *Jeanerette*.

Reclaimed mined-lands have been successfully used for forage production in the Appalachian region. An experiment was initiated in Virginia to determine the effects of mixed grazing goats with cattle on forage biomass, botanical composition and browse species. The three treatments included an no grazing control, cattle grazing alone, and mixed grazing goats with cattle. Three replicates were used for grazed treatments and two replicates for the control. Replicate paddocks for grazing were 1.8 ha each and control replicates were 0.2 ha each. Three steers (280 ± 4.0 kg BW) were allocated to each grazing treatment. The stocking rate was based on 0.6 ha/steer. The mixed grazing treatment included 15 young intact male goats (20.3 ± 2.5 kg BW). The assumption was 1-2 goats per mature cow (1 animal unit) without a cost to existing cattle operations. Animals were rotationally stocked among replicates by grazing one replicate for two weeks and then allowing 4 weeks rest. Water and trace minerals were provided free choice at all times. Grazing was from May 30 to September 29 in 2006 and from May 30 to August 30 in 2007. Forage biomass yield was determined in spring, summer and fall by clipping 8-0.25m² square quadrants per grazing treatment and 4-0.25m² in the control treatment to a 2.5 cm height. Prior to clipping, botanical composition and groundcover were assessed visually. Autumn olive (*Elaeagnus umbellata* Thunb.) measurements included branch length, shrub height, and shrub survival. Eight shrubs were randomly identified and tagged with a letter in each treatment replication while four shrubs were used in the control treatment. Effect of treatment, block, season, year and treatment by time interactions were tested. Significance was tested at the 5% level. In both years, total forage biomass yield was greater for the control and cattle grazing alone treatments. In 2007, forage growth was impacted by a late season frost and an extended drought. The grass component of the grazed pastures increased, weed content declined while the legume content was maintained at a low level. Autumn olive was severely impacted by goat browsing. Shrub survival was lower ($P < 0.5$) in mixed grazing (61%) by the end of the experiment compared to over 90% for the control and cattle grazing alone treatments. Mixed grazing resulted in greater utilization of pasture resources mainly due to the different grazing habits of goats and cattle offering opportunities for complementary pasture use.

Key Words: Browse, Cattle, Goat

101 Anthelmintic resistance in small ruminants in the Delmarva region. E. K. Crook*[1], D. J. O′Brien[1], N. C. Whitley[2], R. Kaplan[3], and J. L. Eierman[1], [1]*Delaware State University*, *Dover*, [2]*North Carolina A&T State University*, *Greensboro*, [3]*University of Georgia*, *Athens*.

The purpose of this study was to assess anthelmintic resistance in the Delmarva region in order to propose better parasite management for this area. Nine farms were used to test the effectiveness of at least one anthelmintic including two farms from DE (goats, Farm A and B), two from VA (sheep, Farm C and D), and five farms from MD (goats, Farm E and F, sheep, Farm G to I). Anthelmintics tested were determined based on prior anthelmintic use on the farms. A fecal egg count reduction test (FECRT) was conducted on each farm to determine effectiveness of tested anthelmintics (≥90% reduction) with each test including an untreated control (CON) group. Drug efficacy was calculated as FECR%=100(1–Xt/Xc)) with Xt and Xc being the arithmetic FEC mean in the anthelminitic treatment (t) and CON groups (c). In DE, efficacy of albendazole (ALB; Farm A), moxidectin (MOX; Farm A), ivermectin (IVM; Farm B) and levamisol (LEV; Farm B) were tested. In VA, efficacy of ALB, MOX, LEV (Farms C and D) and IVM (Farm D) was tested. The efficacy of MOX (Farm E), IVM (Farm F) and LEV (Farm F) were tested on goat farms in MD. On the sheep farms in MD, VAL (Farm G), MOX (Farms H and I), LEV (Farm I) and IVM (Farm I) were tested. The results from this study indicated that ALB was effective in one out of three farms tested (96.3, 70.1, and 78.7% on farms A, C and D, respectively); MOX was effective in two out of six farms tested (100, 99.7, 1.5, 73.9, 81.3, 33.2% on farms A, H, C, D, E, and I, respectively); IVM was ineffective on all three farms tested (-31.3, 32.8, and 85.6% on farms B, D, and I, respectively); and LEV was effective on four out of five farms tested (98.8, 99.5, 100, 92.7, 84.4% on farms B, C, D, and I, respectively). This data indicates that anthelmintic resistance is on the rise in this area and alternative means of parasite control need to be evaluated.

Key Words: Parasites, Sheep, Goats

102 Use of copper oxide wire particles (COWP) to control gastrointestinal nematodes (GIN) in stressed lambs or kids. J. M. Burke*[1], J. E. Miller[2], and T. H. Terrill[3], [1]*USDA, Agricultural Research Service*, *Booneville, AR*, [2]*Louisiana State University*, *Baton Rouge*, [3]*Fort Valley State University*, *Fort Valley, GA*.

Previous research has indicated that GIN infection was reduced in lambs and kids in response to 1 g COWP. Two studies were conducted to determine the effectiveness of COWP (1 g) to control naturally occurring GIN in mixed gender lambs or kids during times of stress. Lambs (~120 d of age; 31.8 ± 1.0 kg BW) were randomly assigned to receive nothing or COWP (n = 18/group). Lambs were weaned 14 d earlier (early May) and were in confinement. After treatment, lambs were moved back to grass pasture. In Exp. 2, meat goat kids (~90 d of age; 14.6 ± 0.4 kg BW) remained with dams on grass pasture (n = 21), were weaned, but remained in nearby pasture (n = 17), or were weaned and moved to confinement and fed grass hay and 100 g supplement/ head (n = 23) and randomly assigned within each stress group to receive nothing (n = 29) or COWP (n = 32). For both studies, feces and blood were collected every 7 d between D 0 and 14 after COWP for fecal egg counts (FEC; log transformed) and blood packed cell volume (PCV) analyses. Data were analyzed using the mixed models procedure with a repeated statement for day. In Exp. 1, FEC were similar between groups on day of treatment. Then, FEC increased in COWP treated lambs between D 0 and 7, but was lower than untreated lambs by D 14 (untreated: D0, 1068; D7, 554; D14, 894; COWP treated: D0, 486; D7, 913; D14, 186 ± 257 eggs/g; COWP × day, $P < 0.002$). The PCV (30.9 ± 0.8%) was similar between groups and days during this study. In Exp. 2, there was no influence of stress imposed on FEC. The FEC increased over time (D0, 439; D14, 2085 eggs/g; $P < 0.001$), but did not decrease in response to COWP. PCV was similar among groups on D0 and 14, but PCV of kids in confinement was greater than other groups on D7 (stress × day, $P < 0.001$), perhaps because a reduction in water intake. In summary, there was a delayed reduction of FEC in response to COWP in stressed lambs, but no influence of COWP on GIN in 90 d old kids. Failure of COWP to influence GIN in kids in Exp. 2 is not understood.

Key Words: Copper oxide, Gastrointestinal nematodes, Small ruminants

103 Administration of copper oxide wire particles as a bolus or in feed for gastrointestinal nematode control in yearling or peri-parturient does. J. M. Burke*[1], J. E. Miller[2], S. Wildeus[3], and T. H. Terrill[4], [1]*USDA, Agricultural Research Service*, *Booneville, AR*, [2]*Louisiana State University*, *Baton Rouge*, [3]*Virginia State University*, *Petersburg*, [4]*Fort Valley State University*, *Fort Valley, GA*.

Widespread anthelmintic resistance in small ruminants has necessitated alternative means of gastrointestinal nematode (GIN) control. The objective was to determine the effectiveness of copper oxide wire particles (COWP) administered as a bolus or in a complete feed supplement to control GIN in yearling or peri-parturient Spanish does. In early March 2008, yearling (n = 25) or peri-parturient (n = 36) does were randomly assigned to remain untreated (CON) or administered 2 g COWP as a bolus (BOL) or in a feed supplement (SUP; n = 8 or 9/treatment for yearlings; n = 12/treatment for peri-parturient does). Does were due to start kidding 10 d later and all kidded within 28 d after study began. All goats had access to free choice bermudagrass hay and trace mineral in semi-confinement. A pooled fecal sample was collected for culture on D 0 (day of COWP administration) from the yearling and peri-parturient does and indicated that *Haemonchus contortus* comprised 72% and 61% of nematode population, respectively and remaining nematodes were *Trichostrongylus spp*. Feces and blood were collected every 7 d between D 0 and 21 for fecal egg counts (FEC) and blood packed cell volume (PCV) analyses. FEC were log transformed for data analysis. Data were analyzed using the mixed models procedure of SAS with a repeated statement for day (0 - 21) and included COWP treatment, production phase, and interactions in the model. In yearling does, FEC of the BOL group was less than CON and SUP groups and in the peri-parturient does, FEC of BOL and SUP groups was less than CON (COWP × production phase, $P < 0.005$). A peri-parturient rise in FEC was apparent in the peri-parturient does (production phase × day, $P < 0.001$). PCV tended to decline with time in both yearling and peri-parturient does ($P < 0.09$), but was similar between treatments. In summary, it appeared that the BOL was more effective than the SUP for GIN control in yearling does, and both the BOL and SUP were effective in peri-parturient does. However, differences between groups of does may have been confounded with age.

Key Words: Copper oxide, Gastrointestinal nematode, Goat

104 Effect of copper oxide wire particles incorporated into feed pellets on the peri-parturient rise in ewe fecal egg count. S. T. Orlik*[1], J. E. Miller[1], J. M. Burke[2], 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 parasitism, specifically *Haemonchus contortus*, is a major constraint to small ruminant production. Infection can not be controlled efficiently due to widespread resistance to available anthelmintics. Copper oxide wire particles (COWP) have been shown to effectively reduce *H. contortus* infection in lambs and ewes. The objective of this study was to evaluate COWP incorporated into feed pellets on controlling the peri-parturient rise in fecal egg count (FEC) of ewes during lactation. Twenty ewes (Suffolk x Gulf Coast Native) were randomly allocated to control and COWP groups (10 each) at the beginning of lambing. Ewes grazed ryegrass pasture. Fecal and blood samples were collected at 7 d intervals for 12 wk (lambs weaned) to monitor infection level. At the start of the study, infection level for Control and COWP groups was 333 and 335 eggs per gram (epg), respectively. Infection steadily increased and COWP (4g/hd) feed pellets were administered one time at one feeding to the COWP group on week 7 when FEC of both groups exceeded 1000 epg. Subsequent to treatment, FEC in the Control group remained greater than 1000 epg and the COWP group FEC was reduced by 81.3-86.5% ($P < 0.05$). There was no difference in blood packed cell volume ($P > 0.05$) throughout the study. There were 15 and 18 lambs born to Control and COWP group ewes, respectively. There was no difference in lamb birth weights (4.8 and 4.6 kg, respectively, $P > 0.05$), but control lambs were heavier at weaning (25.3 and 22.1 kg, respectively, $P < 0.05$). Lamb FEC at weaning was not different (3290 and 2488 epg, respectively, $P > 0.05$). COWP administered in feed pellets effectively controlled the peri-parturient rise in ewe FEC which could result in reduced pasture contamination for subsequent grazing animals. However, the reduced infection in COWP treated ewes did not have any effect on lamb infection level.

Key Words: Haemonchus, Copper oxide wire particles, Ewe

105 Effect of copper oxide wire particles as a bolus or in feed on indicators of gastrointestinal parasitism in goat kids of two breeds. S. Wildeus*[1], J. E. Miller[2], and J. M. Burke[3], [1]*Virginia State University*, *Petersburg*, [2]*Louisiana State University*, *Baton Rouge*, [3]*USDA-ARS*, *Booneville, AR*.

This experiment evaluated the efficacy of mode of administration of copper oxide wire particles (COWP) either as a gel capsule bolus or mixed into supplemental feed to control naturally-acquired gastrointestinal parasite infections in weaned goat kids. In June, 72 April-weaned, mixed-sex Myotonic and Spanish kids with FAMACHA scores ≥3 were allocated either to an untreated control group (CONT), a group dosed with a single gel-cap bolus of 2 g of COWP (BOLUS), or a group with COWP mixed into the supplemental feed to provide 2 g/animal in a single meal (FEED). Groups were balanced by breed and sex. Kids rotationally-grazed permanent, naturally parasite-infected pasture as a single group prior to and during experiment, while being supplemented with corn/soybean meal (16% CP) at 2% of BW. Fecal and blood samples were collected from experimental animals on the day of dosing, and in 7-d intervals for 42 d for determination of fecal egg counts (FEC) and packed blood cell volume (PCV). Data were analyzed with mixed model procedures for repeated measurements and included treatment, breed and sex in the model. FEC were log transformed for analysis. Mean FEC of all kids at the onset of the trial exceeded 4000 eggs/g. FEC decreased in BOLUS and FEED groups (1199 and 860 eggs/g) compared to CONT (2891 eggs/g) within 7 d of treatment, and remained lower ($P<0.05$) up to 35 d after treatment. This difference in FEC was not reflected in a difference in PCV between treatment groups. There was no difference in FEC between BOLUS and FEED groups. *Haemonchus contortus* represented 58% of the nematode population in the goats at the onset of the trial, and decreased to 2-3% in COWP treated kids by d 21 after treatment before recovering to control levels. FEC was lower ($P<0.01$) in Myotonic than Spanish goats (1535 vs. 2966 eggs/g, respectively), but breeds did not differ in PCV. In this experiment, COWP mixed into feed or administered as a bolus was equally effective in suppressing FEC for a period of about 4 wk.

Key Words: Goats, Parasites, Copper oxide wire

106 Use of garlic as a potential natural dewormer in small ruminants. D. J. O′Brien[1], M. C. Gooden*[2], N. C. Whitley[3], and S. Schoenian[4], [1]*Delaware State University*, *Dover*, [2]*University of Maryland Eastern Shore*, *Princess Anne*, [3]*North Carolina A&T State University*, *Greensboro*, [4]*University of Maryland*, *Keedysville*.

It was the objective of this study to evaluate the efficacy of garlic in reducing fecal egg counts (FEC) in sheep (Exp 1) and goats (Exp 2). In Exp 1, eighteen Katahdin ewe lambs were placed in individual pens and were administered either 3ml of garlic juice (GAR; n=8) or water (CON; n=10) daily for 21 days. Weekly fecal samples were collected for FEC determination using the Modified McMaster's technique with a 50 epg sensitivity. In Exp 2, twenty-three crossbred Boer goat kids of mixed sex were placed into a CON (n=11) or GAR (n=12) group according to initial FAMACHA scores and a fecal egg count reduction test (FECRT) was conducted to determine efficacy of treatment. Goats in the GAR group received 0.16 ounces of garlic juice while the CON group received no treatment. Efficacy of GAR was calculated as FECR%=100(1–(Xt/Xc)) with Xt and Xc being the arithmetic FEC mean in the GAR (t) and CON groups (c). A pooled pre- (all animals) and post- (one for each treatment) fecal sample was collected for larval species identification. In Exp 1, there was an effect of day on FEC (P≤0.01), but no effect of treatment. Day 0 FEC (2189±807epg) was lower (P≤0.03) than FEC on d7, 14, and 21 (averaged 4350±882, 4485±1987, 4414±932epg, respectively). In Exp 2, a single dose of garlic was not effective in reducing FEC in goats, with FEC increasing 20.3% over that of the CON (≥ 90% reduction considered effective). The initial pooled fecal sample consisted of 90% Haemonchus contortus (HC) and 10% trichostrongylus (Tric). After treatment, CON fecals consisted of 92% HC and 8% tric while GAR samples consisted of 86% HC and 13% tric. In this study, garlic was not effective in reducing fecal egg counts in lambs and kids. More studies are needed to evaluate the use of natural plant dewormers in small ruminants.

Key Words: Sheep, Goats, Garlic

107 Effect of parasite management practices on fecal egg counts and fiber characteristics in alpacas. S. Wildeus*[1], A. M. Zajac[2], C. J. Lupton[3], and J. R. Collins[1], [1]*Virginia State University*, *Petersburg*, [2]*VA-MD Regional College of Veterinary Medicine*, *Blacksburg, VA*, [3]*Texas AgriLife Research*, *San Angelo, TX*.

Alpacas are a more recent agricultural enterprise in the U.S., and only limited information is available on appropriate management practices for efficient fiber production under non-indigenous environmental conditions. This experiment evaluated the effect of deworming practices on fiber production in alpacas. Sixteen mature male alpacas were allocated to two treatment groups blocked on BW and fiber diameter in March. The control group (′timed′) was treated with ivermectin (0.4 mg/kg BW; sc) at 6 wk intervals, whereas experimental animals were treated individually with moxidectin (0.2 mg/kg BW; oral) when strongylid fecal egg counts >200 eggs/g (′on-demand′). Groups were maintained on naturally parasite-infected pastures (1 ha) previously grazed by sheep and goats. Fecal and blood samples were collected, and FAMACHA anemia scores were recorded at 14-d intervals throughout the grazing season. Manure piles were removed in regular intervals. Alpacas were shorn in May and fleece weight and fiber characteristics were determined. Average body weight throughout the grazing season was similar between treatment groups (timed: 68.4±1.1 kg; on-demand: 68.7±1.5 kg), with no fluctuations except in response to shearing. Packed blood cell volume also was not affected by treatment (timed: 32.2±1.5%; on-demand: 33.8±1.7%), and all FAMACHA scores were ≤2. Fecal egg counts remained low throughout the grazing season (timed: 9.5±7.1 eggs/g; on-demand: 10.1±12.2 eggs/g), and only one animal exceeded 200 eggs/g in the on-demand group, and was treated with moxidectin. Parasite management had no effect on fleece weight (mean 2.64±0.79 kg), or fleece characteristics (average fiber diameter: 33.7±4.7 μm; staple length: 9.75±1.18 cm; fiber curvature: 33.7±5.7 deg/mm). Results suggest that a less aggressive approach towards deworming alpacas for gastrointestinal parasites may be feasible in the Mid-Atlantic region, particularly in years of low rainfall, and would help delay the development of anthelmintic resistance.

Key Words: Alpaca, Parasites, Fiber

108 Factors affecting indicators of *Haemonchus contortus* infection in Polypay and percentage White Dorper ewes. D. K. Aaron*, D. G. Ely, E. Fink, B. T. Burden, and M. M. Simpson, *University of Kentucky*, *Lexington*.

Data collected on 83 Polypay (PP) and 169 percentage White Dorper (WD) ewes and 455 lambings (2005 to 2008) were used to quantify factors affecting indicators of *Haemonchus contortus* infection. Ewes and lambs were managed in a single flock on pasture each year from lambing in April to weaning at 70 d. Ewes received a daily supplement of 0.45 kg shelled corn/hd and lambs were creep fed. Eyelid color scores, based on the FAMACHA© system, packed cell volumes (PCV,%), and egg counts/g of feces (FEC, log transformed), measured on ewes 30 d postpartum and at weaning, were used as indicators of parasite infection. Genetic (sire breed, sire, percent WD breeding) and production (year, parity, and number of lambs reared) factors affecting these indicators were investigated using mixed model, repeated measures procedures. **30-d Postpartum:** Sire breed (PP vs WD) did not affect any of the indicator traits; however, sire differences within breed accounted for significant variation ($P < 0.10$) among eyelid color scores, PCV, and FEC. As percent WD breeding increased, indicator traits revealed decreased severity of parasite infection ($P < 0.10$). In contrast, eyelid color scores increased, PCV decreased, and FEC increased ($P < 0.01$) as parity increased. Ewes rearing single lambs had lower eyelid color scores (1.6 vs 1.8; $P < 0.01$) and higher PCV (33.0 vs 31.4%; $P < 0.01$) than ewes rearing multiples. **Weaning:** Parity and type of rearing remained significant influences on all indicator traits. Parasite infection increased as parity increased. Ewes weaning single lambs had lower eyelid scores (2.3 vs 2.7; $P < 0.01$), higher PCV (30.0 vs 27.0; $P < 0.01$), and lower FEC (6.45 vs 6.96; $P < 0.01$) than ewes weaning multiples. Indicators of *Haemonchus contortus* infection are influenced by characteristics of the ewe, which may mean susceptibility or tolerance to infection is dependent on her genetics and production status.

Key Words: Ewes, *Haemonchus contortus*, Infection

109 Evaluation of Sericea lespedeza as a summer forage and for helminth control of grazing goats. J-M. Luginbuhl*[1], J. E. Miller[2], T. H. Terrill[3], and H. M. Glennon[1], [1]*North Carolina State University*, *Raleigh*, [2]*Louisiana State University*, *Baton Rouge*, [3]*Fort Valley State College*, *Fort Valley GA*.

Two trials evaluated the effects of Sericea lespedeza (*Lespedeza cuneata*, SL) as a summer grazing forage on natural gastrointestinal nematode infections in young goats. In trial 1, 36 Boer cross kids (BW 17.3 kg) were stratified by fecal egg counts (FEC) and sorted into 9 groups of 4 animals in a randomized complete block design with 3 replications. Animals were strip-grazed on either SL, pearlmillet (*Pennisetum americanum*, PM) or a combination (CMBO) of SL and PM plots. CMBO goats strip-grazed SL first, then were switched among PM and SL plots every 14 d. Fecal samples, blood samples and FAMACHA scores were taken every 7 d for FEC and packed cell volume (PCV). After 49 d of grazing, animals were housed together off pasture for 28 d, and were fed concentrate at 1.5% BW while having ad libitum access to fescue hay. Animals were then sacrificed and abomasal and small intestinal contents retrieved. In trial 2, 18 yearling does were assigned to 2 groups to graze either SL or bermudagrass (BG). FEC, PCV and FAMACHA were analyzed weekly. Groups were switched among forage species on d 42 and 70. In trial 1, FEC of kids grazing SL decreased within 7 d and stayed lower ($P < 0.05$) from d 7 through 49. The PCV values of the SL goats were higher ($P < 0.05$) from d 28 to 49 and FAMACHA scores were lower ($P < 0.05$) on d 35 and 49. The FEC of the CMBO kids decreased ($P < 0.06$) within 7 d of grazing SL and then increased ($P < 0.01$) when switched to PM. Six of the 12 kids on PM had to be dewormed within 14 d. Following barn feeding on d 49, FEC rose and PCV decreased in all treatments. Kid gains were similar across treatments (avg 101 g/d). In trial 2, goats grazing SL had lower FEC ($P < 0.05$) than those on BG on d 14, 35 and 42. A 58% (d 42) and 69% (d 70) decrease in FEC was observed within 7 d of switching goats from BG to SL. The SL FAMACHA scores decreased from d 0 to 42 ($P < 0.05$ on d 28 and 42) while BG scores increased. In summary, animals grazing SL had lower FEC and had to be dewormed less frequently.

Key Words: Gastrointestinal nematode, Goat, Sericea lespedeza

110 Influence of chicory in a rotational grazing system on gastrointestinal nematodes (GIN) in sheep. J. M. Burke[1], P. L. Casey*[2], A. Wells[2], and R. Paddock[2], [1]*USDA, Agricultural Research Service*, *Booneville, AR*, [2]*Heifer International*, *Perryville, AR*.

Little is available on a Systems approach for management of GIN in sheep. Objective was to examine differences in GIN infection in lambs rotationally grazing pastures with their dams using a Systems Research approach. Katahdin ewes located at Heifer International, Perryville, AR lambed in MAR. In APR, twin-bearing ewes (n = 6 ewes, 12 lambs/system) were randomly assigned to graze a mixed warm season grass pasture (GR1), a mixed grass pasture with chicory (CHI; 10 to 50%) each for 140 d, or a second grass pasture (GR2 implemented between D56 and 112; D0 = first d of study). The GR1 group was a subset of the main flock of 60 ewes/95 lambs managed on 12 ha (4.2 ewes/ha) and grazed by cattle (n = 69). The CHI and GR2 (also a subset of main flock) were managed on 0.56 ha subdivided into 9 subplots at 10.7 ewes/ha. For all systems, sheep were rotated to adjacent pasture every 3 to 4 d or until forage height declined to 6 cm. The GR1 group returned to original plot 60 d later, the CHI and GR2 groups returned 30 d later, for 1.3, 4.5, and 2 complete rotations, respectively. Fecal egg counts (FEC) and packed cell volume (PCV) analyses were determined every 14 d and BW every 28 d. FEC of CHI was greater than GR1 lambs only on D28, and FEC of GR1 was greater than the CHI lambs on D70 and 140. The FEC of the GR2 lambs was greater than the other groups on D70 and 84 (system × day, $P < 0.001$). FEC of the GR2 lambs was extremely high on D84 (9500 epg), whereas the GR1 and CHI groups never exceeded 3500 epg. Changes in PCV in the CHI group were few compared with the GR1 and GR2 groups. PCV of CHI was less than GR1 lambs on D56, but greater on D84 and 112; PCV of CHI was greater than GR2 on D84 and PCV of GR1 and GR2 lambs was similar (system × day, $P < 0.001$). Deworming of individuals based on FAMACHA was similar among systems. BW of GR1 lambs was greater than CHI on D56 and greater than GR2 on D84, but otherwise similar (system × day, $P < 0.001$). In summary, BW and FEC between GR1 and CHI were similar most of summer, but mid-season FEC of GR2 lambs was markedly higher than other groups. Incidence of anemia was rare in CHI lambs.

Key Words: Chicory, Gastrointestinal nematodes, Sheep

111 Immune status of lambs, born of protein-supplemented periparturient ewes and creep-grazed in spring, against Haemonchus contortus. O. J. Gekara*[1], W. B. Bryan[2], and E. A. Basweti[2], [1]*University of Arkansas*, *Pine Bluff, AR*, [2]*West Virginia University*, *Morgantown*.

An experiment was conducted at the West Virginia University Organic Research Farm in 2006 to determine the effect of a supplemental protein diet fed to ewes during the periparturient period and forage allowance on performance of creep-grazed lambs against Haemonchus contortus parasitism. Thirty six ewes stratified for breed and age (twenty 5-yr old Merino × Dorset Horn crosses and sixteen 2-yr old Merino × Dorset Horn x Suffolk crosses) were fed either a high (18% CP) or low (12% CP) protein diet at the rate of 0.302 kg DM per head/d for 3 wk (2 wk before and 1 wk after lambing). Fifteen ewes stratified for breed and age, 8 fed high and 7 the low CP diet during the periparturient period, and their 23 lambs born between April 1 and April 10 were randomly assigned to two forage allowances (high = 1.5× or low = 1.25× forage DM intake). Animals grazed a naturalized pasture comprised mainly of tall fescue (Festuca arundinacea Schreb.) and some orchardgrass (Dactylis glomerata L.); legumes were mainly red clover (Trifolium pratense L.) and some white clover (Trifolium repens L.); forbs were mainly broad-leaved. Grazing started on April 16 when sward height averaged 8 cm. Sheep grazed pasture with 3-d occupancy and lambs were forward-grazed using a creep gate. A treatment by diet interaction was evident ($P = 0.038$) for lamb ADG. Lambs born of low CP ewes as opposed to high CP ewes gained faster when forage allowance was high, whereas lambs exhibited the opposite response when forage allowance was low. Lambs on high forage allowance had a lower ($P = 0.001$) FAMACHA score (lambs less anemic) compared with lambs on low forage allowance (2.0 vs. 2.9), CP level had no ($P > 0.10$) effect on this score. Lambs on high forage allowance weighed 36.1 kg at 8 months, 5.4 kg more ($P = 0.01$) than lambs on low forage allowance. It is concluded that allowing lambs ample (high forage allowance) access to forage under creep grazing management probably increased lamb immunity against Haemonchus contortus parasitism.

Key Words: Lambs, Management, Haemonchus

Teaching and Undergraduate Education

112 Capstone experiences in undergraduate agriculture. B. D. Whitaker*, D. A. Bowman, M. A. Gazdik, B. R. Pohlad, and C. L. Thomas, *Ferrum College*, *Ferrum, VA*.

The agriculture program at Ferrum College (Virginia) is part of the School of Natural Science and Mathematics. Undergraduate agriculture majors are required to complete a series of three courses that encompass the capstone experience. Successful completion of the course series counts towards the speaking and writing intensive requirements to graduate. Students begin as juniors by taking a course in which they 1) explore the scientific literature in their discipline, 2) respond to relevant issues through effective written communication, 3) respond to relevant issues through effective oral communication, and 4) consider opportunities within their discipline that follow graduation. The year long senior course sequence is designed to 1) integrate a student's total educational experience as an undergraduate, 2) allow students to develop and present a thesis that requires integration of concepts, data, and procedures from both their major and at least one discipline outside their major, and 3) create an opportunity for the students to demonstrate competence in presenting their thesis through both oral and written communication, using modern technology. Although the capstone experience is common for all students, it is also unique because it gives the individual the opportunity to explore and research an area of interest. Exceptional students and those that are considering graduate school/professional school are encouraged to design and implement independent scientific research. The effort and challenges faced when requiring this experience are many but the inherent outcomes, as indicated by the students, would be unobtainable otherwise.

Key Words: Undergraduate education, Experiential learning, Capstone experience

113 Evolution of an animal science learning community: Design, experiences and progress. S. Shaw*, D. A. Coleman, and D. R. Mulvaney, *Auburn University*, ,*Auburn, AL*.

Undergraduate student learning communities (LC) of various design are being emphasized across many campuses because of positive relationships to engagement, student self-reported outcomes, retention and overall satisfaction. Based on these merits, the College of Agriculture partnered with the Department of Animal Sciences to offer freshmen majoring in a pre-veterinary medicine option a LC opportunity. Now in its 7th cohort year of approximately 40 students and two sections, the LC's have evolved. This progression includes changes in pivot and collateral courses, formats, content offered in the pivot course, pedagogy and recruitment of freshmen into the LC. The instructional content of a fall pivot course focused on 'academic success strategies' and 'Auburn University' experience has evolved to now encompass more comprehensive success strategies for college as well as integration of leadership skills. The pivot course offered in the fall is followed with an 'Introduction to Agriculture' course in the spring. Recruitment begins as students become admitted, and accepted enrollment into a major and then intensifies with the summer orientation, Camp War Eagle. Upon enrollment, cohort members are expected to complete the two semester experience. Subjective benefits of the LC are enhanced study skills, freshmen transition, supplemental instruction, networks of collegiate friendships, more acute awareness of campus resources and facilities. Numerous alumni of the Animal Science LC emerge as positional leaders in College of Ag organizations. We have found the LC to be an asset for recruitment and retention by helping students become more successful both academically and professionally and have plans to expand LC across the college.

Key Words: Learning community, Animal science pre-vet, Student success

Undergraduate Student Research Competition

114 The growth potential of tropical forage legumes grown in a semi arid region of Honduras. K. Gregory*[1], F. N. Mhlanga[1], J. Brown[2], and G. Betancourt[2], [1]*Abilene Christian University*, *Abilene, TX*, [2]*Mission Lazarus*, *Choluteca, Honduras*.

Smallholder dairy production in the subtropics is limited by acute shortages of good quality feed. Protein-rich forage legumes offer an opportunity to provide a cheap source of quality feed to enhance smallholder dairy production in the subtropics. The objective of this was to assess the growth performance of five tropical legumes in Southern Honduras. The legume species used in the study were chickpea (*Cicer arietinum*), cowpea (*Vigna unguiculata*), lablab (*Dolichos lablab*), pigeon pea (*Cajanus cajan*) and velvet bean (*Mucuna puriens*). A completely randomized design with four subplots per legume as replications was used. Each subplot was 4.5 m × 9.0 m in area. To simulate the practices of smallholder dairies in this part of Honduras, the legumes were planted without inoculum, fertilizer or irrigation and with little pesticide. Days to emergence ranged from 10-14 days. The Generalized Linear Models procedure in SAS was used for data analysis. Average height at 30 and 60 days varied significantly among the legumes ($P<0.001$). Cowpea had the highest height at both 30 and 60 days after planting (14.14 cm and 43.77 cm, respectively). The least square means for height at 60 days for chickpea, lablab, pigeon pea and velvet bean were 19.9, 9.9, 35.3 and 18.2 cm, respectively. Plant population estimates at 60 days showed highly significant variation among the legumes ($P<0.001$). Cowpea outperformed other legumes with an average plant population of 5400.00 plants per subplot, compared with 155.5, 50.0, 2700.0 and 344.5 plants for chickpea, lablab, pigeon pea and velvet bean, respectively. Lablab showed poor performance on all measurements recorded. The results presented in this study indicate cowpea and pigeon pea have great potential in rural Southern Honduras due to high yields and rapid growth.

Key Words: Forage legumes, Smallholder dairy, Southern Honduras

115 Smallholder livestock production in Zambia: Constraints and opportunities. J. Ferguson* and F. N. Mhlanga, *Abilene Christian University*, *Abilene, TX*.

Large numbers of people who live in the smallholder sectors of Africa depend on agriculture as their major means of livelihood. Agricultural

productivity in these sectors is constrained by many factors that need addressing. A baseline survey was carried out in the smallholder sectors of Northwestern Zambia to obtain information on constraints to livestock production. Data were collected through interviews using a structured questionnaire. A total of 69 farmers randomly selected from two regions in Northwestern Zambia were interviewed. Information on socio-economic characteristics, livestock production and production constraints was collected. Means, standard deviations and frequencies were computed from the data. None of the farmers interviewed had any formal agricultural training. Elementary education was the highest level of formal instruction received by the farmers. Fifty-eight percent of the farmers interviewed owned livestock. Village chickens were the major livestock species owned by most farmers (43%). Flock sizes ranged from 1-84 birds per household with a median of 4 and a mean of 7.4 birds. The production system in the households was based on scavenging indigenous domestic chickens. Goats and cattle were raised by 18% and 4% of the farmers, respectively. Average herd sizes for goats and cattle were 5.0 and 3.8, respectively. The major constraints to livestock production included predation, inadequate health care, poor reproduction, inappropriate housing and poor knowledge of livestock management. Livestock diseases were ranked as the number one constraint by 83% of the farmers. Newcastle disease of chickens was the most important and prevailing disease in the study area. The smallholder farmers were not able to name any other specific livestock diseases, but were able to describe symptoms. The results of this survey revealed the importance of small ruminant and village chicken production. Livestock diseases were identified by the farmers as the major constraints to the expansion of both village chicken and small ruminant production in Zambia.

Key Words: Baseline survey, Smallholder, Village chicken

116 Sustainability and grazing livestock in the Appalachian region. T. M. Garnett* and B. D. Whitaker, *Ferrum College*, *Ferrum, VA*.

The purpose of this study was to see if there were notable differences in total organic matter in the soil and average daily gain (ADG) of Suffolk market lambs through a comparison of traditional pasture grazing to agroforestry. Two plots approximately an acre each were established, one pasture only (control) and the other a pasture with hardwood trees (agroforestry pasture). Within these plots the ADG and 120 d weight was determined by recording weights every other day. Total organic matter in the soil was determined by random sampling taken weekly for the duration of the study. Samples were processed and burned in a muffle furnace to determine total organic matter. The percent understory cover were monitored to determine the effects of agroforestry grazing on livestock, as well as the pasture and the forest. The analysis of variance was generated using PROC GLM (SAS Inst., Cary, NC) and significant differences were determined using LSMEANS statement and Tukey adjustment for multiple comparisons. It was found that there was no difference in the ADG of the market lambs. There was higher organic matter in the soil from the forest compared to the pasture ($P < 0.05$). Results of the understory analysis indicate that the market lambs were using the forest for both shelter and forage ($P < 0.05$). Raising market lambs on agroforestry pastures does not reduce ADG and improves the organic matter in the soil.

Key Words: Sustainable, Agroforestry, Sheep

117 Effect of RADEX on the utilization of poor quality roughages by small ruminants. K. M. Kirkpatrick*[1], F. N. Mhlanga[1], B. E. Brokaw[1], E. Pierce[1], R. H. Anderson[2], and W. Kent[3], [1]*Abilene Christian University*, *Abilene, TX*, [2]*Andersons Consulting & Training Service Inc.*, *Garden City, KS*, [3]*Burrmiester, Inc.*, *Sweetwater, TX*.

Low levels of sodium formate have been shown to improve the digestibility and utilization of poor quality roughages by large ruminants. The effects of sodium formate salts are yet to be assessed in small ruminants. A 42-day feeding trial was conducted to evaluate the effect of a patented formate salt, RADEX, on weight gain and feed intake of growing kids consuming either wheat (*Triticum spp*) straw (CP = 6.37%, ADF = 49.44%, NDF = 72.35%) or sudangrass (*Sorghum bicolor*) hay (CP = 6.41%, ADF= 46.26%, NDF = 72.89%). Twenty-four female Boer kids, three months in age, with an average initial weight of 18.9 kg were used in this experiment. Four dietary treatments of wheat straw (WS), wheat straw plus RADEX (WSR), sudangrass hay (SH) and sudangrass hay plus Radex (SHR) were used in a split plot design using diet as the main plot, three pens per diet as the experimental units and two goats per pen as samples. RADEX was fed at a rate of 0.20g/day per animal. Wheat straw and sudangrass hay were fed *ad libitum*. The Generalized Linear Models procedure in SAS was used for data analysis. Animals receiving either WS or WSR had highly significant weight losses compared to those on either SH or SHR ($P<0.01$). Average daily weight losses were higher ($P<0.05$) for goats on WS (-78.57g/d) than on WSR (-31.48g/d). Although average daily gain was higher for goats fed SHR (33.73 g/d) compared to SH (11.13g/d), the estimates were not different ($P>0.05$). Voluntary daily feed intakes were lower for WS & WSR than for SH and SHR ($P<0.001$), demonstrating relatively poor acceptability of wheat straw. Least square means for daily feed intake per pen were 348.27 g, 312.98g, 727.54g and 753.53g for WS, WSR, SH and SHR, respectively. The results showed that sudangrass was a superior feed to wheat straw and that RADEX improved weight gain though not significantly different. The wheat straw diet was inadequate to foster weight gain, but RADEX reduced the negative impacts.

Key Words: RADEX, Wheat straw, Sudangrass hay

118 Bioavailability of iron in mined humate for nursery pigs. C. M. Ballou*, J. W. Spears, and S. W. Kim, *North Carolina State University*, *Raleigh*.

Humate has been fed to pigs for improving growth and loin quality. Humate is a potential Fe source for pigs because of its high Fe content. There is limited information on Fe bioavailability of humate in pigs. This study was conducted to measure Fe bioavailability of humate relative to feed grade FeSO4 in nursery pigs. Pigs (n=150) were given a 50 mg IM injection of Fe shortly after birth. Pigs were weaned at 21 d of age, and allotted to 5 dietary treatments with grade levels of Fe in the form of FeSO4 and humate (0, 35, and 70 mg/kg of added Fe). There were 6 replicate pens per treatment and 5 pigs per pen. Pigs were fed for 28 d, weighed weekly, and bled at 28 d to measure hemoglobin (Hb) concentrations. Data were analyzed as a completely randomized design with the Proc GLM of SAS software to obtain means, probability of differences, standard errors, and relative Fe bioavailability.
Regression equations were obtained between Fe intake from each Fe source and Hb content or weight gain (WG). Slopes from each Fe source were compared to obtain the Fe bioavailability of humate relative to FeSO4. The basal diet contained 37.2 mg/kg Fe. Pigs fed the basal diet

had 8.15 g Hb/dL, indicating anemic status. Changes in Hb contents for pigs with various Fe intakes from two Fe sources were modeled as: Hb (g/dL) = 7.6509 + 0.0756 x A + 0.0002 x B (P<0.01) and changes in WG of pigs were modeled as: WG (kg) = 3.417 + 0.113 x A + 0.092 x B (P<0.01), where A and B are average daily Fe intakes (mg/d) from humate and FeSO4, respectively. Increases in Hb content were different (P<0.05) whereas increases in WG were not different (P=0.415) between Fe sources. Relative bioavailability of Fe in humate to FeSO4 was 0.3% (0.0002/0.0756) based on Hb content. However, increases in WG as Fe increased did not differ between Fe sources. Collectively, this study suggests that humate is not an effective source of bioavailable Fe for pigs. Positive effects of humate on WG were likely not due to Fe in humate but to other components of humate which warrants further investigation.

Key Words: Bioavailability, Humate, Pigs

119 The effect of initial market grade on linear measurements and carcass characteristics of feeder goats. J. Robinette*, R. Miculinich, B. Galbreath, T. Platt, and T. Wistuba, *Morehead State University*, *Morehead, KY*.

Several studies have indicated that meat goats can be economically produced in the United States and that market demand for goat meat exceeds current supplies. However, live goat markets continue to be difficult to quantify and qualify. Therefore, the purpose of this project was to determine the impact of initial market grade on linear and carcass characteristics of Boer buck kids. Forty five kids (20.9 ± 2.9 kg) were purchased at local auction on January 14, 2007, processed upon arrival and allowed *ad libitum* access to feed and water during a 14 d adaptation phase. Goats were then visually evaluated and classified into one of three market grades. Every two weeks the following measurements were taken: horn length, horn circumference, horn width, heart girth, chest width, forearm circumference, cannon bone circumference, cannon bone length, rack length, loin length, rump length, hip width, pin width and weight. Upon completion of the 45 d feeding period the goats were harvested and carcass measurements were taken. The analysis of variance was generated utilizing PROC MIXED (SAS Inst., Inc. Cary, NC), the model included market grade. Initial weights were increased (P<0.05) for goats in market grades 1 and 2 compared to goats in market grade 3 (23.0 and 21.4 vs. 19.2 kg). Furthermore, market grade 1 and 2 goats had larger initial chest widths, forearm circumferences, and cannon bone circumferences when compared to market grade 3 goats (P < 0.07). Additionally, market grade 3 goats had longer cannon bone lengths than market grade 1 goats initially (P < 0.05). Market grade classification had no impact on rack or loin length. After 45 d on feed, goats with a market grade 1 had greater (P < 0.05) end weights than goats in market grade 3 (34.2 vs. 30.5 kg). Hot carcass weights varied significantly in the market grade 1 goats which had greater (18.1 kg, P <0.05) weights than market grade 2 goats (16.8 kg) which were greater (P < 0.01) than market grade 3 goats (15.2 kg). Results of the present study indicate that initial market grade classification is a relatively accurate estimation of final carcass yields.

Key Words: Meat goats, Marketing, Linear measurements

120 Effects of corn processing method and wet distiller's grains plus solubles inclusion and source on ruminal pH and *in situ* digestiblity of crossbred steers. J. B. Lewis*[1,2], K. J. Jenkins[2], J. M. Patterson[2], N. A. Cole[3], J. B. Osterstock[2,4], L. O. Tedeschi[4], and J. C. MacDonald[1,2], [1]*West Texas A&M University*, *Canyon, TX*, [2]*Texas AgriLife Research*, *Amarillo, TX*, [3]*USDA-ARS*, *Bushland, TX*, [4]*Texas A&M University*, *College Station*.

Six ruminally cannulated crossbred steers (472 kg) were used in a 6×6 Latin square design to determine effects of corn processing method and wet distiller′s grains plus soluble (WDGS) inclusion and source on *in situ* digestibility and ruminal pH. Finishing diets were dry-rolled corn (DRC) or steam-flaked corn (SFC) based and included 20% WDGS from corn (CWDGS), sorghum (SWDGS), or no WDGS. All diets contained 10% alfalfa hay and were formulated to contain 6% dietary fat, 0.70% Ca and 13.5% CP. Periods were 21 days in length (16-d adaptation, 5-d collections). Ruminal fluid pH was tested 4 times/d for 3 consecutive d so that ruminal pH was measured every 2 hr for a 24 hr period. Samples of DRC, SFC, CWDGS, and SWDGS were incubated *in situ* for 0, 2, 4, 8, 12, 16, 24, and 48-h. Samples were incubated only in steers fed diets containing that sample. Mean ruminal pH was greater in steers consuming DRC-based diets than SFC-based diets ($P < 0.01$) and was greater in steers consuming SWDGS than CWDGS and no WDGS ($P < 0.01$), mean ruminal pH for steers consuming CWDGS did not significantly differ from steers that did not consume WDGS ($P = 0.65$). There was no effect of WDGS on *in situ* digestibility of corn ($P > 0.13$); however, SFC had a greater soluble fraction ($P < 0.01$) and a smaller potentially digestible fraction ($P < 0.01$) than DRC. The indigestible fractions of DRC and SFC did not differ ($P = 0.12$). Steam-flaked corn had greater effective ruminal digestibility than DRC ($P < 0.01$; 52.6% vs. 36.1% for SFC and DRC respectively). Corn processing method had no effect on the soluble fraction ($P > 0.21$) or the indigestible fraction ($P > 0.19$) of WDGS. The potentially digestible fraction of CWDGS and SWDGS did not differ in SFC-based diets ($P = 0.71$), but was greater for SWDGS in DRC-based diets ($P = 0.02$). The effective ruminal digestibility was greater for CWDGS (64.3%) than SWDGS (46.1%) regardless of corn processing method ($P < 0.01$). Differences in ruminal digestibility and pH in SWDGS vs. CWDGS and DRC vs. SFC are likely related due to VFA production.

Key Words: Distiller's grains, Corn processing, Ruminal digestibility

121 Effects of intra-nasal or oral administration of a zinc solution on health and growth performance of newly-received stocker cattle. A. R. Guernsey*, E. B. Kegley, J. G. Powell, D. L. Galloway, A. C. White, and S. W. Breeding, *University of Arkansas*, *Fayetteville*.

Male beef calves (n = 88, initial BW 229 ± 1.4 kg) were purchased from area auction barns and delivered as a single group. Upon arrival, cattle were sorted by gender and assigned randomly to 8 pens. Pens were assigned randomly to 1 of 3 treatments; 22 cattle (2 pens) received 3 mL of a nasal spray solution (10.8 mg Zn/mL) into each nostril using a single-use nasal atomizer; 33 cattle (3 pens) received 40 mL of an oral drench (16.25 mg Zn/mL), and 33 cattle (3 pens) received no Zn at processing (negative control). Appropriate treatments were administered at processing on d 0 of the 43 d study. Processing also included

identifying, weighing, vaccinating, treating with an anthelmintic, and castrating bulls. After treatment, cattle were worked and housed so they did not have fenceline contact with any other pens. Cattle were housed on 0.42 ha grass paddocks, allowed ad libitum access to bermudagrass hay, and given a daily grain supplement. Cattle were observed daily, and rectal temperatures were taken to monitor morbidity (≥ 40°C = morbid). Nasal membranes of 4 randomly selected calves/pen were swabbed prior to any treatment on d 0 and then on d 1, 2, 4, and 7. Those treated with intra-nasal Zn at processing had lower ADG (0.65 kg) for the first 28 d as compared to controls (0.92 kg, $P = 0.02$) or oral Zn (0.75 kg, $P = 0.07$). Final BW did not differ ($P = 0.15$). Treatments had no effect ($P = 0.43$) on percentage of morbid calves (averaged 73%). Treatments did however have an effect on bacterial cultures from swabs; fewer ($P \leq 0.04$) *Escherichia coli*, α-*Streptococcus* spp., and *Staphylococcus* spp. colonies were cultured from cattle receiving the intra-nasal Zn. There was no effect ($P = 0.60$) on *Pasteurella multocida* cultured. Bacterial cultures indicated reduced numbers of microbes in the nasal passages after treatment with intra-nasal Zn, but Zn treatments did not benefit overall morbidity or growth rates of stressed cattle.

Key Words: Beef cattle, Zinc, Intra-nasal

122 Mifepristone (RU486) modulation of dexamethasone induced suppression of immunoglobulin M (IgM) production by equine lymphocytes. K. A. Gutierrez*[1], N. C. Burdick[1], J. G. Lyons[1], C. L. Barton[1], J. C. Laurenz[2], N. D. Cohen[1], N. H. Ing[1], and T. H. Welsh, Jr.[1], [1]*Texas A&M University*, *College Station,*, [2]*Texas A&M University*, *Kingsville*.

We previously reported that the synthetic glucocorticoid dexamethasone (DEX) inhibits conconavalin A (ConA) stimulated lymphocyte proliferation *in vitro* (J. Anim. Sci.86(Suppl 2):59; 2008). However, this inhibitory effect of DEX on lymphocyte proliferation could be overcome by co-addition of mifepristone, a glucocorticoid receptor antagonist (RU486). These data suggest benefits of the co-addition of RU486 on a component of cell-mediated immunity; however, it remained to be determined whether RU486 had a similar effect on humoral immune responses. Therefore this study was designed to determine the effect of DEX and the co-addition of RU486 on the production of immunoglobulin M (IgM) by isolated equine lymphocytes. Jugular blood samples from 17 horses (4 breeds; 12 stallions; 3 geldings; 2 mares 5-to-25 years of age; 450-to-800 kg BW) were collected and lymphocytes isolated by density gradient centrifugation. Separate cultures were established for each horse. Isolated lymphocytes ($1x10^5$ cells/well) were incubated for 96 h (37ºC; 5% CO_2) in medium containing ConA (0-to-5 μg/ml) with or without 1 μM Dex in the presence and absence of 1 μM RU486. Production of IgM (ng/mL) was determined by ELISA specific for equine IgM. Data were analyzed using analysis of variance (ANOVA). ConA dose-dependently increased ($P<0.01$) IgM production. Lymphocyte production of IgM in response to ConA was inhibited by DEX ($P=0.05$). Specifically, DEX reduced basal IgM production by 26%. At 2.5 and 5 μg/mL ConA, DEX reduced IgM production by 73% and 63%, respectively. Over all doses of ConA, co-addition of RU486 tended to reduce or prevent inhibitory action of DEX on IgM production ($P<0.15$). Basal IgM production did not differ between DEX and DEX with the co-addition of RU486 ($P>0.05$). However, at greater doses of ConA (5 μg/mL), RU486 was able to negate the inhibitory effects of DEX on IgM production ($P<0.05$). These *in vitro* data demonstrate that glucocorticoid-induced suppression of both the cellular and humoral components of the equine immune system may be ameliorated by mifepristone, a glucocorticoid receptor antagonist.

Key Words: Equine, Immune function, RU486

123 Serum concentrations of cortisol induced by exogenous adrenocorticotropic hormone (ACTH) are not predictive of residual feed intake (RFI) in Brahman cattle. B. J. Agado*[1,3], K. O. Curley, Jr.[1,2], J. G. Lyons[2], D. A. Neuendorff[3], A. W. Lewis[3], T. D. A. Forbes[4], T. H. Welsh, Jr.[2], and R. D. Randel[3], [1]*Texas A&M University*, *College Station*, [2]*Texas AgriLife Research*, *College Station, TX*, [3]*Texas AgriLife Research*, *Overton, TX*, [4]*Texas AgriLife Research*, *Uvalde, TX*.

Identification of feed efficient cattle by determination of residual feed intake (RFI) of individual animals is laborious and expensive (negative RFI value=efficient; positive RFI value=inefficient). A less costly method to predict RFI is needed. Knott et al. reported that rams with poor feed efficiency are more responsive to exogenous ACTH (Dom. Anim. Endocrinol. 34:261-268; 2008); thus, we tested the hypothesis that response to an ACTH challenge in Brahman cattle is directly associated with RFI. Brahman bulls (n=12) (390±19 kg BW) and heifers (n=12) (334±12 kg BW), age 15±1 mon, with established RFI were used. To establish RFI, after the calves were weaned, they were evaluated in separate 70-d test periods for each gender during which the animals were limit fed (2.65% BW/d) in a Calan gate feeding system. The 6 lowest and 6 highest ranking of each gender males (M) and females (F), respectively, were used to assess cortisol response to exogenous ACTH. Blood samples were taken via indwelling jugular catheter every 15 min from 3 h prior to challenge through 4 h after challenge at time 0 h with ACTH (0.1 IU/kg BW). Serum concentrations of cortisol were determined by radioimmunoassay (intra- and inter-assay coefficient of variation of 7.7% and 7.6%, respectively). Data were analyzed using GLM specific for repeated measures. Cortisol concentrations were affected by time ($P<0.0001$) and gender ($P<0.005$) but were not affected by RFI grouping ($P>0.10$). Basal cortisol concentrations (M=7±1; F=14±2 ng/ml), peak cortisol concentrations (M=37±3; F=64±4 ng/ml), amplitude of responses (M=31±3; F=49±4 ng/ml), and area under the curves pre-challenge (M=189±30; F=414±60 ng/ml•h) differed ($P<0.01$) between genders. These data indicate that cortisol response to an ACTH challenge is not a useful predictor of RFI in Brahman cattle. However, a sexual dimorphism in the cortisol response to an ACTH challenge was detected in Brahman cattle.

Key Words: Residual feed intake, Stress, ACTH challenge

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Randel, RD - TX
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Troxel, TR - AR
Chase, CC - FL

Resolutions
Aaron, DK - KY
Brown, AH - AR
Neel, JB - TN

Necrology
Troxel, TR - AR
Coleman, SW - OK
Waller, JC - TN

Academic Quadrathlon
Rosenkrans, CF - AR
Whisnant, CS - NC
Garcia, MR - TX
Yelich, JV - FL
Johnson, KJ - GA

Award - Distinguished Service
Ely, DG - KY
Hill, GM - GA
Brown, AH - AR
Fontenot, JP - VA
Randel, RD - TX

Award - Extension
McCraw, RL - NC
Selk, GE - OK
Harper, AF - VA
Poore, MH - NC
Lane, CD - TN

Award - Graduate Student
Coffey, KP - AR
Forrest, DW - TX
Riley, DG - FL
Aaron, DK - KY
Garcia, M - TX

Award - National Pork Board Innovation
Morrison, DG - LA
Flowers, WL - NC
Payne, RL - GA

Award - Young Animal Scientist - Education
See, MT - NC
Welsh, TH - TX
Looper, ML - AR
Anderson, LH - KY
Spears, JW - NC

Award - Young Animal Scientist - Research
Krehbiel, CR - OK
Willard, ST - SC
Kim, SW - NC
Escobar, J - VA
Sartin, JL - AL

Breeding and Genetics
Brown, MA - OK
Wyatt, WE - LA
Kriese-Anderson, LA - AL
Barham, BL - AR

Extension
Anderson, LH - KY
Hersom, MJ - FL
Banta, JP - TX

Meats
Rentfrow, G - KY
Lawrence, TE - TX
Schmidt, T - MS
Morgan, B - OK

Pasture and Forages
Gunter, SA - OK
Poore, MH - NC
Vendramini, J - FL
Beck, PA - AR

Physiology
Carroll, JA - TX
Willard, ST - SC
Looper, ML - AR
Ryan, PL - MS

Ruminant Animal Production
Carstens, GE- TX
Richards, C - OK
Adesogan, AT - FL
Hill, GM - GA

Small Ruminant Production
Browning, R - TN
Getz, W - GA
Whitley, NC - MD
Solaiman, SG - AL

Teaching and Undergraduate Education
Mulvaney, DR - AL
Blanton, JR - DE
Rosenkrans, CF - AR
Rude, BJ - MS
Miller, RK - TX

Southern Section
American Society of Animal Science

Past Presidents

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
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Past Award Recipients

Distinguished Service Award

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

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

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

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
2008	S. L. Hansen	Dallas	North Carolina State University
2007	P. Williams	Mobile	Texas A&M University
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
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
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

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

Author Index

Please note: Numbers following author's name indicate abstract numbers.

ASAS Southern Section
Future Meeting Dates and Locations

2010	Orlando, FL	February 6–9
2011	Corpus Christi, Texas	February 5 - 8
2012	Birmingham, Alabama	February 4 - 7