abstracts

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ABSTRACTS
2008 ASAS Southern Meeting
February 4–5, 2008
*Author presenting paper

Breeding and Genetics

1 Postweaning gains in calves sired by six sire breeds evaluated on two postweaning management systems. M. A. Brown*[1], X. Z. Wang[2], F. Q. Gao[2], J. P. Wu[2], and D. L. Lalman[3], [1]*USDA-ARS, Grazinglands Research Laboratory*, *El Reno, OK*, [2]*Gansu Agricultural University*, *Lanzhou, Gansu*, [3]*Oklahoma State University*, *Stillwater*.

Postweaning ADG from 462 calves from Brangus cows and sired by 6 breeds (Bonsmara, Brangus, Charolais, Gelbvieh, Romosinuano, Hereford) was measured over a 4-yr period to evaluate the impact of preweaning forage, postweaning management, sire breed, and gender. Preweaning forages were improved forages (common bermudagrass or Old World Bluestem) or native rangeland. Calves from each preweaning forage were weaned at an average 209 d and stratified by sex and sire breed to one of two postweaning management systems (drylot on mixed grain rations or wheat pasture). Gains in each postweaning system were estimated from initiation of fall grazing (early to mid-November) on wheat pasture through late spring for an average of 166 d. Data were analyzed by mixed model least squares procedures. Sire breed of calf differences were not consistent across sex of calf, preweaning management and postweaning management (P < 0.10). In general, Bonsmara- and Romosinuano-sired heifers did not perform as well as heifers from other sire breeds in either drylot or wheat pasture postweaning management. Gelbvieh-sired heifers in drylot gained higher than Brangus- and Charolais-sired heifers (P < 0.10) but not Hereford-sired heifers. On wheat pasture, few differences were evident among Brangus-, Charolais-, Gelbvieh-, and Hereford-sired heifers. Romosinuano-sired steers had lower ADG on wheat pasture than Hereford- and Charolais-sired steers (P < 0.10) and were numerically lower than steers from other sire breed groups on wheat pasture. However, both Bonsmara- and Romosinuano-sired steers were competitive with calves from other sire breed groups in drylot, with the exception of Charolais-sired steers that were higher than other breed groups (P < 0.10). Consequently, the indicated postweaning management for the two non-Zebu tropically-adapted breeds seems to be drylot on mixed rations rather than wheat pasture. Results from these data indicate that genetic differences in postweaning ADG can depend on both preweaning and postweaning environments.

Key Words: Sire breeds, Postweaning, Genotype × environment

2 Evaluation of disposition scores in *Bos indicus*/*Bos taurus* cross calves at weaning. R. R. Funkhouser*, J. O. Sanders, A. D. Herring, C. A. Gill, D. K. Lunt, and J. E. Sawyer, *Texas A&M University*, *College Station*.

Aggressiveness, nervousness, flightiness, gregariousness and overall disposition were evaluated in half *Bos indicus* (Nellore), half *Bos taurus* (Angus) embryo transfer (ET) F_2 calves (n = 404) from 13 different full sib families. Calves were born in both fall and spring from 2003 to 2006 and evaluated shortly after weaning by four different evaluators in an alley. Scores range from 1 to 9, with 1 being completely docile and 9 being wild or crazy. Fixed factors included sire, family (sire), contemporary group, pen (contemporary group), evaluator (contemporary group) and gender. Continuous factors included recipient disposition, with a range of 1 to 5, and sequence (pen (contemporary group)). All factors were significant. The two-way interaction between sire and gender was also significant. Between sires, overall disposition scores of calves by 297J (2.49) were lower (P < 0.05) than those for calves by 551G (3.29) and 437J (3.79); the mean score for those by 432H (2.74) was lower (P < 0.05) than for those by 437J. Between families, average overall disposition score for family 71, sired by 297J, was 2.16 and was lower (P < 0.05) than for seven of the other families. Families 81 (4.13) and 74 (4.96), both sired by 437J, had higher scores (P < 0.05) than those of eight of the other families, including 71; 74 was also higher (P < 0.05) than 81. Bulls had the lowest overall disposition scores (2.17), although the total number of bulls was small (n = 10). Females had the highest overall disposition scores (3.79) while steers were intermediate (3.28). The correlation of recipient disposition and average overall disposition of the calves was 0.12 (P < 0.02); the regression of overall disposition on recipient disposition was 0.26 ± 0.11 (P < 0.02). The results indicate that both genetics and recipient disposition affect ET calf disposition at weaning.

Key Words: Disposition, *Bos indicus* crosses, Embryo transfer calves

3 Breed group means and estimates of heritability for weaning ratio in Angus, Charolais, Hereford, and Red Poll cattle. A. H. Brown, Jr.*, Z. B. Johnson, F. W. Pohlman, and B. R. Kutz, *University of Arkansas*, *Fayetteville*.

The objective was to estimate genetic parameters for the ratio of calf BW to cow BW at calf weaning (WNRTO) and to compare this trait among records of cow-calf pairs (n = 4511), of 4 breed groups: Angus (n = 2611, years 1965 through 1995), Charolais (n = 316, years 1970 through 1995), Hereford (n = 1767, years 1965 through 1995) and Red Poll (n = 217, years 1978 through 1995). Breed groups were maintained separately with containment fences on Ozark Mountain Range. Annual grazing consisted of a 60:40 ratio of endophyte-infected tall fescue to common bermudagrass. Supplemental feeding of cows was limited to the winter season and consisted of prairie hay and range cubes. After weaning, heifers received an average of 2 kg/hd/d of grain until grass was available the following spring. Selection of cows was based on reproductive rate. Sire selection was based on EPDs and results from central station bull tests. About 1/3 of matings resulted from AI. Calves were spring born and birth BW recorded within 24 hrs. Both calf and cow BW were recorded when calves were weaned in the fall. Calf BW were adjusted to 205 d of age by linear regression. Breed group differences for WNRTO were examined using mixed model procedures.

Both direct and maternal heritabilities for WNRTO for each breed group were estimated using MTDFREML. Multiple-trait analyses were conducted with birth BW included. Breed groups differed (P < 0.05) for WNRTO. Red Poll had the highest (P < 0.05) mean WNRTO (0.47 ± 0.01) while Hereford had the lowest (P < 0.05) mean ratio (0.38 ± 0.01). The WNRTO was 0.43 ± 0.01 for Angus and 0.41 ± 0.01 for Charolais. For WNTRO, heritabilities for direct effects were low, ranging from an estimate of zero for Red Poll to 0.15 ± 0.04 for Angus; whereas, heritabilities for maternal effects were higher, ranging from 0.39 ± 0.09 for Charolais to 0.70 ± 0.08 for Red Poll. Results suggest genetic variation for WNRTO, but low heritabilities contraindicate WNRTO as a selection trait.

Key Words: Beef cattle, Ratio of calf/cow, Heritability

4 Genetic analyses of beef traits of crossbred and purebred Romosinuano, Brahman, and Angus steers. D. G. Riley*[1], C. C. Chase[1], M. F. Miller[2], J. C. Brooks[2], D. D. Johnson[3], W. A. Phillips[4], S. W. Coleman[1], and T. A. Olson[3], [1]*USDA, ARS, Brooksville, FL*, [2]*Texas Tech University, Lubbock*, [3]*University of Florida, Gainesville*, [4]*USDA, ARS, El Reno, OK*.

The objective herein was to estimate heterosis and breed effects for beef traits of steers produced by purebred and crossbred matings of Romosinuano, Brahman, and Angus. Steers (n = 469) were spring-born from 2002 to 2004 and weaned at an average of 7 mo of age. They were transported to Oklahoma and grazed winter wheat for 6 mo. They were then fed in feedlot pens for 3 periods: 97, 125, and 153 d, and commercially slaughtered. Traits analyzed were hot carcass weight (HCW), longissimus muscle area (LMA), marbling score (MS), 12th rib fat thickness (BF), and Warner-Bratzler shear force after 7 d aging (SF). Mixed models included fixed effects: year, sire breed, dam breed, sire breed-dam breed interaction, days on feed, age at slaughter, and slaughter group. Sire within sire breed was a random effect. Significant estimates of heterosis were obtained for Angus-Romosinuano for HCW (29.7 ± 8.2 kg; 8.7%) and LMA (3.4 ± 1.2 cm[2], 4%); for Brahman-Romosinuano for HCW (27.1 ± 6.1 kg; 9.1%), BF (1.77 ± 0.55 mm; 17.8%), and LMA (2.23 ± 1.2 cm[2]; 3%); and for Brahman-Angus for HCW (48.7 ± 7.2 kg; 15.8%), BF (2.85 ± 0.64 mm; 21.9%), and LMA (5.63 ± 1.4 cm[2]; 7.5%). Heterosis was not detected (P > 0.35) for MS or SF. Romosinuano direct breed effects (P < 0.01) were to decrease HCW (-47.9 ± 9.4 kg), MS (-56.7 ± 21.1), and BF (-5.01 ± 0.85 mm). Brahman direct effects (P < 0.01) were to increase HCW (32.9 ± 10.6 kg) and SF (0.73 ± 0.3 kg), and to decrease MS (-158.5 ± 23.8). Angus direct effects (P < 0.01) were to increase MS (215.1 ± 23.9) and BF (3.38 ± 0.97 mm), and to decrease SF (-0.7 ± 0.25 kg). Use of Romosinuano in crossbreeding programs with Brahman may result in larger heterosis than expected for some carcass traits. The Romosinuano effects on MS and SF suggested no beneficial effect on US quality grade or tenderness, but there may be a relative Romosinuano advantage as compared to Brahman with regards to these traits.

Key Words: Brahman, Beef Traits, Romosinuano

5 Genetic effects on circulating concentrations of cortisol at and after weaning in breed-types adapted to the subtropics. C. C. Chase, Jr.*[1], R. D. Randel[2], D. G. Riley[1], S. W. Coleman[1], and T. A. Olson[3], [1]*USDA, ARS, Brooksville, FL*, [2]*Texas Agricultural Experiment Station, Overton, TX*, [3]*University of Florida, Gainesville*.

The objective of this study was to evaluate circulating concentrations of cortisol in calves (heifers and steers) at weaning (day 0) and on d 1 and 3 post-weaning. Calves (n = 938) were produced from a three breed diallel mating design and included calf crops from 2002 to 2004. Breed-types of calves were purebred Angus (AA), Brahman (BB), and Romosinuano (RR) and all F_1 crossbred combinations (AB, BA, AR, RA, BR, RB). At weaning (day 0) and on d 1 and 3 post-weaning, a blood sample was collected via jugular venipuncture from each calf. Plasma was frozen and stored until analysis of cortisol concentrations using RIA. Fixed effects included sire and dam breed (n = 3 each) and their interaction, calf sex, year (n = 3), location (n = 3), day of sampling (n = 3), and cow age. Order through the chute, calf age, and calf weaning weight were used as covariates. Random effects were calf and sire. Heifers had higher (P < 0.001) plasma concentration of cortisol than steers (37.1 ± 0.78 vs. 32.9 ± 0.79 ng/mL, respectively). For purebred calves, cortisol concentration was lowest (P < 0.05) for AA (29.3 ± 1.60 ng/mL) and did not differ (P > 0.10) between BB ($33.7 \pm$

1.56 ng/mL) and RR (35.2 ± 1.21 ng/mL). Estimates of heterosis (P < 0.04) were 5.1 ± 1.20 ng/mL (16.2%) for AB, 2.8 ± 1.03 ng/mL (8.7%) for AR, and 2.2 ± 1.05 ng/mL (6.5%) for BR. Heterosis for BA was greater (P = 0.03) than that for BR. Direct breed effects for Romosinuano were 6.5 ± 2.58 and for Angus were -8.8 ± 2.88 ng/mL. Maternal breed effects for Angus were 3.7 ± 1.60 ng/mL. Direct and maternal breed effects not mentioned were not significant. Day 1 cortisol concentration (36.5 ± 0.80 ng/mL) was greater (P < 0.02) than cortisol concentration on day 0 (33.6 ± 0.82 ng/mL) or day 3 (35.0 ± 0.80 ng/mL). The difference between day 0 and 3 approached significance (P = 0.053) and would suggest that cortisol concentrations were slightly elevated 3 d after weaning. To our knowledge these are some of the first results that evaluate circulating cortisol in diverse genotypes adapted to the subtropics.

Key Words: Beef breeds, Weaning, Hydrocortisone

6 Genetic markers in the leptin gene and association with carcass traits in Brahman steers. D. E. Franke*[1], T. D. Bidner[1], M. G. Thomas[2], and B. W. Woodward[3], [1]*Louisiana State University Agricultural Center, Baton Rouge*, [2]*New Mexico State University, Las Cruces*, [3]*Merial Limited, Duluth, GA*.

Several genetic markers in the leptin gene are associated with carcass fatness traits in beef cattle. Genotypes for five markers in the leptin gene were determined in 392 Brahman steers to evaluate their associations with carcass traits. The Brahman steers were produced in 27 Brahman herds in Louisiana and sired by 67 bulls. Following backgrounding, finishing, and harvesting at weight and backfat industry endpoints, carcass data were recorded 24-hr postmortem and Warner Bratzler shear force measured in 7- and 14-d aged steaks. Frequencies of genetic markers were 0.63 CC, 0.35 CT, and 0.02 TT for E2FB; 0.01 CC, 0.18 CT, and 0.81 TT for UASMS1; 0.98 CC and 0.02 CT for UASMS2; 0.67 AA, 0.31 AG, and 0.02 GG for A1457G; and 0.81 CC, 0.18 CT, and 0.01 TT for C963T. Haplotype CTCAC had the greatest frequency at 0.76; all other haplotypes had frequencies less that 0.10. Carcass and shear force data were analyzed with a mixed model containing fixed effects for contemporary harvest group, genotype of the respective genetic marker, and slaughter age as a covariate. Sire of steer was included in the model as a random variable. Genetic markers UASMS1 and C963T influenced variation in marbling score (P ≤ 0.05). Genotypes CT and TT at the UASMS1 locus had higher marbling than genotype CC (399.8 vs 366.9) and genotypes CC and CT at the C963T locus had higher marbling than genotype TT (400.3 vs 371.9). No other genotype or haplotype accounted for a significant amount of variation in prediction of carcass traits. In summary, genetic markers in the leptin gene appear to have a high degree of homozygosity in this sample of Brahman steers; however, UASMS1 and C963T markers appear to have potential in predicting marbling score.

Key Words: Leptin markers, Brahman steers, Carcass traits

7 Relationships among genomic polymorphisms of bovine CYP3A28, body condition score, and productivity of Brahman-influenced cows. A. Moubarak*[1], T. Killian[1], M. Looper[2], R. Okimoto[3], and C. Rosenkrans[1], [1]*University of Arkansas, Fayetteville*, [2]*USDA, ARS, Booneville, AR*, [3]*Cobb-Vantress, Siloam Springs, AR*.

The objective this study was to determine effects of CYP3A28 polymorphism and body condition (BC) on physiological and productivity responses of Brahman-influenced (1/4 - 3/8) cattle. Cows were managed on endophyte-infected KY-31 tall fescue to achieve low (4.3 ± 0.1) or moderate (6.1 ± 0.1) BC at initiation of the breeding season. They were then moved to bermudagrass for the breeding season. Specific primers for bovine CYP3A28 (P450F: CAACAACATGAAT-CAGCCAGA; P450R: CCTACATTCCTGTGTGTGCAA) were used to develop a 565 base amplicon. Restriction enzyme, Alu I, was used to digest the amplicon and for genotyping the cows. Serum was harvested from blood samples collected 35 d prior to the breeding season. Polymorphism distribution was homozygous cytosine (CC; n = 40), heterozygous (CG; n = 43), and homozygous guanine (GG; n = 16). A genotype by BC interaction was found (P < 0.05) for serum prolactin concentration. Within the CG genotype, moderate BC had a larger concentration of serum prolactin than low BC cows (24.3 vs 4.6 ng/mL ± 2.7, respectively). Serum IGF-1 concentrations were greater (P < 0.01) in cows with moderate BC compared to cows with low BC (91 vs. 69 ng/mL ± 5; respectively). Serum lactate dehydrogenase activity (lactate to pyruvate) was greater (P < 0.05) for

CC than GG cows (8.2 and 7.3 IU/mg of protein ± 0.26). Percentage of cows calving was not affected (P > 0.3) by genotype (70, 65, and 50, respectively, for CC, CG, GG); however, there was an interaction effect (P < 0.05) for genotype by BC for the cows that calved. Heterozygous cows with low BC had the latest calving date (87 d); whereas, CC cows with moderate BC and GG cows with low BC had the earliest calving date (70 d). Results indicate that the CYP3A28 gene was related to physiological characteristics and profitability traits of beef cattle. These data also suggest that the polymorphism may be associated with cattle susceptibility to ergot alkaloid poisoning.

Key Words: Cytochrome P450, Cattle, Genomics

8   Relationships among bovine heat shock protein 70 genotype, forage type, and plasma concentrations of HSP-70. I. Nabhan*[1], M. Lamb[1], S. Reiter[1], R. Okimoto[2], M. Brown[3], H. Brown, Jr.[1], and C. Rosenkrans, Jr.[1], [1]*University of Arkansas*, *Fayetteville*, [2]*Cobb-Vantress*, *Siloam Springs, AR*, [3]*USDA/ARS*, *El Reno, OK*.

Previously, we have reported that the bovine HSP-70 gene is polymorphic, shows breed bias, and is related to milk production (Lamb et al., 2005; 2007). Our objective was to determine if composite HSP-70 genotypes were related to plasma concentration of HSP-70. Genomic DNA and plasma samples were collected from 71 cows. The cows were Angus (n = 18; Bos taurus), Brahman (n = 24; Bos indicus), and Angus-Brahman reciprocal crosses (n = 29). Cows were maintained on either endophyte-infected toxic tall fescue (TF; Festuca arundinacea Schreb.) or common bermudagrass [CB; Cynodon dactylon (L.) Pers]. A 523 base segment was amplified via PCR using specific primers developed from GenBank accession number U09861, and eight single nucleotide polymorphisms (SNPs) were identified. Animals were assigned to one of three composite genotypes based on SNP allelic combinations. Plasma concentrations of HSP-70 were lower (P < 0.05) for cows grazing bermudagrass than those grazing fescue (5.4 vs. 8.5 ng/mL). An interaction (P < 0.05) between forage type and HSP-70 genotype affected plasma concentrations of HSP-70. When that interaction was evaluated, SNP 2087 accounted for most of the variation observed. Cows that were CG at SNP 2087 and grazing fescue had greater (P < 0.01) concentrations of HSP-70 than cows grazing bermudagrass or those having CC at SNP 2087 (22.4 vs. 5.3, 5.5, and 7.8 ng/mL; respectively for CG-TF, CC-CB, CG-CB, and CC-TF). Polymorphisms within the HSP-70 gene are related to plasma concentrations of HSP-70, interact with forage type, and may be useful in identifying cattle that are less susceptible to fescue toxicosis.

Key Words: HSP-70, Cattle, Genomics

9   Porcine reproductive and respiratory syndrome (PRRS) viral proteins GP5 and M interact with host membrane fusion protein Snapin. V. Rilington*[1], D. Yoo[2], and H. C. Liu[1], [1]*North Carolina State University*, *Raleigh*, [2]*University of Illinois*, *Urbana*.

Porcine Reproductive and Respiratory Syndrome virus (PRRSV) causes a devastating disease that cost pork producers millions of dollars per year. PRRSV is a positive strand RNA virus that mutates at a high rate thus prevents full immune protection by vaccinations. PRRSV infections consist of an acute and a persistent stage. In the persistent stage, PRRSV is found in lymphoid tissues 150-200 days post infection. During this persistent stage, virus can still be shed from the infected animal. How PRRSV avoids the immune system for so long after infection is unknown. Many viruses have evolved several ways to avoid the host immune system usually through host-viral interactions. To determine possible interactions between PRRSV and its host, we have used the yeast two hybrid system. This approach allows us to examine protein-protein interactions in a eukaryotic setting. The two viral proteins we examined were glycoprotein 5 (GP5) and matrix protein (M). GP5 and M form a heterodimer which is important for viral structure and infectivity. GP5 and M were cloned into a bait vector and transformed in the yeast strain AH109. Each transformant was mated to a macrophage library Y187 strain. The macrophage library consisted of cDNA products derived from uninfected, infected and PMA stimulated macrophages. Over 10^7 clones were screened. Fifty-one clones which interacted with GP5 were isolated and 47 had homology with Snap-associated protein (Snapin). Of the 20 clones found to interact with M, 11 had homology to Snapin. The Snapin interaction with both proteins was confirmed by β-galactosidase activity and reverse mating. In the reverse mating, Snapin was cloned into the bait vector and GP5 and M were cloned into the prey vector. Snapin has been recently found to interact with many proteins involved in membrane fusion or with a part of a pore complex. Currently, experiments are ongoing to confirm Snapin interaction with both GP5 and M proteins in a MARC 145 cell line and to determine the binding epitopes involved in the interaction.

Key Words: PRRSV, Yeast-2-hybrid, Snapin

Extension

10   Effects of dietary supplementation of benzoic, formic, and lactic acids to pig diets on ammonia emission from manure and urine pH. S. W. Kim*[1], J. O. Vaughn[2], and D. A. Monson[3], [1]*North Carolina State University*, *Raleigh*, [2]*Emerald Performance Materials*, *Kalama, WA*, [3]*Texas Tech University*, *Lubbock*.

A total of 216 pigs was used to evaluate the effects of benzoic acid supplementation on ammonia emission from mature of pigs compared to those fed a diet with organic acids. Pigs were weaned at 21 d of age and fed 3 diets for 5 wk based on 3 phase feeding program following nutrient requirements from NRC. There were 9 replicates per treatment and 8 pigs per pen. Treatments were (1) **NC**: negative control without any supplements; (2) **BB**: benzoic acid supplementation groups with 1.0% Kalama benzoic acids (Emerald Performance Materials, Kalama, WA); and (3) **OB**: organic acid supplementation groups with 1.0% organic acids at 1:1 ratio of formic acid and lactic acid. At the end of 5 wk feeding, pigs in each pen were moved to a pen (1.2 × 2.4 m) in a ventilated environmental chamber (3.0 × 3.0 × 2.4 m) for 24 h during which aerial ammonia concentrations were measured. The fan inside the chamber was working continuously at a constant speed (0.014 m^3 air/sec) during the experimental period. Two calibrated multi-gas monitors (Pac III and Miniwarn II, Draeger Safety, Inc., Pittsburgh, PA) with ammonia sensors were used to measure changes of aerial ammonia during 24-h period at 10 min intervals. During wk 4, urine samples were obtained directly from the pigs (3 pigs per pen) between 800 and 1100 h to measure pH within 10 min of collection. Aerial ammonia emission at 0 h did not differ among treatment groups. Aerial ammonia emissions from pigs in BB and OB were lower (*P*<0.05) than pigs in NC during the last 3 hr, last 5 hr, last 7 hr, last 10 hr, and entire 24 hr period, respectively. Aerial ammonia emissions from BB and OB did not differ during the entire 24 hr period. Urine pH from BB (6.21) was lower (*P*<0.05) than NC (7.37). This study shows that dietary supplementation of benzoic acid and organic acid can reduce the ammonia emission from pig manure possibly by reducing urine pH.

Key Words: Ammonia, Benzoic acid, Pigs

11   Measuring the impact of equine grazing schools. S. M. Jones*, J. A. Jennings, R. A. Klerk, and K. Norton, *University of Arkansas*, *Little Rock*.

Horses are well adapted to consuming forage and can survive without any other type of feed, although the demands of sport and recreation often dictate feeding more concentrated feeds. Pasture is the easiest and often least expensive form of forage to feed because the horse harvests it. However, many horse owners have not been educated on how to plan and manage horse pastures. Participant evaluations from previous programs indicated there was a need by many equine owners to receive more formal education on managing pastures for equines. As a result, the University of Arkansas Cooperative Extension Service has been conducting

annual equine grazing schools since 2004. In 2007, an evaluation instrument was developed to measure the impact of the equine grazing schools. The Equine Grazing School curriculum included equine nutrition, forage nutrition disorders, forage growth, establishment and management of forages, fencing options, paddock design, plant identification, pasture inventories, grazing methods, stocking rates, and equine grazing behavior. Teaching methods included classroom lecture and field exercises. Schools were taught in two sessions, three hours per session. Each participant completed a fifteen question pre-program evaluation, 1 (low knowledge level) to 5 (high knowledge level), designed to measure knowledge change on each subject taught. The same fifteen question knowledge change post-program evaluation was also completed by all the participants. Participant gender was 46.7 percent male and 53.3 percent female. The overall knowledge of participants increased from pre-program evaluation (1.88 mean) to post-program evaluation (3.98 mean). Female participants pre-evaluation scores was lower than the male participant (1.61 and 2.16, respectively), but post-evaluation scores were higher for the females (4.03) as compared to male participants (3.92). The results of this evaluation suggest that equine owners need pasture management education and the current horse grazing school curriculum is improving the knowledge of the participants.

Key Words: Equine, Pasture, Management

12 Mississippi Master Stockman: collaborative beef and equine programming-equine emphasis. P. R. Buff*, J. A. Parish, and J. D. Rhinehart, *Mississippi State University*, *Mississippi State*.

The Mississippi Master Stockman Program was initiated as a new statewide Extension effort designed for horse owners and beef cattle producers interested in learning more about improving their operations. Unique aspects of this educational program were: 1) combining equine and beef cattle programming into a joint event, 2) utilizing resident experiment station herds for practical demonstrations, and 3) offering both advanced and basic training levels simultaneously. The 2007 Mississippi Master Stockman Program was held in September 2007 at the Mississippi Horse Park and the Mississippi Agricultural and Forestry Experiment Station campus horse and beef cattle units. The proximity of these facilities enabled their simultaneous use with minimal transport of participants from classrooms to farm facilities. This 1.5 d educational program featured a low-stress cattle handling on horseback demonstration for both equine and beef cattle interest participants and included Master Horseman and Master Cattle Producer certification opportunities. Horse interest participants chose from basic and advanced equine tracks. Participants were required to complete exams on various equine topics to graduate as a Master Horseman. Program sessions covered topics including reproduction, marketing, forage systems, nutrition, genetics, selection, herd health, livestock handling, hoof care, freeze branding, horsemanship, and foal management skills. Upon completion of the course, program graduates were awarded a Master Horseman plaque, cap, and certificate. The basic and advanced equine tracks were each rated by equine owners and Extension Service attendees for overall effectiveness as 4.83, where 1=poor and 5=excellent. The facilities/locations for the program were rated as 4.89 on the same scale. For the equine tracks, 100% of respondents indicated that they would attend another Master Stockman Program. Master Stockman participant feedback reveals that combining equine and beef cattle Extension programming, integrating experiment station herds into Extension efforts, and segmenting program options into basic and advanced levels can be an effective program delivery format.

Key Words: Equine, Beef cattle, Extension

13 Mississippi Animal Disease and Disaster Preparedness Program. J. D. Rhinehart*[1], J. Watson[2], P. R. Buff[1], and J. A. Parish[1], [1]*Mississippi State University*, *Mississippi State*, [2]*Mississippi Board of Animal Health*, *Jackson, MS*.

The Mississippi Animal Disease and Disaster Preparedness program was initiated in 2006 as a mutual effort between the Mississippi State University Extension Service and Mississippi Board of Animal Health (MBAH) to obtain, and maintain, basic information regarding the location of livestock in the state. The overall goal of the effort is to have a readily accessible database showing the location of livestock in the event of a natural disaster, disease outbreak, or other animal health emergency. The program was promoted in three major ways: 1) pamphlet distribution, 2) local and regional commodity group meetings, and 3)

portable display use. The pamphlet includes an outline of the importance of this program to the livestock community, a description of how and where the data will be maintained, who will have access to the information, instructions on how to register, and a registration form. Two different pamphlets were printed; one tailored for horse owners and one for cattle owners. Registration forms were similar and each provides an opportunity to list other species located on the premises. Additionally, the pamphlets were printed such that they are pre-posted to be mailed to the MBAH upon completion of the registration form. A portable display board was created to exhibit at gatherings where livestock and/or horse owners were expected to attend and included information similar to that provided in the pamphlet. Participation has not been as robust as expected. For the first data collection period, only 3.6% of an estimated 26,570 locations had registered. After the first summary, a reward incentive was established to stimulate further participation. Portable livestock scales were offered to counties with the greatest numerical and percentage increases from August 2006 to August 2007. As of August 2007, 2,148 locations had registered (8.1%). This represents a 45.6% increase from the initial report. While recent progress is encouraging, continued emphasis is needed on program marketing to effectively meet program objectives.

Key Words: Natural disaster, Livestock, Extension

14 Missouri livestock producers' perceptions of the national animal identification system. B. L. Deimeke*, W. D. Walker, C. Levesque-Bristol, and E. L. Walker, *Missouri State University*, *Springfield*.

A survey of 4,200 Missouri livestock producers was performed to determine impact of respondent demographics and source of information on perception of the National Animal Identification System (NAIS). Written surveys using a Likert-type scale to indicate perception of NAIS in a favorable light were used with 1 being less favorable and 7 more favorable were mailed on March 23, 2007 with a response rate of 14.7%. Data was analyzed through a series of correlations, independent t-tests, and Analysis of Variance (ANOVA). Individuals with less than a Bachelors degree did not view NAIS (3.50 ± 0.06) as favorably as individuals with a Bachelors degree or higher (3.79 ± 0.09; $P < 0.02$). Other factors influencing NAIS perception included owning a home computer with or without internet, the use of external animal identification, adoption of new production practices, number of acres managed, and farm income ($P < 0.05$). Number of external animal identification methods used, number of species of animals owned, and district of the state where the producer lived were also significant ($P < 0.05$). Variables not having a significant impact on NAIS perception included age, gender, non-farm income, political party, growing up in a rural or urban setting, selling livestock into commerce, access to an office computer, and owning, renting, or both owning and renting land ($P > 0.05$). Perception of NAIS was correlated with confidence in general news sources ($r = 0.25$; $P < 0.01$). Additionally, source of NAIS news was correlated with confidence in general news ($r = 0.45$; $P = 0.001$). Missouri livestock producers have expressed concerns about the implementation of NAIS. Several demographic variables impact perception of NAIS in Missouri, including educational status, farm size and profitability. Knowing the variables that impact perception of NAIS might help national and state agencies develop educational programs for NAIS within specific target demographics.

Key Words: National Animal Identification, Missouri, Livestock producer

15 Determining wastage when ground feeding soybean hulls. B. M. Nichols[1] and R. S. Wells*[2], [1]*Cameron University*, *Lawton, OK*, [2]*Samuel Roberts Noble Foundation*, *Ardmore, OK*.

Angus cross steers (n=24; 293 ± 29 kg) were used to conduct a pilot study to ascertain the most accurate method of determining wastage when ground feeding soybean hulls. A simultaneous study was done to quantify the amount of fines present in bagged soybean hulls. Feed to be offered to the experimental groups was sieved with a No. 8 U.S.A. standard testing sieve over a twenty day period. Fines increased steadily over the twenty day period showing an average, low, and high of 4.96%, 2.38%, and 8.82%, respectively. In Exp. 1, steers were split into two groups of twelve head per treatment. Treatments were 1) cattle fed in flat bottom bunks (CON), and 2) cattle fed on the ground (GROUND). Wastage was determined by utilizing the weigh-feed-weigh method on fourteen continuous

4

days. Results were highly unreliable due to many uncontrollable variables (i.e.: distance of travel to chute from feeding site, and rain). In Exp. 2, wastage was recovered post-feeding from GROUND steers on days 13 and 14 of the weigh-feed-weigh method by vacuum. The two day average of wastage was found to be 7.8%. Limitations were observed such as the amount of trash picked up along with the feed and an inability to separate out the fines physically. Precipitation also makes this difficult due to clumping of the soil. In Exp. 3, the flat bottom bunk was lined with artificial turf and cattle were fed on the turf for a period of six days to attempt a simulated ground feeding experience. CON steers were used in this experiment since they were accustomed to eating out of the bunk. Estimated waste (%) was comparable to that of the vacuum method (P=0.16). Turf feeding resulted in an average of 12.61% waste. There was a numerical decrease in wastage across the six days of feeding. Results from the three different methods of determining wastage showed the weigh-feed-weigh method to be less than adequate while the vacuum and simulated ground feeding methods showed potential of further use. The figure of 10.21% attained when calculating an average including data from both the vacuum and simulated ground feeding methods has the possibility of carrying merit if further replications could be performed.

Key Words: Byproduct feeds, Soyhulls, Ground fed

16   Free-choice mineral disappearance and projected mineral balance of beef cows consuming bermudagrass and prairie hay. C. P. McMurphy*[1], D. L. Lalman, S. J. Winterholler, and C. J. Richards, *Oklahoma State University*, *Stillwater*.

Mineral disappearance data from Angus and Angus x Hereford fall-calving (F; n=65) and spring-calving (S; n=150) beef cow herds were used to characterize annual mineral intake patterns and to project mineral balance when cows consumed prairie or bermudagrass hay during fall and winter periods. Each herd was managed as a contemporary group and rotated through tall grass prairie and common bermudagrass pastures during the spring and summer months. During fall and winter, cows grazed tallgrass prairie pastures and were fed supplemental prairie or bermudagrass hay. Cottonseed meal was supplemented at an average daily rate of 0.91 kg per hd during fall for S and 0.45 kg per hd for F. Both herds received 1.36 kg per hd daily of cottonseed meal during winter. Mineral supplement contained 9.5% Ca, 8.3% P, 0.3% Mg, 0.5% S, 1040 ppm Cu, 3110 ppm Zn, 142 ppm Mn, and 12 ppm Se. Mineral disappearance was recorded weekly beginning in March 2003 and continued through October 2005. To project fall and winter mineral balance, mineral supplement consumption and average mineral concentration in prairie and bermudagrass hay samples were used to approximate dietary mineral intake. Forage intake was assumed to be similar to data recorded in previous experiments at this station using both prairie and bermudagrass hay. Projected dietary mineral intake was compared to mineral requirements according to NRC Model Level 1 (1996). Mineral supplement disappearance averaged 54 g per d with no herd × season interaction (P>0.2) and no difference due to herd (P=0.99). However, season influenced (P<0.01) apparent mineral consumption, averaging 83, 48, 39, and 62 g per d during winter, spring, summer and fall, respectively. A 2 g per d deficiency of Mg was projected when S cows consumed prairie hay during winter. Similarly, 2 g and 4 g per d deficiencies of P and Mg, respectively, were projected when F cows consumed prairie hay during the fall months. In conclusion, seasonal mineral consumption had a greater influence on projected mineral balance than did stage of production or forage species according to NRC (1996).

Key Words: Beef cows, Mineral disappearance, Mineral balance

17   Corn stover as an emergency feed for beef cows. M. H. Poore*[1], A. D. Shaeffer[1], and J. L. Godwin[2], [1]*North Carolina State University*, *Raleigh*, [2]*North Carolina Department of Agriculture and Consumer Services*, *Raleigh*.

Extreme drought conditions during the 2007 grazing season have resulted in a severe feed shortage over much of NC. An informal survey of livestock extension agents conducted during August 2007 suggested that the expected hay shortage exceeded 250,000 metric tons. Continued drought conditions during autumn have likely exacerbated the shortage. A broad educational program has been launched by Cooperative Extension and the NCDA&CS to help producers wisely cull herds and find alternative feed resources to meet their calculated feed needs. One alternative feed that was identified early in the program was corn stover. While corn yields were reduced, many areas of the state had yields high enough to generate large quantities of potential stover. This material has not been used traditionally in NC, so 6 emergency field demonstrations were conducted during September to educate beef producers and corn growers about harvesting and feeding this material. As a result, large quantities of corn stover have been harvested and will be fed in the coming winter. To date, 53 samples of corn stover have been analyzed by the Feed and Forage Testing Service of the NCDA&CS. Mean composition (%± SD) of samples on a dry basis follows: DM, 85.8±9.0; CP, 5.68±1.35; ADF, 46.2±4.5; Ca, 0.32±0.10; P, 0.11±0.05; and TDN, 56.4±2.98. Mean nitrate ion level was not high (0.20%) but was highly variable (SD = 0.30%) with 26% of samples ≥0.25% and 11% ≥0.5% nitrate ion. Of samples analyzed, 27% contained less than the recommended 80% DM, and bales on several farms with 72 to 76% DM were observed to heat to near 60° C. In order to better understand nutritional implications of baling with excessive moisture, corn stover in adjacent windrows was baled at either 71 or 90% DM. The wet baled material reached higher peak temperatures than the dry baled material (62° C vs 42° C, P < 0.01) with peak temperature 96 h after baling for the wet baled stover, and 24 h after baling for the dry baled stover. Change in the nutritional value of this material will be determined after 2 months of storage.

Key Words: Corn stover, Drought, Beef cattle

18   Effect of region of origin, Southeast versus Midwest, on feedlot performance and carcass traits in beef calves. W. D. Busby*[1], D. Strohbehn[1], L. R. Corah[2], and M. E. King[2], [1]*Iowa State University*, *Ames*, [2]*Certified Angus Beef LLC*, *Wooster, OH*.

Calves (n=27,538) from 15 states fed at ten Iowa feedlots through the Iowa Tri-County Steer Carcass Futurity over six years (2002-07) were used to evaluate the effect of origin of calves on feedlot performance and carcass traits. A common diet was fed and similar implant and health programs were administered to all calves. Five Midwest (M) states (n=9,310) and ten Southeast (SE) states (n=18,228) were represented. Calves were sorted and harvested when they were visually evaluated to have one centimeter of fat cover. Delivery weight (kg), delivery age (days), final weight (kg), and ADG (kg/day) were 290.7, 324.3, 533.4, and 1.44; and 285.6, 252.9, 536.8, and 1.46 for SE and M calves, respectively (P<0.001 for each pair of values). Morbidity rate (%), treatment cost ($/head), and mortality rate (%) for SE and M calves were 15.22, 5.01, and 1.43; and 20.76, 7.38, and 1.76, respectively (P<0.05 for each pair of values). The percentage of Prime, Choice, Select, and Standard carcasses for SE and M calves were 1.14, 67.94, 28.33, and 2.59; and 1.01, 69.28, 27.22, and 2.48, respectively. A significantly higher (P<0.001) percentage of the SE versus M calves (21.57% and 19.02%, respectively) of the black-hided Angus calves eligible for the *Certified Angus Beef* ® Program (CAB®) were accepted. When considering feedlot and carcass traits and all associated costs, the SE calves had a profit/head of $48.63 versus $37.31 for M calves (P<0.001). Southeast calves had fewer health problems, higher CAB® acceptance rates, and more profit/head while Midwest calves tended to have better feedlot performance.

Key Words: Health, Region of origin, Quality grade

19   Effect of percentage Angus on feedlot performance and carcass traits in beef calves. W. D. Busby[1], L. R. Corah[2], M. A. McCully*[2], and M. E. King[2], [1]*Iowa State University*, *Ames*, [2]*Certified Angus Beef LLC*, *Wooster, OH*.

Calves (n=18,250) from 15 states (ten in the Southeast and five in the Midwest) fed at ten Iowa feedlots through the Iowa Tri-County Steer Carcass Futurity (2002-07) were used to evaluate the effect of percentage Angus in each calf on feedlot performance and carcass traits. A common diet was fed and consistent implant and health programs were administered to all calves. Each calf was categorized into four classifications [Low Angus (L) (n=4,767), Half Angus (H) (n=3,684), Three-quarter Angus (3/4) (n=3,460), and Straight Angus (S) (n=6,339)] based on the breed information of its dam and sire. Calves were harvested when visually evaluated to have one centimeter of fat cover. Percentage Angus, arrival weight (kg), final weight (kg), and ADG (kg/day) were 9.5, 290.0, 538.7, and 1.41; 48.9, 288.2, 537.9, and 1.47; 73.5, 288.0, 533.5, and 1.45; and 98.8, 285.5, 529.7, and 1.49 for L, H, 3/4, and S, respectively. Percentage Angus and ADG for each classification were significantly different from all other classifications (P<0.05). Morbidity rate (%), treatment cost ($/head), and

mortality rate (%) for the L, H, 3/4, and S calves were 22.84, 7.77, and 1.85; 15.72, 5.44, and 1.33; 15.69, 5.48, and 1.39; and 14.78, 4.60, and 1.48, respectively. Morbidity rate and treatment costs were different (P<0.05) between high and low percentage Angus calves. The percentage Prime, Choice, Select, and Standard quality grades were 0.26, 52.45, 42.17, and 5.12; 0.50, 69.54, 27.89, and 2.07; 1.09, 71.87, 25.27, and 1.77; and 2.27, 81.69, 15.36, and 0.69 for the L, H, 3/4, and S calves, respectively (P<0.05). Acceptance rates for black-hided calves eligible for the *Certified Angus Beef* ® Program were 9.51, 17.74, 18.96, and 29.61 percent for the L, H, 3/4, and S groups, respectively (P<0.05). Yield grades for L, H, 3/4, and S carcasses were 2.56, 2.80, 2.90, and 3.00, respectively (P<0.05). Feedlot performance, health, and carcass merit were positively influenced by the percentage of Angus in the calves.

Key Words: Percentage angus, Health, Feedlot and carcass performance

20   The Virginia Quality Assured (VQA) certified feeder calf program: Ten years of value-added feeder cattle marketing. J. B. Hall*, B. R. McKinnon, W. D. Whittier, and S. P. Greiner, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

The objective of the VQA certified feeder calf program was to develop a mechanism to create value-added marketing program for feeder cattle. In 1997, Extension Specialists and staff of the Virginia Cattlemen's Association developed a program to provide cattle that are healthy and perform well in the feedlot. The cornerstone of the program is a third party certified vaccination program against clostridial diseases, bovine respiratory disease (BRD), and pasturella. All vaccinations are completed by 14 d before sale in accordance with label directions and beef quality assurance guidelines. Additional levels of the program include a 45 day weaning and backgrounding program and/or sired by bulls that are above breed average for YW EPD. Extension professionals conducted educational meetings for producers to assist them in adopting management techniques necessary to develop VQA cattle. Calves marketed as VQA certified feeder cattle are graded and evaluated by VDACS graders, and usually marketed in multifarm tractor trailer load lots through the telo-auction. Numbers of cattle sold in the program increased (P< 0.01) 464% from 2800 per yr to 13000 per yr. Over 61,000 VQA cattle were sold during the ten yr of the program. The percentage of weaned-backgrounded calves increased (P<0.05) from < 50% to 92%. Cattle marketed as VQA were compared to cattle marketed during the same week on the Virginia in-barn graded feeder calf sales. Virginia Quality Assured feeder calves grossed an additional $1.8 million in premiums for their owners. The average premium paid for VQA cattle has varied annually from a low of $12.20 per head in 1999 to a high of $42.25 in 2005. Over the 10 years of the program the average premium received was $29.00 per animal. In conclusion, the VQA program demonstrates that a science-based educational and marketing program delivered by a consortium of Extension, industry, and governmental personnel can increase the number of producers adopting a value-added feeder cattle system.

Key Words: Beef cattle, Value-added, Marketing

21   Improving the efficiency of a beef cow calf operation using IRM principles. B. W. Haller*, J. T. Richeson, B. L. Barham, M. S. Gadberry, J. A. Jennings, and T. R. Troxel, *University of Arkansas, Division of Agriculture, Cooperative Extension Service*, *Little Rock*.

In 2004 (yr 1) the Arkansas Beef Improvement Program used IRM principles to assist a commercial beef cow calf producer. The producer's goals were to increase forage quantity and quality, shift forage type, increase adjusted 205-day wt, improve cattle handling facilities and implement field specific herbicide program and herd management software. The farm consisted of 82 ha with an average stocking rate of 57.4 animal units (AU). Farm records from yr 1 served as baseline data. Fields were inventoried annually to determine the percentage of forage type and species and bare ground. In yr 1 the percentage of warm and cool season forages was 76.5% and 1.9%, respectively. By yr 4, the forage type shifted to 44.5% and 13.6% warm and cool season forages, respectively (*P* <0.005). Stockpiling bermudagrass and bahiagrass was initiated in yr 1. Stockpiling increased the grazing season 23 d and reduced winter feed cost by $5.24/ AU. These practices lengthened the grazing season and reduced hay needs. In yr 1 the percentage of clover was 0.6%, so clover was established in one field.

Percentage of clover increased to 5.5% (*P* <0.005) in yr 4. The percentage of weeds increased from 19.8% to 31.4% (*P* <0.005) from yr 1 to 4 possibly due to two yrs of below normal rainfall (yr 2 and 3). A field specific herbicide program was implemented in yr 3. Cow herd performance records were collected annually. Bulls with EPD's that complemented the cow herd genetic base were purchased in yr 1, and likely contributed to adjusted 205-d wt increasing by 10.0% or 24.5 kg by yr 3. The internal rate of return for the bull purchases was 84.8%. In yr 1, cattle handling facilities were redesigned, the mineral program was changed, software was purchased and electronic identification was implemented. The IRM approach enabled the producer to achieve his production goals, and other area producers have adopted practices utilized in this project.

Key Words: IRM, Efficiency, Cow calf

22   Effect of beef cattle production characteristics on rate of adoption. J. J. Cleere*, C. T. Boleman, and K. Merten, *Texas Cooperative Extension*, *College Station, TX*.

Beef cattle producer demographics seem to be an important aspect in the development of successful extension education programs. A total of 291 out of 740 participants responded to a survey that was distributed at the end of a state-wide beef cattle producer educational program. Participants noted that the number of years in the ranching business was 16.4 ± 14.2, percentage of time devoted to ranching was 51.7 ± 32.8 and the percentage of income generated from cattle was 25.5 ± 29.4. The top five ranked items (n = 18 total) by percentage that participants said they "probably" or "definitely" planned to adopt were: closely monitor the nutrition of cattle (95.6%), use low stress cattle handling methods (95.2%), closely monitor rangeland conditions (94.4%), Beef Quality Assurance principles (94.0%), and increasing the level of vaccinations that are performed (92.6%). A Pearson product moment correlation was used to measure the relationship of practice adoptions and type of beef cattle producer and their ranching characteristics. Percentage of time devoted to ranching and percentage of income generated from cattle yielded low to moderate relationships with at least five of the 18 practices. Percentage of time devoted to ranching was correlated (P < 0.05) with the adoption of practices to reduce feed costs (r = 0.22), replacement heifer development strategies (r = 0.22), biosecurity principles (r = 0.20), monitor rangeland conditions (r = 0.23), and utilize DNA selection technology (r = 0.27). Percentage of income generated from cattle was correlated (P < 0.05) with the adoption of basic calf management practices (r = 0.31), crossbreeding systems (r = 0.25), pregnancy detection (r = 0.21), increasing the level of vaccinations (r = 0.21), and utilize DNA selection technology (r = 0.29). This study is best described as investigative in nature as it relates to the types of producers that are attending programs and their adoptions of practices. Extension educators should consider these types of characteristics when designing programs for producers.

Key Words: Extension education, Beef cattle, Adoption

23   Beef IQ: A multi-session educational program for Arkansas beef producers. B. Barham*[1], M. Gadberry[1], J. Richeson[1], P. Beck[2], W. Whitworth[3], R. Hogan[4], and J. Powell[5], [1]*University of Arkansas Division of Agriculture Cooperative Extension Service*, *Little Rock*, [2]*University of Arkansas Division of Agriculture Southwest Research & Extension Center*, *Hope*, [3]*University of Arkansas Division of Agriculture Southeast Research & Extension Center*, *Monticello*, [4]*University of Agriculture Division of Agriculture Northeast Research & Extension Center*, *Kiser*, [5]*University of Arkansas Division of Agriculture Cooperative Extension Service*, *Fayetteville*.

Current Extension educational programs typically are allowed a maximum of 30-40 minutes on most programs. This short time frame does not allow adequate time to cover beef production topics in enough detail to give producers an understanding of complex production issues. Therefore, a multi-session educational program was designed to provide in-depth and hands-on training for Arkansas beef producers. Six sessions were designed to cover topics in breeding and genetics, reproduction, animal health, economics, forage and pasture management, and nutrition. Participant in the first course were mainly beef cattle owners (88%), but managers (3%), professionals (3%) and persons planning on starting a beef cattle operation (6%) were also present. Of the current owners nine percent owned less than 25 head, 34% owned between 25 and 50 head, and 57% owned more than

50 head. Thirty four percent of the participants had fewer than 10 years experience, 25% had between 10 and 20 years experience, and 41% had more than 10 years experience. The majority of the participants were commercial producers (82%) while 9% were purebred and 9% were both purebred and commercial producers. Sixty seven percent of the participants were part time cattle producers with off farm income, 23% of the producers were part time cattle producers with other on farm income, and 10% of the participants were full time producers. At the conclusion of each session, participant's were asked to rate their level of knowledge on the respective session topics on a one to five scale (1=low level of knowledge, 5= high level of knowledge). Results from the breeding and genetics session indicate producer knowledge increased from 2.68 prior to the session to 3.86 following the session. The reproduction session showed an increase in knowledge from 2.5 to 4.0. The animal health session reported an improvement from 2.62 to 3.96. The economics session resulted in an improvement from 2.6 to 3.8. The forage and pasture session indicated an improvement in knowledge from 2.6 to 4.1. The Beef IQ program was successful in increasing the knowledge of Arkansas beef producers in various beef production topics.

Key Words: Beef, Producer education, Extension

24   Mississippi Master Stockman: Collaborative beef and equine programming-beef emphasis. J. A. Parish*, J. D. Rhinehart, and P. R. Buff, *Mississippi State University*, *Mississippi State*.

In 2006, the Mississippi State University Extension Service launched the Master Cattle Producer program. Nearly 200 beef cattle producers in Mississippi completed the comprehensive Master Cattle Producer training via interactive videoconferencing in its inaugural year. Participant feedback indicated a need to provide both hands-on training and advanced instruction in the Master Cattle Producer subject areas. The Master Cattle Producer program expanded in 2007 to become part of the Mississippi Master Stockman Program that also includes a Master Horseman component. The initial Mississippi Master Stockman Program was held in September 2007 at the Mississippi Horse Park and the Mississippi Agricultural and Forestry Experiment Station campus beef cattle and horse units as a 1.5 d educational program. Master Cattle Producer and Master Horseman certification opportunities were offered as an integral part of the program. Participants chose from the following beef cattle program options: basic cow-calf, advanced cow-calf, and stocker cattle tracks. Program sessions covered topics including Beef Quality Assurance, reproduction, marketing, end product, forages, nutrition, genetics, herd health, livestock handling, stocker cattle sourcing and receiving, hoof care, freeze branding, electronic identification systems, and calf management skills. Upon course completion, program graduates were awarded a metal Master Cattle Producer farm sign, cap, and certificate. All beef cattle topics and speakers were rated by producer and Extension Service attendees for overall effectiveness as 4 or higher, where 1=poor and 5=excellent. The facilities/locations for the program were rated as 4.89 on the same scale. When asked to rate program length appropriateness, 85% and 15% of the beef cattle track participant evaluations indicated that program length was appropriate and too short in length, respectively. For the beef cattle tracks, 100% of respondents indicated that they would attend another Master Stockman Program. Based on participant evaluation results, the Master Stockman Program will be scheduled as an annual educational event with both core and novel topics.

Key Words: Beef cattle, Equine, Extension

25   Results of technology questions as part of Master Cattle Producer Survey. J. B. Neel*, A. E. Fisher, W. W. Gill, C. D. Lane, Jr., and F. D. Kirkpatrick, *University of Tennessee*, *Knoxville*.

Tennessee beef producers were surveyed during 2004-2007 as part of the University of Tennessee Master Cattle Producer Program to determine use of technology in their respective beef operation. All data were analyzed using the FREQ procedure of SAS. A total of 999 surveys were completed by producers in meetings across the state, in which 59% were classified as commercial, 12% were purebred and 28% indicated both. Ten percent of the producers indicated they would not use computers in their operation, 30% reported they currently use computers and 60% said they were not using but intended to. Fifteen percent of the producers did not have internet access. Sixty-nine percent of producers were interested in receiving information via internet and 16% indicated they were not interested in receiving information via internet. Computer use on beef cattle farms is significant. The Internet is a valid information delivery system and should be expanded in the future. Future uses of survey results include development of beef cattle educational programs as well as exploring new, creative modes of delivery.

Key Words: Computer use, Internet, Beef surveys

Graduate Student Competition

26   Endotoxin induced uncoupling of the somatotrophic axis in nursery pigs. L. E. Hulbert*[1], J. A. Carroll[1], and K. Haydon[2], [1]*Livestock Issues Research Unit, Agricultural Research Service-USDA*, *, Lubbock, TX*, [2]*Prince Agri Products, Inc.*, *Quincy, IL.*

Lipopolysaccharide (LPS) is an endotoxin known to stimulate the innate immune response and stress axis in pigs. However, little is known about the effects of LPS on pig somatotrophic responses. The objective of this study was to determine the effects of an endotoxin challenge on weaned pig serum concentrations of growth factors. Crossbred pigs (n = 32, 6.7 ± 0.2 Kg) were selected at weaning (20.5 ± 0.3 d of age), transported to a climate controlled facility, penned individually and provided with *ad libitum* feed and water. After a 12 d acclimatization period, pigs were non-surgically fitted with jugular catheters. On d 13, pigs were infused i.v. with LPS (25 µg/Kg BW). Blood samples were collected every 30 min from -2 to 4 h following LPS challenge. Serum was analyzed for growth hormone (GH), insulin-like growth factor (IGF) -1 and IGF-2. Concentrations of GH decreased ($P < 0.001$) 0.5 to 2 h post-LPS challenge when compared to baseline concentrations (0.5 to 2 h: 5.22 ± 0.41, -2 to -1h: 9.81 ± 0.86 ng/mL). Serum GH concentrations sharply increased ($P < 0.001$) at 2.5 h (20.95 ± 3.19 ng/mL), then returned to similar concentrations as the 0.5 to 2 h post-LPS period ($P = 0.281$), but remained below baseline ($P< 0.001$). Serum IGF-1 concentrations decreased gradually from the first sample (-2 h) then increased ($P < 0.01$) rapidly at 0.5 h post LPS (0.5 h: 84.9 ± 4.88, -0.5h: 72.44 ± 5.11 ng/mL). Concentrations of IGF-1 remained below ($P<0.01$) baseline from times 1.5 to 3 h post-LPS (50.89 ± 2.84 ng/mL), then began to return to baseline concentrations 4 h post-LPS (68.66 ± 5.36 ng/mL). Endotoxin challenge did not affect IGF-2 concentrations although time fluctuations were observed throughout the time periods. The uncoupling of the GH/IGF-1 axis implies that IGF-1 is important for stimulation of an innate immune response in pigs. While GH is important for immunity, subsequent increase in GH may be associated with the liberation of energy to fend off invading pathogens.

Key Words: Swine, Growth hormone, IGF

27   Effects of MEGALAC-R® inclusion to receiving diets of weaned feeder calves. D. B. Araujo*, R. F. Cooke, G. R. Hansen, and J. D. Arthington, *University of Florida - IFAS*, *Gainesville*.

The objective of this experiment was to determine the effects of supplemental MEGALAC-R® on performance and plasma acute-phase protein concentrations of weaned, transported beef steers during a feedlot receiving. Prior to shipping (d -40 to d 0), 64 weaned Braford steers were stratified by initial BW and randomly allocated to 2 bahiagrass (*Paspalum notatum*) pastures. Each pasture was randomly assigned to receive 1 of 2 treatments, which consisted of grain-based supplements, with (EN) or without (CO) the inclusion of a rumen-inert fat source (Energy Booster 100®) at 2.1% (as-fed basis), and fed daily at a rate of 4.1 kg of DM/steer. On d 0, steers were loaded onto a commercial truck, hauled for 24

h, and delivered to the feedlot (d 1). Upon arrival, steers were stratified by pre-shipping treatment and randomly re-assigned in a 2 x 3 factorial arrangement to receive CO, EN, or MG (grain-based supplement with inclusion of Megalac-R® at 2.5%; as-fed basis). From d 1 to d 29, steers were offered a free-choice mixture of treatments, bermudagrass (*Cynodon dactylon*) hay and cottonseed hulls. Steer shrunk BW was recorded on d -40, d 1 and d 30 to determine ADG. Individual DMI was recorded daily during the post-shipping period (GrowSafe® system; Model 4000 E). Blood samples were collected on d 0, 1, 4, 8, 15, 22 and 29 for determination of fibrinogen and ceruloplasmin concentrations. No pre-treatment effects or pre- x post-shipping treatment interactions were observed. During the post-shipping phase, steers fed MG had decreased ($P < 0.05$) ADG and mean DMI ($P < 0.01$) compared to CO-fed steers (0.80 and 1.04 kg/d, and 2.37 and 2.80% of BW, respectively). Steers fed MG had poorer feed efficiency (G:F; $P < 0.05$) compared to EN steers, and tended ($P = 0.10$) to have poorer G:F compared to CO steers (0.29, 0.37, and 0.35 mean G:F for MG, EN, and CO steers, respectively). Steers fed EN tended to have ($P = 0.07$) greater mean plasma fibrinogen concentrations compared to CO-fed steers (378, and 332 mg/100mL, respectively). In this experiment, supplementation of Megalac-R® to feeder calves during the receiving period of the feedlot decreased DMI, ADG and feed efficiency.

Key Words: Megalac, Steers, Feedlot

28   Horned vs. polled: A survey of gene expression in neonatal horn buds and skin. K. R. Wunderlich*, C. A. Abbey, and C. A. Gill, *Texas A&M University*, *College Station*.

The objective of this study was to characterize the expression of genes from the polled interval (*IFNAR* to *SOD1* on BTA1) in neonatal horn buds (n = 4) and polled skin (n = 4). We also examined the expression patterns of other genes known to be involved in chondrogenesis and osteogenesis to gain a better understanding of the developmental pathways associated with horn development. By qualitative RT-PCR, 7 of the 17 genes from the polled interval were expressed in either the horn buds or polled skin or both, and 14 of 22 genes with roles in bone and cartilage development were expressed. The cartilage specific marker, *COL2A1*, was not expressed at this time point. Expressed genes were subsequently evaluated by quantitative real-time RT-PCR in horned (n = 6), scurred (n = 6), and polled (n = 6) samples from day old calves. None of the genes that we examined from the polled interval were differentially expressed at this time point. Some bone markers were differentially expressed. *RUNX2* is required for ossification and demonstrated approximately 5:3:1 fold differences in expression in horned, scurred, and polled samples, respectively. *SOX9* is expressed in early osteogenic precursors and down-regulates *RUNX2*. We observed 1:1:2 fold differences in expression of *SOX9* in the horned, scurred and polled samples, respectively. *FOXL2*, which is strongly upregulated in fetal goat skin samples affected by polled intersex syndrome, was expressed in the bovine horn buds, but expression in neonatal polled samples was almost undetectable. Horn growth occurs primarily after birth and differential expression of known osteogenic markers was observed in samples from horned, scurred and polled calves. Because no differences in expression were observed for genes from the polled interval, our results suggest that the polled gene may have its primary effect during fetal development.

Key Words: Polled, Cattle horns, Gene expression

29   Identification of signatures of recent positive selection in beef and dairy cattle. J. Choi*[1], R. Villa-Angulo[2], K. Wright[3], L. K. Matukumalli[2], C. P. Van Tassell[4], C. D. Bustamante[3], J. J. Grefenstette[2], and C. A. Gill[1], [1]*Texas A&M University*, *College Station*, [2]*George Mason University*, *Fairfax*, [3]*Cornell University*, *Ithaca*, [4]*USDA-ARS*, *Beltsville*.

The objective of this study was to detect signatures of selection among 12 *Bos taurus* beef and dairy breeds using genotypes for 29,660 autosomal SNP from the bovine HapMap database. Approximately 9.4 million genotypes were used to calculate Wright's F_{ST} and standardized integrated extended haplotype homozygosity scores (iHS). The iHS score provides a measure of recent positive selection because when an allele rises rapidly in frequency due to strong selection, it tends to be associated with high levels of haplotype homozygosity that extend further than expected under a neutral model. Two Anoa and Water Buffalo were genotyped as outgroups and the ancestral allele was assigned

for 10,193 autosomal SNP. Haplotype phase was estimated using fastPHASE software and recombination rates (rho) per Mb were estimated for each population. These data were inputs for iHS software (J. Pritchard and W. Wen). We empirically determined that a 200kb gap size and 10Mb window were optimal for these data. Raw iHS scores were standardized to obtain a final statistic with mean 0 and variance 1, regardless of the frequency of the SNP. Extreme positive and negative values are potentially interesting, so we plotted |iHS| by position on each chromosome. The top 1% of |iHS| values were above 2.694. There was evidence of a sweep in progress in Limousin and Piedmontese near *MSTN* on BTA2. On BTA14, in regions that were densely sampled with SNP, there was evidence of selective sweeps in Charolais, Limousin, Piedmontese, Guernsey and Norwegian Red cattle. Markers with extreme |iHS| were subsequently compared to the top 1% of markers based on F_{ST} (> 0.344). Only 3 SNPs were concordant between these 2 sets. This lack of concordance is not unexpected because F_{ST} is a measure of the amount of differentiation between beef and dairy breeds, while iHS is a measure of incomplete selective sweeps within breeds.

Key Words: Haplotypes, Selection, SNP

30   Dihydrotestosterone levels in genetically naked and furred male rabbits. R. H. Jackson*[1], S. D. Lukefahr[1], R. L. Stanko[1,2], and D. O. Flores[1], [1]*Department of Animal and Wildlife Sciences, Texas A&M University-Kingsville*, [2]*Animal Reproductive Laboratory, Texas A&M University Agricultural Research Station*, *Beeville*.

Rabbits are highly prone to heat stress in tropical environments where there is tremendous potential for small-scale meat rabbit projects to alleviate hunger and poverty. One solution may be the breeding of rare, genetically naked rabbits due to an autosomal recessive. Previous reported studies conducted in summers from 2002 to 2004 showed advantages of naked compared to furred rabbits for performance characters such as higher feed intake and faster ADG, and lower core body temperatures and respiratory rates. To elucidate the physiological mechanism of naked gene expression, our hypothesis reflects the model of androgenic alopecia (i.e., male patterned baldness) in humans involving elevated levels of dihydro-testosterone (DHT). The primary aim of this investigation was to determine if a difference exists between naked and furred rabbits for mean serum DHT concentration, and secondly if a relationship exists between DHT and ADG performance. Data were collected over a three-year period (2005 to 2007). Matings were made between a homozygous naked parent and a heterozygous furred parent, which produced 16 litters. Weaned female and male fryers (n = 73) were randomly assigned to growing cages containing two or three either naked or furred fryers from different litters. Following a 42-d growing period, blood was drawn from only males (n = 34) to evaluate serum DHT. Models consisted of the fixed effect of treatment (naked vs. furred) and random effects of batch (i.e., a contemporary group effect of litters born within 1 wk), litter nested within batch, and residual error. Data revealed a large range of DHT values from 23 to 2,794 pg/ml (SD of 521 and CV of 150%). Results from ANOVA showed that naked male rabbits had a 135% higher DHT concentration than furred male rabbits (least-squares means of 466±163 and 198±166 pg/ml, respectively). However, this large numerical difference was not statistically significant ($P = 0.26$) perhaps due to the small sample size. Residual correlations were small (r = 0.16 and - 0.01 for naked and furred rabbits; $P > 0.05$) between DHT and ADG. Our results are preliminary and more data are needed for more precise results.

Key Words: Rabbits, Dihydrotestosterone, Growth

31   Historic genetic characterization of King Ranch Quarter Horses. L. Dobson*[1], S. D. Lukefahr[1], S. Moore[2], D. S. Delaney[2], and J. Lee[2], [1]*Department of Animal and Wildlife Sciences, Texas A&M University-Kingsville*, [2]*King Ranch*, *Kingsville, TX*.

The objective of this investigation was to conduct a retrospective trend analysis from 1915 to present on ancestral breeding, genetic relationships, and inbreeding of King Ranch linebred Quarter Horses. Data involved analysis of eight-generation pedigrees of sixteen elite stallions and twenty brood mares. Each horse was genetically characterized to determine the degree of Foundation (F), Thoroughbred (Tb), and unknown (U) ancestry. The F influence was calculated based on birth of ancestors prior to or by 1940. Tb was measured using two approaches: 100 minus F (Tb1), and ancestry indicated in generation eight

(Tb2). U was likewise calculated based on generation eight ancestry records. To determine historic genetic relationships to Old Sorrel, Mr. San Peppy, and Peppy San Badger to present elite stallions, a composite pedigree file was developed involving numeric codes for stallions, sires of stallion, and dams of stallion, which traced ancestry back to Old Sorrel (born in 1915). Pedigree data were analyzed by Multiple Trait Derivative Free Restricted Maximum Likelihood software to obtain genetic relationship and inbreeding coefficients. Inbreeding trends were quantified by regression based on grouping of ancestors by decade of birth from 1920 to 1990. Results revealed the average F influence was 89.1±0.79% and 77.3±3.82% for stallions and mares, respectively, and 31.7±3.3% for U ancestry for the stallions. Mean values for Tb1 influence were 10.9±0.93 and 22.7±3.82% for stallions and mares, respectively, and for Tb2 was 13.8±1.3% for stallions. Computed mean genetic relationship coefficients of elite studs to Old Sorrel, Mr. San Peppy, and Peppy San Badger were 6.4±1.0, 13.4±2.1, and 25.2±3.8%, respectively. Mean inbreeding coefficient to Old Sorrel, Mr. San Peppy, and Peppy San Badger was 1.6±0.66% (range of 0.0 and 8.7%). From 1920 to 1960, inbreeding trends for stallions, sires of stallion, and dams of stallion were negligible (P > 0.05). In planning future matings, application of these procedures would be of potential value to maintain genetic integrity and(or) relationships while minimizing inbreeding within this infamous line of Quarter Horses.

Key Words: Quarter horse, Inbreeding, Genetic relationship

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32   Effects of dietary supplementation of yeast culture to sow diets on sow and litter performance. C. Vasquez*[1], B. J. Min[1], and S. W. Kim[2], [1]*Texas Tech University*, *Lubbock,*, [2]*North Carolina State University*, *Raleigh*.

Twenty nine sows (Camborough-22, PIC) were used to determine the effects of dietary supplementation of yeast culture (Diamond V XPC[TM] Yeast Culture, Diamond V Mills, Cedar Rapids, IA) to gestation and lactation diets on the performance of sows and their litters. Within their parity (primiparous vs. multiparous) and initial body weight group 5 d prior to breeding, sows were allotted to 2 treatments: **CON** (no yeast culture, n=16, average parity=1.54±0.16) or **YC** (12 and 15 g XPC/d during gestation and lactation, respectively, n=13, average parity=1.54±0.19). Treatments were fed during the entire gestation and lactation periods. Sows were fed 2 kg/d during gestation and ad libitum during lactation (21 d). Body weight and backfat thickness of sows were measured on d 5 prior to breeding, d 30 and 110 of gestation, and d 0 (immediately after farrowing) and 21 of lactation. Litter BW was measured on d 0 and 21 of lactation. On d 18 of lactation, milk yield was measured by weigh-suckle-weigh method. After weaning, number of days from weaning to estrus was recorded. Initial BW and backfat of sows measured at d 5 prior to breeding were similar between treatments. Changes in BW and backfat thickness during gestation did not differ between treatments. Yeast culture did not affect litter size at birth and at weaning. Litter birth weight was similar between treatments, but litter weight at weaning was greater (*P* < 0.05) for YC (60.9±2.5 kg) compared to CON (53.9±2.1 kg). Litter weight gain during lactation tended to be greater (*P* = 0.053) for YC (43.9±2.2 kg) compared to CON (38.1±1.8 kg). Voluntary feed intake of sows and changes in BW and backfat thickness during lactation did not differ between treatments. Yeast culture showed no effect on number of days from wean to estrus. When measured by weigh-suckle-weight method, milk yield was similar between treatments. Collectively, dietary supplementation of yeast culture to gestation and lactation diets can increase the growth of nursing piglets without affecting nutrient intake of sows and mobilization of sow body reserves.

Key Words: Litter weight gain, Sow, Yeast culture

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33   Identification of single nucleotide polymorphisms in the promoter region of the bovine follicle stimulating hormone gene. S. Nabhan*[1], S. Reiter[1], D. Kreider[1], M. Looper[2], and C. Rosenkrans[1], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA/ARS*, *Booneville, AR*.

Follicle stimulating hormone (FSH) is a pituitary glycoprotein that stimulates maturation of gametes. Our objectives were: 1) identify single nucleotide polymorphisms (SNPs) in the promoter region of the bovine FSH gene, and 2) evaluate the relationship between FSH SNPs, serum metabolite concentrations, follicle size, calving date, and calving percentage. Brahman-influenced cows (n = 99) were managed to achieve low (n = 50; BCS = 4.3 ± 0.1) or moderate (n = 49; BCS = 6.1 ± 0.1) body condition (BC). Blood samples were collected at 35

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d before the breeding season. Genomic DNA was prepared, and amplified via PCR using specific primers (forward: GGGGGTAAGCAAGGACATTT; reverse: TGTGAAACTAAACTAAACCTTGTGG). After sequencing, four SNPs were identified at base positions c86t (n = 26; 26.3%), t152c (n = 8; 8.1%), a210t (n = 17; 17.2%), c419t (n = 54; 54.5%). In addition, a cytosine insertion between bases 420/421 (n = 16; 16.2%) was detected. Follicle size and calving percentage were not affected (P > 0.16) by the identified polymorphisms. Cows with CT polymorphism at base 86 had greater (P < 0.08) serum concentrations of prolactin when compared with CC cows (16 vs 10.7 ng/mL ± 2.0). An interaction (P < 0.04) between BC and SNP c86t resulted in cows with low BC and CT genotype having greatest (P < 0.06) concentrations of plasma NEFA. Base 152 SNP interacted (P < 0.05) with BC; cows with low BC and TC genotype had increased (P < 0.08) serum concentrations of IGF, and later calving dates than cows of TC genotype with moderate BC and TT genotype with low BC. Cows with a cytosine between bases 420 and 421 had greater (P < 0.01) plasma NEFA and serum prolactin concentrations than cows without the insertion (304 vs 227 mEq/mL ± 11; and 20 vs 11 ng/mL ± 2, respectively). These results indicate polymorphisms within the promoter region of the bovine FSH gene are associated with NEFA and hormone concentrations, but a larger data set will be needed to detect differences in calving rates.

Key Words: FSH, Bovine, Genomics

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34   Effects of dried distillers grains during preconditioning on subsequent wheat pasture and finishing performance of fall-weaned beef steers. S. J. Winterholler*, B. P. Holland, T. K. Dye, C. R. Krehbiel, and G. W. Horn, *Oklahoma State University*, *Stillwater*.

Fall-weaned steer calves (n=64; initial BW=197±25 kg) were fed increasing amounts of corn dried distillers grains with solubles (DDGS) in a 56-d preconditioning period. Steers were stratified by BW and randomly allotted to receiving pens (4 pens/treatment). Pens were randomly assigned to treatments of: 0.30, 0.75, 1.20 or 1.65% BW of DDGS (33.2% CP, 44.8% NDF, 10.8% fat, 0.52% S; DM basis). Prairie hay (4.8% CP, 68.8% NDF) was fed *ad libitum* and refusals measured weekly. The 1.65% level was chosen to maximize DDGS intake and not exceed maximum tolerable dietary S concentration according to the NRC (1996). After the 56-d trial, calves grazed wheat pasture prior to feedlot entry. As level of DDGS increased, ADG increased quadratically (*P*<0.01) with means of 0.54, 0.93, 1.10 and 1.28 kg/d, respectively. Prairie hay intake decreased linearly (*P*<0.01) as DDGS level increased. For every 0.45 kg DDGS consumed, prairie hay intake decreased 0.15 kg (R^2 =0.90). Increasing levels of DDGS resulted in increased DMI (linear *P* <0.01; 4.91, 5.82, 6.17 and 6.86 kg/d). Also, G:F improved quadratically (*P*<0.01) with increasing DDGS (0.11, 0.16, 0.18 and 0.19, respectively). The 128-d wheat pasture ADG was greatest for steers fed the lowest DDGS level (*P*<0.01) and decreased linearly (*P*<0.01) with gains of 1.38, 1.33, 1.24 and 1.28 kg/d, respectively. Feedlot ADG was not different (*P*=0.51) across treatments. Level of DDGS did not affect dressing percentage, marbling score, 12th-rib fat thickness, LM area, % KPH, or yield grade (*P*>0.25), but HCW tended (*P*=0.12) to increase linearly with increasing DDGS. Though outside of our treatment range, the response function suggested preconditioning ADG would be maximized at 2.0% of BW of DDGS. Similar calculations showed 1.38% of BW of DDGS optimized G:F. From an economic standpoint, with increasing cost of DDGS and hay priced at $65/ton, cost/kg of gain decreased linearly (*P*<0.03) across increasing DDGS at $125/ton, but was not different (*P*>0.10) at $150 or $175/ton. Steers readily consumed DDGS at all levels and showed no signs of polioencephalomalacia.

Key Words: Calves, Dried distillers grains, Growth

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35   Corn grazing: Opportunities for cattle production and wildlife enterprises. D. H. Manning*, R. C. Vann, and J. C. Jones, *Mississippi State University*, *Mississippi State*.

To ascertain potential ecological and landowner benefits of non-conventional agricultural systems, this project was designed to monitor cattle production and wildlife utilization of land areas that allow grazing steers to harvest corn planted with no-till methods. In 2005-2007, study sites were located in 4 MS counties, including 4 steer-harvested corn sites (SHS) and 4 conventionally-harvested corn sites (CHS). Steers in the finishing phase were placed on corn fields in July to

August each year. Corn yield averaging 5,649 kg/ha on SHS and 6,277 kg/ha on CHS were used to determine a stocking rate of 3.7 animals/ha. Steers were weighed prior to corn grazing and every 30 d until removal of animals from corn fields in October to November. Grazing access was limited to 0.40-1.20 ha sections in each field by poly-wire temporary electric fencing, and animals were provided access to new sections every 7-14 d. Steers had an average starting weight of 432 kg and ending weight of 523 kg with an ADG of 1 kg/d. An average of 2,711 kg of total beef was produced equaling 268 kg gain/ha over a 73 d grazing period. Following the grazing period, all cattle were sent to feedlots or sale facilities. In addition to beef production, SHS attracted mourning doves (Zenaida macroura) due to residual grain, natural foods, and foraging conditions created by grazing cattle. Dove numbers were greater on SHS when compared to CHS (P < 0.05). Doves per survey on SHS during fall ranged from 10-600 (mean = 111). Number of doves per survey on CHS in early fall ranged from 0-29 (mean = 3). After offsetting costs of field preparation, fencing, and cattle needs, landowners using this production system can increase income by at least $250/ha from lease hunting and production of quality beef cattle.

Key Words: Corn grazing, Beef steers, Mourning doves

36   Bioavailability of iron from soil contamination as affected by silage fermentation. S. L. Hansen* and J. W. Spears, *North Carolina State University*, *Raleigh*.

Excessive dietary iron (Fe) can negatively impact absorption of other minerals and cause tissue damage through the production of free radicals. Ruminants are often exposed to high dietary Fe, frequently due to consumption of soil. Iron in soil is largely bound to a chelating agent, however; exposure to an acidic environment similar to that occurring during silage fermentation may cause this Fe to become soluble. To test this theory, 14 experimental silos (2 replicates of 7 treatments) were tightly packed with corn greenchop. Treatments included 3 types of soil (Cecil clay loam, 3.4% Fe; Georgeville silt loam, 4.3% Fe; and Dyke clay loam, 6.9% Fe) at 2 levels of soil inclusion (1 and 5% contamination, as-fed basis) added to greenchop prior to ensiling, in addition to a control treatment with no soil added. Silage was allowed to ferment for 90 days before silos were opened and silage was freeze-dried and ground. To simulate contamination after ensiling each soil type was added to control silage at the 2 levels of inclusion. Addition of soil to greenchop prior to ensiling resulted in greater (*P* < 0.01) amounts of water soluble Fe compared to soil addition after ensiling, suggesting that Fe-soil binding properties were altered due to ensiling. To test the bioavailability of Fe during ruminant digestion an enzymatic *in vitro* system was modified to simulate the rumen, abomasum and intestine. The presence of soil, regardless of time of addition, type or inclusion level, resulted in greater (*P* < 0.01) soluble Fe concentrations after all 3 phases when compared to control silage. Ensiling further increased (*P* < 0.01) soluble Fe concentrations after each phase when compared to silage contaminated with soil after ensiling. Iron that was soluble following the intestinal phase may be available to the animal for absorption, and ensiling resulted in increased concentrations of this potentially bioavailable Fe. These results suggest that soil contamination of harvested feeds prior to ensiling may represent a source of high Fe in the diets of cattle.

Key Words: Bioavailability, Iron, Ruminant

37   Microarray analysis of gene expression in boars supplemented with organic selenium. S.M. Speight*[1], M.J. Estienne[1], A.F. Harper[1], and C.R. Barb[2], [1]*Virginia Polytechnic Instiute and State University*, *Blacksburg*, [2]*USDA*, *ARS*, *Athens, GA*.

Work in our laboratory has demonstrated that dietary supplementation with an organic source of selenium (Sel-Plex; Alltech, Inc., Nicholasville, KY) has positive effects on growth performance (feed conversion efficiency) and semen characteristics in boars. The objective of this study was to compare gene expression in boars fed diets supplemented with selenium from either organic or inorganic sources. Beginning at weaning (28 d of age), crossbred boars had ad libitum access to one of three diets: I) a basal diet with no supplemental selenium (controls), II) a basal diet supplemented with 0.3 ppm organic selenium (Sel-Plex), and, III) a basal diet supplemented with 0.3 ppm inorganic selenium (sodium selenite; Premium Selenium 270; North American Nutrition Co., Inc., Lewisburg, OH). There were 5 boars per treatment. At the end of the growing-finishing phase (average BW = 137 kg), the boars were transported to the University of Georgia meats laboratory for slaughter. Testis parenchyma from the right testis was removed immediately after slaughter, flash-frozen in liquid nitrogen, and transferred to -80 degrees C for subsequent microarray analysis. Total RNA was isolated from testis using organic extraction and the RNeasy column protocol (Qiagen, Valencia, CA). Affymetrix Gene Chip Porcine Genome Arrays were processed at Yerkes Microarray Core at Emory University in Atlanta, GA using standard Affymetrix protocols (Affymetrix, Santa Clara, CA). No differences (P > 0.05) among treatments were detected for genes known to regulate testis development and function such as steroidogenic acute regulatory protein (STAR), FSH-receptor, LH/HCG-receptor and testis enhanced gene transcript (TEGT). The mechanisms responsible for the beneficial effects of organic selenium on growth and reproductive performance in boars remain to be determined.

Key Words: Boar, Microarray, Selenium

38   Evidence for possible involvement of IGF type II receptors (IGF2R) in regulating growth of two concomitant dominant follicles in cattle. P. Y. Aad*[1], S. E. Echternkamp[2], and L. J. Spicer[1], [1]*Oklahoma State University*, *Stillwater*, [2]*USDA, U.S. Meat Animal Research Center*, *Clay Center, NE*.

Regulation of multiple ovulations in monotocous species such as cattle is not well understood. Gene expression of the FSH receptor (FSHR) in granulosa (GC), and LH receptor (LHR) and IGF2R in GC and theca (TC) cells, as well as estradiol (E2) and progesterone (P4) levels in follicular fluid (FF) were quantified in cows selected (Twinner) and unselected (Control) for multiple ovulations. Cows were slaughtered at days 3 and 6 of an estrous cycle, and ovaries from each cow were snap frozen in liquid nitrogen; FF, GC and TC were separated and collected. Total RNA from GC and TC was extracted, and target gene mRNA levels were quantified using multiplex real-time RT-PCR. Follicles were ranked F1 through F3 based on their diameter and E2 level in FF; F1 and F2 had greater diameters and FF E2 levels than F3, but no differences in FF P4 levels were observed among F1, F2 and F3. Twinner cows had on average larger (P < 0.01) F1 and F2 with greater (P < 0.01) FF E2 levels than Control cows. FSHR and LHR mRNA in GC were greater (P < 0.05) in F1 and F2 vs F3, with Control cows having greater (P < 0.05) FSHR mRNA than Twinner cows. Abundance of IGF2R mRNA in TC of F1, F2 and F3 of Twinner cows was less (P < 0.05) than Control cows mainly on day 3. In GC, IGF2R mRNA abundance was less (P < 0.05) in F2 of Twinner than Control cows. Abundance of IGF2R in GC but not TC negatively correlated with size and estradiol (r = -0.33, P < 0.01), Further, in GC, IGF2R mRNA was correlated with only FSH mRNA (r = 0.3, P < 0.05), whereas in TC, IGF2R mRNA was correlated with both GC and TC LHR mRNA (r = -0.27 and 0.67 respectively, P < 0.05). In conclusion, our data support the hypothesis that reduced theca and granulosa cell IGF2R levels in early developing cohort antral follicles of Twinner cows, induced by increased IGF-I, may increase the amount of free or bioavailable IGF-II which in turn may act in an autocrine or paracrine fashion to regulate follicular development such that two cohort follicles are selected and become dominant.

Key Words: Theca, Granulosa, IGF type 2 receptor

39   Single nucleotide polymorphisms in the 5′ flanking region of inflammatory mediator genes in ascites– susceptible and –resistant broilers. S. H. Whiting*[1], D. L. Kreider[1], S. T. Reiter[1], and N. B. Anthony[2], [1]*University of Arkansas Department of Animal Science*, *Fayetteville*, [2]*University of Arkansas Department of Poultry Science*, *Fayetteville*.

The underlying cause of pulmonary hypertension syndrome (PHS, ascites) in broilers is attributed to genetic factors that stem from selection for improved commercial traits. Differences in the production of interleukin 8 (IL–8), inducible nitric oxide synthase (NOS2), and constitutive nitric oxide synthase (NOS3) have been recorded in association with the development of ascites. It is not known if the varying genetics between ascites–susceptible and ascites–resistant broilers extends to the control of IL–8 and nitric oxide (NO). The objective of this study was to examine the relationship between single nucleotide polymorphisms (SNPs) in the 5′ flanking regions of the genes for three inflammatory mediators and ascites susceptibility in broilers. The broilers used were derived from a commercial pedigree elite line that had undergone thirteen generations of divergent selection for ascites susceptibility (SUS) and ascites resistance (RES).

All sequenced 5′ flanking regions were in relation to the start of exon one. These regions included 518bp in IL–8 (Genbank NW 001471685.1), 651bp in NOS2 (Genbank NW 001471685), and 200bp in NOS3 (Genbank NW 001481304). Upstream of IL–8, one SNP, G–369A, was found. However, SNP frequencies did not differ between lines (P≤.1106). In the flanking region of NOS3 two SNPs were observed to differ in frequencies between RES and SUS broilers, C–141G (P≤.0003) and C–131T (P≤.0001). Within the NOS2 flanking region T–604C (P≤.0138), C–423T (P≤.0138), T–540A (P≤.0138), G–596A (P≤.0231), and G–368 (P≤.0231) were more prevalent in SUS than in RES broilers. The observed differences in SNP frequencies found in NOS2 and NOS3 provide a possible link between published innate differences in vasoactive agents and the development of PH.

Key Words: NOS, IL–8, Ascites

Meats

40 Has quality grade declined? R. D. Rhoades*, J. E. Sawyer, A. D. Herring, and D. P. Anderson, *Texas A&M University*, *College Station*.

The primary objectives of this review were to quantify historical trends in Choice and Select beef supply based on yearly pounds of federally inspected product and to explore the short-term demand structures for Choice and Select product. Annual data (1938-2005) were acquired from USDA and included pounds of federally graded Choice, Select and inspected beef. Data were analyzed as time series data using a linear regression model including linear, quadratic and cubic effects of time. Analyses were conducted across the entire time span and subsequent analyses were conducted across shorter time spans. Additionally, daily supply and demand data for average boxed beef price were recorded for the most recent 52 weeks, aggregated into weekly averages, and elasticity estimates were calculated to determine demand sensitivity relative to price. There was a quadratic effect (P<0.01) of time on the amount of Choice beef produced over the entire time span; Choice output increased at a decreasing rate. However, there was no effect (P=0.18) of time on Choice output from 1997 to 2005; Choice product output remained fairly consistent. Over the entire time span there was a cubic effect (P<0.01) of time on the amount of Good/Select beef produced, as a result of relatively stable product volume from 1938 to 1986, followed by rapid escalation until 2000, followed by another period of stability. Short-run, Choice load elasticity (-0.39) suggests that limited change in the weekly quantity demanded for choice product at any given price level. However, price change has a greater impact on the quantity of Select beef demanded (elasticity of -0.90). Over time, increases in Select beef output have resulted from increases in beef presented for grading. Recent stabilization in the slaughter mix may suggest that an optimum is being approached. Evaluation of short-run demand structure supports this premise, and suggests that the products may not be substitutes.

Key Words: Beef, Choice, Demand

41 Consumer preferences in purchasing beef and values they attribute to branded beef products. M. M. Beverly* and R. D. Hanagriff, *Sam Houston State University*, *Huntsville, TX*.

There have been significant changes in consumer demand at the retail counter, such as health, convenience, palatability preferences, and safety concerns. These changes have spurred new marketing programs, which include product differentiation and changes in production practices. Branded programs offer a means for satisfying consumer demand for high quality and differentiated beef products. To help answer the question of who is driving the branded beef market and why, an online survey was sent to interested beef consumers to determine their preferences of purchasing, as well as values they attribute to certain product characteristics. Of the 13,000 surveys emailed, 502 responses were ample to validate the results (Kreiche and Morgan, 1970). The demographics of the respondents were 44% males and 56% females, 76% married and 34% married with two or more children. With an increasing consumer demand for "value-added" products, respondents were asked to categorize attributes such as packaging, color, product guaranty, previous experience in buying the product, among others. Attributes ranked moderate and always important (3 to 5 score) include guaranteed tender (3.45), guaranteed satisfaction (3.39), low price (3.32), and low fat or lean (3.32). Gender also impacted attribute value. Females differed from males (p<.05) in the value ascribed to bright red color, guaranteed tender, low fat or lean, American Heart Association certification, no antibiotics used on cattle, and all natural production practices. These results illustrate that retail demand characteristics are essential to understanding marketing beef products.

Key Words: Branded beef, Value added beef, Beef consumer preferences

Pastures and Forages

42   Tifton 85 bermudagrass and supplemental corn gluten for direct harvest off-pasture of Bonsmara and Simmental crossbred steers. F. M. Rouquette, Jr.*[1], T. D. A. Forbes[2], B. G. Warrington[2], J. W. Holloway[2], K. R. Hawks[3], R. K. Miller[3], and C. R. Long[1], [1]*Texas Agricultural Experiment Station*, *Overton*, [2]*Texas Agricultural Experiment Station*, *Uvalde*, [3]*Texas A&M University*, *College Station*.

Costs of feedlot gains encourages supplementation on pasture to reduce feedlot time or for direct harvest off pasture. Cattle were stocked on ′Tifton 85′ bermudagrass (PAS) with and without daily, hand-fed corn gluten (SUP) at 0.8% BW. Three replicate pastures of PAS and SUP were each stocked with 17-mo Bonsmara crossbred (BONS) steers (n = 79 hd) and 8-mo Simmental crossbred (SIMX) steers and heifers (n = 74 hd) from June to mid-Sept in 2006 and 2007. In Sept, cattle were harvested directly off pasture or after a feedlot period (FDLT) to assess carcass attributes. Pasture ADG was affected by year (P < .001), SUP (P < .001), year x SUP (P < .007), and breedtype (BRED) (P < .001). The ADG from SUP vs PAS was greater in 2006, 0.83 kg d^{-1} vs 0.41 kg d^{-1}, and 2007 at 0.66 kg d^{-1} vs 0.42 kg d^{-1}. Cattle were heavier (P < .001) in 2007 vs 2006 with initial weights of 356 and 308 kg, and off-pasture weights of 409 and 369 kg. Cattle receiving SUP gained more, were heavier off pasture, and had higher BCS than cattle on PAS. The ADG of BONS at 0.66 kg d^{-1} was greater than SIMX at 0.50 kg d^{-1}. Direct harvest steers from SUP affected yield grade (P < .02) and KPH (P < .01). Ribeye area (REA) of direct harvest steers was larger for SUP (P < .05)

and for BONS likely due to age. The FDLT of 90 days or more resulted in greater (P < .001) hot carcass weight (HCW), backfat, yield grade, KPH, marbling, and REA compared to direct PAS harvested steers. The HCW and KPH were affected by SUP (P < .04) BRED (P < .004), FDLT (P < .001), and BRED x FDLT (P < .001). Backfat and yield grade were affected (P < .001) only by FDLT. Marbling was not affected by SUP, but was affected by BRED (P < .008), FDLT (P < .001) and BRED × FDLT (P < .03). The REA was affected by SUP (P < .007) BRED (P < .02), FDLT (P < .001), and BRED × FDLT (P < .001). Performance on PAS was enhanced by SUP, but carcass traits of direct harvest steers were considered less than desirable for current merchandizing standards.

Key Words: Bermudagrass, Corn gluten, Carcass

43   Effect of corn supplementation on pasture performance and carcass characteristics of cross-bred Bonsmara steers grazing winter annual pasture. T. D. A. Forbes*[1], F. M. Rouquette[2], B. G. Warrington[1], K. R. Hawks[3], R. K. Miller[3], and J. W. Holloway[1], [1]*Texas Agricultural Experiment Station*, *Uvalde*, [2]*Texas Agricultural Experiment Station*, *Overton*, [3]*Texas Agricultural Experiment Station*, *College Station*.

A study was conducted to examine the effect of corn supplementation on performance and carcass characteristics of cross-bred Bonsmara steers grazing winter

annual pastures and harvested directly off pasture or after a 90-d feeding period (DOF). The study was conducted at two locations (LOC): Uvalde and Overton, Texas over two yr (YR). At Uvalde, animals (n=58) were placed on irrigated annual ryegrass pastures in early December. At Overton, animals (n=116) were placed on pasture overseeded with a rye-ryegrass mixture in January. Animals were weighed (mean LW Uvalde 255 ± 30.5 kg; Overton 263 ± 37.3 kg) and allotted to one of two supplement treatments (TRT) consisting of no supplement or 0.8%BW of corn fed daily. Animals were weighed at 28d intervals and estimates of body condition score (BCS) obtained at the initiation and conclusion of grazing. At the end of grazing, 4 hd from each TRT were harvested. Total gain (TOTG), ADG and final BCS off pasture were determined. The remaining animals were sent to a feedlot. After 90d on feed, 4 hd from each LOC × TRT combination were harvested. After harvest, hot carcass weight (HCWT), fat color, marbling score, ribeye area, backfat thickness and KPH fat were recorded. At Uvalde, animals remained on pasture for 152d in both years. At Overton, animals remained on pasture for 82d in year 1 and 103d in year 2. The TRT × LOC interaction was significant (P<0.02) for ADG and TOTG. Animals on both TRT at Overton had greater ADG (1.2 ± 0.015 kg/d) than animals at Uvalde (0.97 ± 0.022 kg/d). Body condition was increased by TRT (P<0.05). Hot carcass wt was positively influenced by DOF and LOC (P<0.05). The YR × LOC interaction for HCWT was significant (P<0.05). Fat color was influenced by DOF and YR (P<0.01). Marbling was influenced by YR x DOF (P<0.01). Ribeye area was influenced by DOF, LOC and YR × LOC (P<0.01). Backfat thickness was increased by DOF (P<0.01), but not by TRT, YR or LOC. Internal fat (KPH) was influenced by DOF, LOC and YR × LOC (P<0.01). Corn supplementation had little apparent effect on carcass attributes for animals harvested off pasture.

Key Words: Supplementation, Grass-fed, Marbling

44   Evaluation of feeding systems for finishing beef cattle. J. D. Shockey*, S. A. Gunter, P. A. Beck, and J. A. Apple, *University of Arkansas Division of Agriculture*, *Hope*.

Research has shown many health benefits to grass-finishing beef over conventional feedlot beef, though increased CLA production. Drawbacks to grass-fed beef have been low marbling, tenderness, and off flavors in meat. The objective of this research is to evaluate different feeding systems through the slaughter process for tenderness, marbling, and consumer acceptance. November 1, 2006, 30 weaning Angus steers (BW = 257 kg) that were ½ brothers were divided into 2 groups stratified by ultrasound predicted intramuscular fat and assigned to either a forage-based diet (9.1 ha pasture of rye, ryegrass and wheat; CP 32% and TDN 89% on DM basis) or a concentrated diet (corn, cottonseed meal and wheat haylage; CP 15% and TDN 81% DM basis). Pastures were sprayed with glyphosphate and no till drilled in early Sep. (45.5 kg rye, 54 kg wheat, and 9 kg ryegrass). Feed was mixed weekly and fed ad libitum for the duration of the study. Feedlot steers gained BW faster (P < 0.01) than grass-fed steers (2.73 vs 2.03 lb daily, respectively). However, cost of gain was less for grass-fed steers $0.41 compared to $0.66 for feedlot steers based on actual cost of feed ingredient and pasture establishment. Net return per head was $13.20 for feedlot steers and $168.47 for grass-fed based on the carcasses price ($3.41 and $3.91/kg, respectively). A consumer preference panel evaluated steaks harvested from the longissimus dorsi at the 13 rib and evaluated each steak in 6 categories; taste, tenderness, moisture, after taste, quality and overall recommendation. Feedlot steers received high marks from the panel but no preference differences between systems were detected (P > 0.05). Quality grades were different between systems (P < 0.01) with feedlot steers at 4.01 and 3.27 for grass-fed (Select = 3.0, Choice = 4.0). Warner-Bratzler shear test were less (< 0.01) for grain-fed steers than grass-fed steers (2.8 vs 4.3 kg, respectively). Grass-finished steers had lower ADG, but a lower cost of gain and a higher net return than feedlot steers than feedlot finished steers. Grass finished beef also had minimal issues with consumer preferences and tenderness compared to feedlot finished beef.

Key Words: Grass-fed, Cattle, Carcass quality

45   Performance of finishing steers in drylot or on ryegrass pasture. V. A. Corriherr*, G. M. Hill, and B. G. Mullinix, *University of Georgia*, *Tifton*.

Beef steers were finished on ryegrass pasture or in drylot with corn oil supplementation. Steers for both Exp.1 and 2 were implanted with Component ® on d1 of each experiment. Steer BW were means of consecutive daily unshrunk BW. Exp.1: Steers were backgrounded on rye pasture (initial BW 369.4 ± 29.1 kg) for 71d (ADG: 1.78 ± 0.11 kg). Following rye grazing, beef steers (n=16; initial BW 424.3 ± 27.8 kg; age 18 mo.;Angus and Angus-X) were fed ground corn supplement (SUP: 1% BW; Rumensin 200mg/d) without and with corn oil (0.075% BW) while grazing ryegrass pastures (cultivar "Big Daddy", 4 total pastures, 1.62ha each). Steers were ranked by BW and randomly assigned to dietary treatments on ryegrass for 83d. Steer supplement DMI on ryegrass was higher for corn than corn + oil treatments (Table, *P* < 0.03). Despite increased supplement DMI, steer ADG, HCW, YG and QG (12 = US Choice -) were similar for both treatments. Exp. 2: Two-year-old beef steers (n=20; initial BW 488.2 ± 42.4 kg; British crossbreed and Brahman derivative) were fed a free-choice total mixed ration consisting of 55% corn silage (DM 35.6%, CP 11%) and 45% concentrate mix (88% ground corn, 10% SBM, 0.019% mineral/Rumensin/vitamin premix) on DM basis, without and with corn oil (7% of DMI) while in drylot. Steers were ranked by BW and randomly assigned to dietary treatments. Steer 86-d ADG, QG and HCW were similar for treatments however, YG was significantly higher for corn oil treatments. Rib sections and subcutaneous fat samples were retained for fatty acid composition. Feeding corn oil decreased SUP intake for grazing steers (Exp1) and tended to increase ADG, HCW, YG and QG. Steers fed corn oil in drylot (Exp2) had similar DMI and ADG but higher HCW, YG and QG.

Table 1.

Exp. 1	Corn	Corn + Oil	SE	*P* <
SUP DMI, kg	4.63	4.33	0.01	0.03
83-d ADG, kg	1.78	1.89	0.19	0.40
SUP DMI/gain, kg	2.64	2.33	0.10	0.12
HCW, kg	347.90	354.44	6.95	0.17
YG	2.38	2.75	0.13	0.16
QG	12.27	12.61	0.39	0.55
Exp. 2	**TMR**	**TMR + Oil**	**SE**	***P*<**
Total DMI, kg	24.43	24.30	0.71	0.92
86-d ADG, kg	2.41	2.41	0.35	0.99
Total DMI/gain, kg	10.88	10.57	0.95	0.79
HCW, kg	381.88	401.31	21.24	0.43
YG	1.97	2.81	0.17	0.01
QG	11.63	11.92	0.75	0.74

Key Words: Steer, Corn oil, Fatty acids

46   Evaluation of forage sampling method and characterization of chemical composition of subtropical forages selected by grazing cattle. A. Hughes* and M. Hersom, *University of Florida*, *Gainesville*.

The nutritive value of subtropical forages has been documented to be relatively low. Currently, there is little published data regarding the nutrient quality of bahiagrass (Paspalum notatum) pastures. What data does exist consists of hand harvested samples, which does not account for the ability of cattle to selectively graze pasture. The objective of this study was to characterize the chemical composition of bahiagrass forage selected by grazing cattle compared to forage collected by hand sampling. Forage and masticate samples were collected monthly from pastures with estimated high and low forage availabilities (FA). Samples were collected from four locations in Florida during December 2006 to May 2007 and analyzed to determine IVOMD, CP, NDF, and ADF. Forage was sampled by hand-clipping to a height of 3.5 cm and dried at 65°C for 48 h. Simultaneously, forage selected by grazing was collected using eight ruminally cannulated steers (2 steers/location) and lyophilized. Mean DM yield was affected by month (P=0.002). Mean concentrations of IVOMD and CP were 31 and 29% greater (P<0.001) for masticate compared to forage samples. Likewise, IVOMD and CP concentrations differed among sampling months (P<0.001). Concentrations of IVOMD and CP were least in January and December (46.4 and 9.43%, respectively) and greatest in April (55.3 and 12.6%). Concentration of IVOMD exhibited a month × FA effect (P=0.03). Minimum IVOMD was observed in January for high (47.9%) and low (44.8%) FA. Concentration of IVOMD in low

FA was greatest in March (57.2%), whereas IVOMD of high FA peaked in April (59.4%). A month × FA interaction was not observed (P=0.78) for CP concentration. Minimum forage IVOMD (36.9%) and CP (7.5%) occurred in January and increased by 13.9 and 3.9 units, respectively, to a maximum in April. Masticate IVOMD and CP increased by 7.3 and 2.4 units, respectively, from a minimum in December (55.3 and 11.4%) to a maximum in February. Collectively throughout the study, cattle were able to select forage that was 30% greater in IVOMD and CP compared to standing forage values.

Key Words: Grazing, Selection, Chemical composition

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47   Urea and(or) feather meal supplementation for yearling steers grazing limpograss (Hemarthria altissima var. 'Floralta') pasture. W. F. Brown*[1], M. B. Adjei[2], and J. D. Arthington[2], [1]*University of Florida*, *Gainesville*, [2]*University of Florida*, *Ona*.

The unique relationship between TDN and CP concentration (low CP relative to TDN) in limpograss (Hemarthria altissima) may provide an opportunity for improving cattle performance through protein supplementation. In each of three years, yearling crossbred steers (initial weight approximately 270 kg) grazed limpograss during the summer and fall (five steers per ha, three pasture replications per treatment) and were fed liquid cane molasses-based supplements (1.4 kg DM daily) alone, or containing urea and(or) hydrolyzed poultry feather meal. In yr 1 and 2, protein supplementation did not influence ADG. In these years, pasture availability was in excess at all times, and visual observations indicated that the upper canopy contained abundant leaf. Pasture samples had in vitro organic matter disappearance (IVOMD):CP ratios ranging from 6.5 to 8.1, and plasma urea nitrogen (PUN) concentration in the blood of steers fed no supplemental protein was high (10.6 to 15.9 mg/dL), both not suggestive of a situation where providing a protein supplement might improve animal performance. In yr 3, ADG was improved (P <0.05) by protein supplementation. Forage availability was in excess at the beginning of the trial but declined significantly as the trial progressed. At the end of the trial, forage IVOMD:CP ratio (11.1) and PUN values of steers fed no protein supplement (6.6 mg/dL) were both suggestive of a situation where providing supplemental protein might improve animal performance. Grazing management of limpograss pasture can affect canopy composition, thereby influencing cattle response to protein supplementation. In cases where limpograss is moderately grazed resulting in abundant leaf in the grazed horizon, dietary energy:protein ratio can be balanced, and positive responses to protein supplementation may not be observed. Where limpograss is grazed more intensively resulting in greater quantities of stem in the upper pasture canopy, an imbalance of dietary protein (low) relative to energy can develop, increasing the opportunity for enhancing cattle performance through protein supplementation.

Key Words: Forage, Supplementary feeding, Protein

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48   Effect of stocking rate and cottonseed cake supplementation on stocker cattle grazing bermudagrass. M. S. Gadberry*[1], P. Beck[2], T. Hess[3], D. Hubbell, III[3], J. W. Butterbaugh[4], B. C. Rudolph[4], and M. Smith[4], [1]*University of Arkansas, Cooperative Extension Service*, *Little Rock*, [2]*University of Arkansas, Southwest Research and Extension Center*, *Hope*, [3]*University of Arkansas, Livestock and Forestry Branch Station*, *Batesville*, [4]*Furst-McNess*, *Freeport, IL*.

The objective of this study was to determine the effect of stocking rate complemented with two supplementation rates of cottonseed cake on the performance of stocker cattle grazing bermudagrass. Seventy-two head of crossbred, steers (290 ± 3.70) were randomly assigned to 1 of 18, 0.81 ha paddocks. Paddocks were assigned to 1 of 3 stocking rate allocations (SR; 3.75, 5, and 6.25 hd/ha) and 1 of 3 cottonseed cake supplementation rates (CCR; 0, 0.3, and 0.6% BW) for a total of 9 pasture treatments with 2 replicates per treatment. Grazing was initiated June 12. There was no difference (P = 0.84) in initial forage mass (3400 ± 129.3 kg/ha) among treatments. As a result of drought, grazing was terminated for 2 pastures on d 49, and grazing was terminated for an additional 7 pastures on d 56. Average days on study (66 ± 12.7 d), however, was not affected by SR

(P = 0.33), CCR (P = 0.47), or SR x CCR (P = 0.81). Average daily gain was similar among SR (P = 0.44) and averaged 1.02 ± 0.07 kg/d. Increasing CCR resulted in a linear increase (P < 0.001) in ADG which averaged 0.75, 1.10, and 1.23 kg at 0, 0.3 and 0.6% BW CCR, respectively. However, ADG did not differ between the 0.3% and 0.6% BW CCR contrast (P = 0.23). The interaction between SR and CCR was not significant for ADG (P = 0.58). Total BW gain per ha increased (P = 0.04) as SR increased (291, 294, and 406 ± 30.0 kg/ha for 3.75, 5 and 6.25 hd/ha SR, respectively). Total BW gain per ha increased linearly (P < 0.01) with increasing CCR (224, 374, and 393 ± 30.0 kg/ha for 0, 0.3 and 0.6% BW, respectively). Similar to ADG, total BW gain did not differ between the 0.3 and 0.6% BW CCR contrast (P = 0.68). There was no interaction (P = 0.99) between SR and CCR for total gain per ha. Feed efficiency, expressed as additional gain/ha per kg supplemental feed, was 0.61 and 0.37 ± 0.07 for 0.3 and 0.6% BW CCR, respectively (P = 0.04). The lack of interaction between SR and CCR suggest these variables affected performance independently. Overall, increasing CCR from 0 up to 0.6% BW increased animal performance and provided efficient supplemental feed conversions.

Key Words: Stocker cattle, Stocking rate, Cottonseed cake

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49   Coastcross II, Russell, and Tifton 85 bermudagrass hay intake and digestion by steers. G. M. Hill*[1], W. F. Anderson[2], D. J. Renney[1], S. V. Tucker[1], and B. G. Mullinix, Jr.[1], [1]*University of Georgia*, *Tifton*, [2]*USDA-ARS*, *Tifton, GA*.

Coastcross II is a new bermudagrass entry being compared with other cultivars for quality and yields for grazing and hay production. Exp.1. In a 2-yr (2005, 2006) replicated small plot study (4 plots/entry, each 10m[2], total annual N 196.7 kg/ha), Coastal (C), Coastcross II (C2), Russell (R), and Tifton 85 (T85) were clipped five times/yr at 5-wk intervals, and the 2-yr average IVDMD (%), ADF, and NDF (% of DM), respectively, were: IVDMD=51.6[b], 56.5[a], 48.1[c], 56.6[a], SE 0.4; ADF=28.3[b], 30.0[a], 30.5[a], 30.3[a], SE 0.2; NDF=71.3[b], 69.6[c], 72.9[a], 69.9[c] SE 0.3; means with different superscripts differ (P < 0.05). Total annual yields (kg/ha) for C, C2, R and T85, respectively, were: 2005=12,640[c], 20,410[a], 17,828[ab],18,826[ab], LSD$_{0.05}$ 2,640; 2006=16,330[c], 28,260[a], 22,814[b], 29,393[a] LSD$_{0.05}$ 2,990. Exp.2. In 2006, C2, R and T85 hays were harvested at 5-wk maturity and fed to steers to determine DMI and digestibility. Hays were harvested from 0.61 ha paddocks of each bermudagrass that were fertilized with ammonium nitrate (280 kg/ha) 5 wk before harvest. Beef steers (n =18; age =24 mo; BW= 475.4 ± 33.8 kg) were randomly assigned to treatments in a completely randomized design experiment. Steers were individually-fed C2, R, and T85 hays free-choice for 17d, with corn (0.22 kg DM/d) as a carrier for chromic oxide (10 g/steer daily, d 8 to d 17) as an indigestible marker. Fecal samples (11/steer; d 13 to d 17) were composited for each steer, ground through a 1mm screen, and analyzed for Cr and nutrients. Hay DM, CP, ADF, and NDF (%, DM basis), respectively, were: C2= 90.4, 14.0, 36.24, 72.4; R = 91.0, 15.6, 35.5, 72.0; T85 = 91.1, 14.2, 35.0, 71.3. Least squares means for hay DMI and digestion coefficients (DC; Table) were adjusted for steer BW. Hay DMI was higher (P < 0.01) for T85 than for C2 and R. Digestion of OM, CP, ADF and NDF were higher (P < 0.01) for T85 than C2 and R. Although annual average forage yields and IVDMD were similar for C2 and T85, and higher than C and R, hay intake and digestibility of OM, CP and fiber by steers were higher for T85 than C2 and R.

Table 1.

Item	C2 hay	R hay	T85 hay	SE	P <
Hay DMI, kg	4.71[b]	4.82[b]	5.77[a]	0.21	0.01
OM DC, %	61.2[b]	60.2[b]	69.1[a]	1.10	0.01
CP DC, %	67.2[b]	66.3[b]	72.5[a]	1.14	0.01
ADF DC, %	49.1[b]	49.2[b]	59.3[a]	1.58	0.01
NDF DC, %	59.2[b]	56.7[b]	67.5[a]	1.25	0.01

Key Words: Steer, Hay, Digestion

50 Post-weaning performance of spring-born calves weaned from tall fescue pastures with a wild-type toxic endophyte or a non-toxic novel endophyte.

K. Coffey*[1], W. Coblentz[2], J. Caldwell[1], D. Hubbell, III[1], T. Hess[1], C. West[1], M. Looper[3], C. Krehbiel[4], and C. Rosenkrans[1], [1]*University of Arkansas, Fayetteville*, [2]*USDA-ARS, Marshfield, WI*, [3]*USDA-ARS, Booneville, AR*, [4]*Oklahoma State University, Stillwater*.

Numerous studies have reported compensatory gain during a subsequent feedlot period by yearling cattle that grazed KY-31 tall fescue [Lolium arundinaceum (Schreb.) Darbysh.] infected with its wild-type endophyte (Neotyphodium coenophialum; E+). However, post-weaning performance by calves weaned from E+ is limited. Our objective was to compare post-weaning performance by spring-born calves grazing E+ with that of calves grazing a non-toxic endophyte-tall fescue association developed at the Univ. of Arkansas (HM4). Gelbvieh × Angus crossbred cows (n=156; 492±19.2 kg initial BW) confirmed as pregnant were allocated randomly by weight and age to one of four 10-ha pastures in 2005 and to one of eight 10-ha pastures in 2006. Pastures consisted predominantly of E+ or HM4 and cows began grazing during the fall of each year. Calves were born and remained on their assigned pastures until weaning in 2006, but were removed from HM4 in the summer of 2005 because of low forage availability from dry summer conditions. After weaning, calves grazed bermudagrass pastures followed by winter annuals. Steers weaned from HM4 were heavier (P < 0.01) at weaning, at feedlot transport, and at the end of the feedlot period (40, 38, and 37 kg, respectively), and produced heavier hot carcasses (26 kg; P < 0.05) than steers weaned from E+. Daily gains during the post-weaning and feedlot periods, and carcass quality and yield grades did not differ (P ≥ 0.33) between HM4 and E+. Heifers weaned from HM4 tended (P < 0.10) to be heavier at weaning (18 kg), but post-weaning gains did not differ (P ≥ 0.33) between forages. Negative impacts of E+ on nursing calves were not compensated for during later production stages on non-toxic feedstuffs, but those impacts did not persist and cause further negative impacts on post-weaning animal performance.

Key Words: Tall fescue, Novel endophyte, Calves

51 Evaluation of toxic and non-toxic endophyte-infected tall fescue on growth rate and grazing behavior of beef heifers.

C. R. Bailey*[1], M. L. Looper[2], K. P. Coffey[3], and C. F. Rosenkrans, Jr.[3], [1]*Arkansas Tech University, Russellville*, [2]*USDA-ARS, Dale Bumpers Small Farms Research Center, Booneville, AR*, [3]*University of Arkansas, Fayetteville*.

A 2 × 3 factorial treatment arrangement was used to examine effects of toxic endophyte-infected (TE) and non-toxic endophyte-infected (NT) tall fescue on growth rate and grazing behavior of pregnant Brangus (B) and Gelbvieh (G) heifers (n = 72). On d 0, heifers were weighed, blocked by breed and randomly assigned to graze either TE or one of two NT (HiMag, HM; MaxQ, MQ) pastures (6 pastures/forage type; 4 heifers/pasture). Heifers were weighed on d 28, 56 and 99. Grazing behavior was visually monitored for 28 d (n = 13 observations) between 1300 and 1500 and heifers were recorded as either grazing or in the shade. No breed x forage interactions (P > 0.05) were observed for BW or ADG except for d 0 BW (P = 0.02), which was greater (P < 0.01) for G than B heifers; therefore, BW on d 0 was used as a covariate. At d 28, BW was greater (P = 0.01) for G than B heifers; BW was not different (P > 0.10) at d 56 or 99. On d 28, 56 and 99, HM and MQ heifers were heavier (P < 0.01) than TE heifers. Gelbvieh heifers exhibited greater (P = 0.01) ADG than B heifers (1.07 vs. 0.85 ± 0.06 kg/d) from d 0 to 28, but not from d 0 to 56 or 99 (P > 0.11). Heifers grazing HM and MQ had greater (P < 0.01) ADG than TE heifers. Forage type influenced (P < 0.01) grazing behavior. Fewer TE heifers (17%) were observed grazing than MQ (29%) and HM (41%) heifers. Additionally, 65% of TE heifers, but only 51% of MQ and 43% of HM heifers were observed in the shade (P < 0.01). Breed did not influence (P > 0.10) grazing behavior. Pregnant heifers grazing NT performed better than those grazing TE, which could be attributed to increased time grazing NT pastures as opposed to more time in the shade for heifers grazing TE.

Key Words: Beef heifers, Fescue, Grazing behavior

52 Effect of rotational or continuous grazing strategy of winter pasture on beef heifer and forage performance.

D. Skeans*, J. Rowntree, G. Gentry, K. Guidry, and G. Lum, *Louisiana State University Agricultural Center, Baton Rouge*.

Maximizing forage production and cost of gain are two primary concerns of producers when evaluating stocker grazing programs. Increasing input costs associated with preparing winter pasture increase the appeal for assessing alternative grazing methods. Decreasing forage stress by rotationally grazing cattle holds potential to extend grazing days while increasing weight gain on prepared winter pasture. A grazing study was conducted in which rotational and continuous grazing systems were evaluated. Four 8.09 ha pastures where prepared then seeded with winter wheat, (*Triticum aestivum*) and annual ryegrass (*Lolium multiflorum* L). Two pastures were designated for continuous grazing, the remaining pastures were subdivided into 12 paddocks each. *Bos indicus* influenced heifers (n= 120) were randomly allotted to either: 1) continuous grazing or 2) 12-paddock rotational grazing. Each rotational paddock was grazed 2 or 3 d and followed by 28 d of rest. Grazing was initiated on December 6, 2006 and extended to April 17, 2007. Each of the pasture units were evaluated on a time x treatment basis, and were assessed for heifer performance, forage availability, and nutrient content. A grazing method x time interaction was observed for forage mass (*P* < 0.001). Rotational and continuous forage availability x time exhibited positive and negative linear slopes, respectively. Heifer weight gain was reflective of forage availability, resulting in a time x grazing treatment effect (*P* < 0.05). At trial termination average weight gain, for rotationally and continuously grazed heifers were 104.5 kg and 54.48 kg, respectively. There was no treatment effect for forage nutrients; however, nutrient response variables exhibited a quadratic effect for time of measure (*P* < 0.05). We conclude that rotationally grazing winter pasture increases forage availability, and in turn heifer weight gain. Thus, producers can benefit from rotationally grazing winter pasture.

Key Words: Rotational grazing, Winter grazing, Heifer development

53 Effect of establishment method and stocking rate on performance of calves grazing small grain pasture.

P. Beck, M. Morgan*, S. Gadberry, S. Gunter, T. Hess, and D. Hubbell, *University of Arkansas Division of Agriculture, Little Rock*.

This research was conducted to determine the effect of fall stocking rate of small grain pastures on animal performance during the fall and subsequent spring for 3 establishment methods including: 1) no-till (NT) seeding into undisturbed stubble, 2) reduced-till (RT) - disking once followed by broadcast seeding, and 3) conventional-till (CT) - drilling into a prepared seedbed. Soft-red winter wheat was sown in the first week of September at 136 kg/ha. During the fall, 60 steers (BW = 255 ± 4.0 kg) were stocked to 0.81-ha pastures at 0.27 ha/steer or 1.6 ha pastures at 0.42, or 0.55 ha/steer (n = 2 pastures/stocking rate and establishment method) and grazed from 31 October until 2 or 14 February (depending on forage availability). During the spring, 180 steers (BW = 237 ± 2.9 kg) were stocked to pastures at 7.5 steer/ha and grazed from 28 February until 4 or 10 April (depending on forage availability). Data were analyzed using the mixed procedure of SAS. Fall BW gain and ADG were not affected (*P* ≥ 0.17) by establishment method or the establishment method x stocking rate interaction, but as stocking rate increased from 0.55 to 0.27 ha/steer there were linear (*P* < 0.01) decreases in BW gain (144, 121, and 103 ± 4.8 kg, respectively) and quadratic (*P* = 0.05) decreases in ADG (1.35, 1.15, and 1.18 ± 0.05 kg, respectively). During the spring there was an interaction (*P* = 0.04) between stocking rate in the fall and establishment method for BW gain and ADG. At the 0.27 ha/steer stocking rate, BW gain and ADG during the spring grazing period for NT (42 and 1.03 kg, respectively) and CT (37 and 0.90 kg) were greater (*P* ≤ 0.04) than RT (25 and 0.66 kg), but at the 0.55 and 0.42 ha/steer stocking rates, establishment method had no effect (*P* ≥ 0.07) on BW gain or ADG. Gain/ha was not affected (*P* ≥ 0.17) by stocking rate, establishment method, or the interaction. Based on this data, pastures established by NT or CT can be stocked at 0.27 ha/steer in the fall with no effect on animal performance during the spring.

Key Words: Small grain, Tillage, Stocking rate

54 Impact of substituting perennial cool-season grasses for winter wheat on stocker performance. W. A. Phillips*[1], B. K. Northup[1], B. C. Venuto[1], and G. W. Horn[2], [1]*USDA-ARS, El Reno, OK*, [2]*Oklahoma Agricultural Experiment Station, Stillwater*.

Winter wheat pasture is the primary forage resource for grazing stocker calves in the southern Great Plains. However, wheat (*Triticum aestivum* L.) is an annual and must be established each fall. The objective of this experiment was to compare the productivity of grazing systems based on a combination of wheat and perennial cool-season grasses (PCSG) with a system based on wheat pasture only. A total of thirty six 2-ha plots of tall wheatgrass (*Elytrigia pontica* var. Jose), smooth brome (*Bromus inermis* var. Lincoln), intermediate wheatgrass (*Thinopyrum intermedium* var. Manska) and winter wheat (var. Pioneer 2174) were grazed each fall (N=3). Plots received 45 kg of N/ha each fall and were used as the experimental unit. Grazing was initiated on Nov. 15 ± 3 d. Plots of PCSG were grazed for 37 ± 6.5 d at a stocking rate of 0.5 ha/calf. Wheat plots were gazed for 40 ± 6.5 d at a stocking rate of 0.3 ha/calf. To complete the 123-d winter grazing season, all stockers were moved from plots to a single wheat pasture at a stocking rate of 0.3 ha/calf. Data were analyzed by mixed model with grass cultivars as the main effect and year as random effect. Daily gains were less (P = 0.03) for calves grazing PCGS plots than for calves grazing winter wheat plots (0.84 vs. 1.01 kg/d). Daily gain (0.84 ± 0.05 kg/d) during the 86-d period when calves were grazing a common wheat pasture was similar (P = 0.22) among stocker calves from PCGS and wheat plots. We concluded that a previous diet of PCSG would not affect BW gain on wheat pasture. However, the combination of less (P < 0.01) ADG and stocking rate of PCSG plots in comparison to wheat plots reduced (P< 0.01) the amount of BW gain/ha of land resource within the enterprise from 187 kg/ha for an all wheat pasture system to 124 kg/ha for the combination system. When total ha of pasture are finite and a combination of PCSG and wheat are used, the distribution of land resources needed to provide enough forage for a 123-d grazing season was 62% PCSG and 38% wheat. Based on these data, we conclude that substituting wheat with PCSG will lessen the amount of BW gain produced per ha.

Key Words: Grazing, Wheat pasture, Cool season grass

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

Whole cottonseed (WCS) and a poured molasses-protein product (PMP; Sweetlix 24% Poured Block, Sweetlix, Mankato, MN) were fed to winter-calving beef cows. On December 19, 2006, 2 wk before calving began, 78 pregnant mature beef cows (initial BW 576.7 ± 60.3 kg; Brangus, Braford, Brahman derivatives) were assigned to groups by BW, cow age (mean 6.8 yr), and breeding, before groups were randomly assigned to six paddocks of dormant pastures. Dietary treatments fed 90 d until calving season ended were: 1) Hay only (H); 2) Hay plus PMP (HPMP); and 3) Hay plus whole cottonseed (HWCS; 24.1% CP, 15.7% crude fat) at a rate of 0.5% of cow BW daily. Mixed bermudagrass hay (13.1% CP, 3.0% crude fat) was fed free-choice in hay rings in each pasture. Means of consecutive daily cow BW were recorded initially, at d 90, d 190, d 268. Cows were body condition scored (BCS; scale 1 to 9), and ultrasound rib fat (URB) and rump fat (URU) were measured on d 1, d 90, and d 212. During the breeding season (79 d; March 26 to June 13, 2007) cows were exposed to fertile Angus or Brangus bulls. Pregnancy rates were determined 45 days after the breeding season ended. Calf birthweights (kg) and calf age (d) at d 90, for H, HPMP, and HWCS, were: 37.9, 43.7; 40.8, 46.6; 39.9, 51.0. During the 90-d supplementation period, HPMP cows had PMP DMI of 0.221 kg/d; HWCS cows had WCS DMI of 2.72 kg/d, and HWCS cows tended to have the lowest hay disappearance (Table). At d 90, cows fed HWCS had higher ADG and BCS than cows on H or HPMP, but URB and URU were similar for treatments. Cow URB, URU, and BW were similar for treatments on d 212. Cow pregnancy rates, calf 90 d BW, and calf 205-d weaning BW were similar for treatments. Feeding WCS during calving before the breeding interval improved cow gains and BCS, but it did not improve pregnancy rates or calf weaning weights.

Table 1.

Item	Hay	Hay + PMP	Hay + WCS	SE	P <
Hay disappearance, kg	16.33	15.95	14.24	2.30	0.39
Cow ADG d 1 to d 90, kg	-0.10[b]	0.04[b]	0.30[a]	0.05	0.01
Cow ADG d 1 to d 212, kg	-0.08	-0.09	-0.02	0.03	0.12
Cow d 90 BCS	5.11[b]	4.99[b]	5.45[a]	0.12	0.02
Cow d 90 URB, cm	0.37	0.35	0.39	0.05	0.81
Cow d 90, URU, cm	0.32	0.25	0.30	0.05	0.60
Cows pregnant, %	89.2	96.3	87.6	5.65	0.14
Calf d 90 BW, kg	88.2	86.2	90.9	2.82	0.16
Calf 205-d BW, kg	237.2	240.6	235.9	4.37	0.73

Key Words: Cottonseed, Cow, Protein

56 Effects of stage of maturity at harvest and hybrid on production characteristics of corn silage. R. Pitzer*, B. Rogers, H. Nauman, B. Galbreath, J. Willard, and T. Wistuba, *Morehead State University, Morehead, KY*.

Agronomic characteristics were evaluated for five corn silage hybrids harvested at two stages of maturity. The hybrids were planted in a randomized complete block design in plots that were twelve rows wide and 30.5 m long and replicated 3 times. Hybrids were planted on May 5, 2007 when soil temperature was 24.5°C and outside air temperature was 29.4°C and grown under dry land conditions on the Morehead State University Farm which has tilsit silt loam soils. Plant population was set for 24,600 plants per acre and rows were thinned to meet that standard. Border rows were not utilized for the interpretation of agronomic data. Hybrids were harvested at 80% milk-line and seven days post black layer and data were collected for whole-plant, fodder, and ear dry matter (DM), as well as, yield data for whole-plant, fodder, and ear. Data were analyzed as a randomized complete block design (experimental unit = plot). The analysis of variance was generated using PROC GLM (SAS Inst., Inc. Cary, NC), the model included hybrid and maturity and the hybrid × maturity interaction. Least-squares means were calculated and separated using pair-wise t-tests (PDIFF option). Forage DM yields were greater (P < 0.05) at the 80% milk line stage of maturity than for the seven day post black layer stage of maturity. Dry matter contents of the whole plant hybrids ranged from 35 to 49% and was greatest (P < 0.05) for the seven day post black layer silages. Dry matter contents of the fodder fraction and the ear fraction, ranged from 25 to 40% and 58 to 70% respectively. Furthermore, DM was greatest (P < 0.05) for the seven day post black layer fodder and ear fractions. However, there were no main effect differences in agronomic characteristics due to hybrid.

Key Words: Corn silage, Stage of maturity

57 Fecal-near infrared reflectance spectroscopy (NIRS) calibrations for predicting fecal output of donkeys. N. Kidane*, J. Stuth, and D. Tolleson, *Texas A & M University, College Station*.

Fecal-NIRS calibration equations have successfully been developed and applied for predicting diet quality and intake in ruminant and equines. However, information about the potential of NIRS technique for predicting fecal output is scant. The objective of this study was to determine if fecal excreta of free-grazing donkeys (Equus asinus) can be measured using fecal-NIRS equations. Ten, 7 d (4 d adaptation, 3 d collection) in vivo feeding trials were conducted using 10 female donkeys (5 pregnant and 5 open) with an average BW 196.3 ± 50.6 kg, at Texas A & M University, College Station. Donkeys were fed 100 unique diets blended from 13 forage and crop residues for 10 weeks (plus 1 wk adaptation). Animals were fed twice a day (0700-1900) and refusals were collected before each meal. For each animal, feed was offered as 2% of BW, and daily feed intake and fecal output were recorded. To generate wet chemistry data (reference) for each diet fecal samples were collected for three consecutive days and a composite of the 3 d samples then chemically analyzed for DM content using the

standard procedures of AOAC (1995). For spectra collection, 100 dried ground fecal samples were scanned using a Pacific Scientific model 6500 (1100-nm to 2498 nm at 2 nm intervals), and spectra were recoded as log 1/R (R = reflectance). Three calibrations: Pregnant (PRG, n = 50), Non-pregnant (NPG, n = 50) and Combined (COM, n = 100) were developed after regressing fecal spectra against reference data using the modified partial least square (MPLS) model. The SE calibration (SEC) and coefficient determination (R2) were 3.33 g/kg$^{.75}$ and 0.36, 2.17 g/kg$^{.75}$ and 0.86, and 2.16 g/kg$^{.75}$ and 0.88, for PRG, NPG and

COM, respectively. The SE of cross validations (SECV) were 3.7 g/kg$^{.75}$, 4.31 g/kg$^{.75}$ and 3.78 g/kg$^{.75}$ for the PRG, NPG and COM, respectively. The degree of accuracies obtained for calibrations (NPG and COM) were within the acceptable standard for NIRS. These results indicated that NIRS equations were successful to predict feces excreted by donkeys, and the technique could be considered as a tool for manure managements on pasture.

Key Words: Donkey, Fecal output, NIRS

Physiology

58   Do light and temperature truly affect semen quality in all species?
J. Weathers*, H. Goolsby, J. Smith, L. Penrose, and S. Prien, *Texas Tech University*, *Lubbock*.

Artificial insemination is routinely practiced in a number of economically important species. The process often requires that collected semen be stored for short periods prior to insemination (0-4 hrs). While it is well recognized that semen handling procedures and environmental conditions have an influence on the quality of the sample, the extent is still unknown and procedures appear to be based more on tradition than science. Initial findings from the stallion suggest that, contrary to dogma, stallion semen can survive in a number of storage environments, and is affected more by the addition of media extenders (P < .001) than either temperature or lighting conditions. Additionally, the effects of ambient light and temperature on extended semen samples were examined in two other farm species, bovine and porcine, to determine if other species semen can also tolerate a number of storage environments. Semen samples were collected from animals of all three species (five collections/species). After the initial post-collection evaluation extender was added, and the semen samples were split and placed into four environments: lit at room temperature (LR), non-lit at room temperature (NR), lit within an incubator (LI) and non-lit within an incubator (NI). Semen samples were monitored for motility percentages, forward progressiveness and pH shifts at varying time points. As expected, the quality of the sample appeared to decrease over time (P < .001) regardless of treatment. However, each species appeared to have its own specific environmental requirements for storage, with bovine and equine being much more tolerant than porcine (P < .001). The data from this study appears to suggest that the dogma of a universal requirement of a dark, warm storage environment for short-term storage is untrue, and that each species should be evaluated independently to determine optimum storage conditions.

Key Words: Semen collection, AI

59   Effects of dietary supplementation with an organic source of selenium on semen characteristics in boars. M. J. Estienne*, S. M. Speight, and A. F. Harper, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

Grains are often deficient in selenium and swine diets are typically supplemented with 0.3 ppm sodium selenite, the maximum rate allowed by the FDA. Inorganic selenite may not be as effective as the selenium indigenous to grains, which is incorporated in an organic form. The objective was to assess semen characteristics in boars fed an organic selenium source (Sel-Plex; Alltech, Inc., Nicholasville, KY). Yorkshire x Landrace boars were weaned at 28 d of age and assigned to one of three treatments: I. basal diets that met or exceeded nutrient recommendations with the exception of selenium, II. basal diets supplemented with 0.3 ppm selenium from an organic source (Sel-Plex), and III. basal diets supplemented with 0.3 ppm selenium from sodium selenite (n = 10 boars per group). Boars had ad libitum access to feed until completion of the grow-finish phase, and were then limit fed at a rate of 2.5 kg/d. At 15 m of age, semen was collected on five consecutive days. With the exception of the percentage of spermatozoa with morphologically abnormal heads (P = 0.02), there were no effects of diet (P > 0.1). The percentage of sperm cells with abnormal heads was lowest (P < 0.06) in boars fed sodium selenite (0.1) and highest in control animals (0.5), with boars receiving Sel-Plex having an intermediate value (0.4) that was not different from the other two groups (SE = 0.1). Semen quality decreased with time, but the negative effects of day of semen collection on characteristics of sperm motility were least pronounced in boars fed diets supplemented with Sel-Plex.

Effects of treatment x day were detected for the percentages of progressively motile (P = 0.02) and rapidly moving (P = 0.03) spermatozoa, and measures of sperm velocity, including path velocity of the smoothed cell path (P = 0.05), and average velocity measured in a straight line from the beginning to the end of track (P = 0.05). Although the results of this study are encouraging and suggest positive effects of supplementation with Sel-Plex on semen characteristics in boars, the effects of the organic source of selenium on actual fertility remain to be determined.

Key Words: Selenium, Semen, Boar

60   Use of a new collection vessel to improve post-collection semen parameters. W. Langdon*, J. Weathers, C. Barron, L. Welch, L. Hightower, L. Penrose, and S. Prien, *Texas Tech University*, *Lubbock*.

The commercial use of artificial insemination in cattle is well established. While the basic concept has changed little since its inception, significant improvements have been made in all aspects of the process save one; the holding environment at the time of collection. Other than maintaining temperature, little has been done to improve the collection environment receptacle itself. Given that numerous studies have demonstrated sperm are highly susceptible to the activation of shock proteins, it would appear improvement is needed in the collection environment. Recently a device was developed to improve the collection environment (BreedMaX; Embryonic Technologies, Austin, TX). The system consists of a device and media combination. Due to CSS rules, use of the media as designed may be limited. Therefore, the object of the current study was to determine if the device alone improved the quality of semen samples in a traditional collection method. Twelve bull collections were split between three collection environments; traditional (A), the BreedMaX system as designed (B), and use of the collection device without the media component (C). At each collection, the ejaculate was equally split between two treatments. Results continue to demonstrate the new collection system to be a superior collection environment over traditional methods with prolonged motility (P < .001) and time to last insemination dose (P < .01). While numerical increases were seen in semen parameters collected with the media component over the length of the experiment (312 h), there appeared to be no statistical difference between samples collected with and without media (trt B vs C), in motility, but also forward progression and acrosome reaction score (P = .20). However, there were significant differences in the number of intact acrosomes prior to 72 hrs in the media group (B; P < .01). The data continues to support the concept that the new collection device is superior to traditional methods. Further, the data suggest the inclusion of media may delay important biochemical processes and prevent premature cell death. Continued study of the new system, including pregnancy testing, appears to be warranted.

Key Words: Semen collection, AI

61   Effects of penicillamine, hypotaurine and epinephrine (PHE) on post-thaw bovine sperm parameters, as measured by computer-assisted sperm analysis. C. N. Person, T. D. Lester, M. D. Person, and R. W. Rorie*, *University of Arkansas*, *Fayetteville*.

A computer-assisted sperm analyzer (CASA) was used to compare sperm parameters of frozen-thawed semen from 10 bulls after culture in sperm-TL medium with or without Penicillamine, Hypotaurine, and Epinephrine (PHE). The sperm parameters measured at 0, 2, 4, 6 and 8 h of culture were those previously reported

to be highly associated with bull fertility. With high quality semen, differences in percent progressive sperm were not apparent between the control and PHE treatments until at least 4 h of culture. For very poor quality semen, the percent progressive sperm decreased rapidly over time in the control treatment. At 4 h of culture, the percent progressive sperm in the PHE treatment was approximately 25% greater than that of the control treatment. By 8 h of culture, the percent progressive sperm in the PHE treatment was over 50% greater (P = 0.006) than that of the control treatment. Sperm cultured in PHE supplemented medium had higher path velocity (VAP) from 2 to 8 h than those cultured in Sperm-TL alone (P = 0.02). From 2 to 8 h of culture, sperm in the PHE treatment also had higher progressive velocity (VSL; P = 0.01) and track speed (VCL; P = 0.004). Sperm cultured in medium alone had lower lateral amplitude (ALH) for the first 4 h of culture and from 6 to 8 h of culture (P = 0.03). Over the 8 h culture period, there were no differences detected between PHE and control treatments for sperm beat frequency (BCF; P = 0.67), sperm path linearity (P = 0.73) or straightness (P = 0.29). These results indicate that the addition of PHE to sperm media improves a number of sperm parameters that are associated with bull fertility.

Key Words: Sperm, PHE, CASA

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62   Effects of an extender containing a novel protein source on semen quality. L. Penrose*, K. Evenson, E. Fernandez, H. Goolsby, M. Seller, A. Skillern, J. Weathers, and S. Prien, *Texas Tech University*, *Lubbock*.

Cryopreservation is used to store and maintain sperm for use in artificial insemination (AI). In comparison to fresh samples, there is a significant decline in the forward progression and motility scores of sperm post-thaw; reducing the number of functional cells. Lipid peroxidation (LP) a normal process needed for capacitation, occurs prematurely in cryopreserved samples; due to high levels of phospholipids, sterols and fatty acids present in the cell membrane. Sperm are sensitive to damage from reactive oxygen species (ROS) release, caused by LP. Extenders are often composed of albumins that cause lipid peroxidation processes to increase creating free oxygen radicals that damage sperm. The present study was to determine if an extender with a novel or soy-based protein could limit oxidative damage compared to traditional extenders in a cooled state. Semen samples from eight boars were prepared with 14 extender formulas either soy-based protein source (n=3), novel protein source (NPS) (n=8), or traditional commercial control (n=3). Motility was evaluated over 48 hrs. Samples were collected for acrosome reaction analysis. Semen samples were also collected from five additional boars and extended, with four NPS formulas, soy and traditional controls. Motility was evaluated over 8 hrs. Lipid peroxidation was measured on all samples and lipid free radical concentration was measured for one boar at all time points. Some NPS extenders showed comparable motility to the control until 30 hours. A trend toward less acrosome reacted cells was seen. Motility was significantly different over time (P<.001); as were treatments (P < .02). The effects are separate as the interaction was P=.437. In LP, MDA levels were >0 over all time points and time did not affect MDA levels in samples (P = .95), indicating a trend toward less LP in NPS. Yet, there were differences between treatments (P = .12). Increasing ROS production with decreasing motility is seen. NPS warrants further investigation with more samples, NPS has the potential to improve sperm function improving AI outcomes. Yet, refinement of the formulation is needed.

Key Words: Semen collection, AI

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63   Influence of endophyte-infected fescue on semen characteristics of Brahman-influenced bulls. M. L. Looper*[1], R. W. Rorie[2], C. N. Person[2], M. D. Person[2], T. D. Lester[2], and C. F. Rosenkrans, Jr.[2], [1]*USDA-ARS*, *Booneville, AR*, [2]*University of Arkansas*, *Fayetteville*.

Sixteen (mean age = 1.1 ± 0.1 yr; mean BW = 478 ± 34 kg) Brahman-influenced bulls were used to determine the effects of forage type on semen characteristics. Bulls were blocked by BW, scrotal circumference (SC), and pre-grazing semen characteristics and randomly assigned to graze endophyte-infected tall fescue (EI; 4 bulls/pasture; 2 pastures) or novel endophyte-infected tall fescue (NE; 4 bulls/pasture; 2 pastures) from mid-April to mid-August (119 d). Semen characteristics and SC were measured monthly with semen collection by electroejaculation. Semen was evaluated using a computer-assisted sperm analysis system. Forage type x date interaction influenced (*P* < 0.05) SC; overall SC was = 37 ± 2 cm.

Percentage of live sperm tended (*P* = 0.12) to be increased in NE bulls (80%) compared with EI bulls (67%). In July (mean maximum ambient temperature = 32°C) and August (mean maximum ambient temperature = 37°C), percentages of motile (74 vs 53%, NE and EI, respectively) and rapid (67 vs 45%, NE and EI, respectively) sperm were greater (*P* < 0.05) from bulls grazing NE than EI bulls. Percentage of progressive sperm tended (*P* = 0.06) to be greater in NE bulls (57%) compared with EI bulls (38%). Bulls grazing EI tended (*P* = 0.07) to have more static sperm than NE bulls. Average velocity of the sperm path (μm/sec), average velocity in a straight line from the beginning to the end of the sperm track (μm/sec), and average velocity measured over the actual point-to-point sperm track (μm/sec) were slower (*P* < 0.05) in EI bulls than NE bulls and were slower (*P* < 0.05) in August compared to July. Mean width (ALH; μm) of head oscillation as the sperm swims tended (*P* < 0.07) to be less in EI bulls than NE bulls; ALH tended (*P* = 0.06) to be less in August than July. Overall, semen from bulls grazing EI exhibited a reduction in a number of sperm motility parameters when compared to bulls grazing NE. Effects of EI on semen quality were exacerbated by increased maximum ambient temperatures.

Key Words: Bulls, Fescue, Semen

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64   Evaluation of PG type and two progestogen based estrous synchronization programs in suckled postpartum *Bos indicus*×*Bos taurus* cows. E. N. McKinniss*, R. D. Esterman, S. A. Woodall, B. R. Austin, G. Hansen, and J. V. Yelich, *University of Florida*, *Gainesville*.

A 2×2 factorial experiment was conducted to compare the effectiveness of dinoprost tromethamine (PGD; Prostamate®) versus cloprostenol sodium (PGC; Estrumate®) in a modified 7-11 (7-10) protocol and Select Synch + CIDR® (SCC) protocol in *Bos indicus* × *Bos taurus* cows (n= 324). Cows were equally distributed to four treatments (TRT) by body condition score (Scale 1-9; mean 4.9 ± .5) and days postpartum (DPP; mean ± 13.1 d) on d 0 of experiment. On d 0, the 7-10 TRT received a once-used-CIDR® that was removed on d 7 concomitant with PGD (25 mg) followed by GnRH (100 μg; Cystorelin®) on d 10. On d 17, 7-10 cows received either PGD (n=76) or PGC (500 μg; n=81). Also on d 10, the SCC TRT received a new CIDR® concomitant with GnRH with CIDR removal on d 17 where cows received either PGD (n=83) or PGC (n=84). For all TRT, estrus was detected twice daily for 72 h after PG and cows were AI 6 to 12 h after detection of estrus. Non-responders were timed-AI + GnRH 72-76 h post PG. Main effects (PGD vs. PGC; 7-10 vs. SCC) were evaluated for estrous response (ER), conception rate (CR), timed-AI pregnancy rate (TAIPR), and synchronized pregnancy rate (SPR). ER (59.9; 49.0%), CR (62.0; 45.5%) and SPR (45.5; 31.2%) were greater (P < 0.05) for SCC compared to 7-10, respectively. TAIPR were similar (P>0.05) between SCC (20.9%) and 7-10 (17.5%). PG treatment had no effect (P >0.05) on ER, CR, and SPR; however, PGC had a greater (P< 0.05) TAIPR (23.9%) compared to PGD (14.5%). The effect of DPP was evaluated for cows ≤40, 41-59,≥60 DPP on d 0. ER, CR, TAIPR, SPR were similar (P> 0.05) for cows 41-59 and ≥60 DPP so they were combined. ER (58.3; 44.1%), CR (59.3; 37.8%), and SPR (43.8; 23.8%) were greater for cows > 40 compared to ≤40 DPP, respectively. TAIPR were similar for cows > 40 (22.0%) compared to ≤40 (12.8%) DPP. In conclusion, PG type had no effect on SPR but the SCC TRT had a greater SPR compared to the 7-10 TRT and SPR was greatest for cows > 40 DPP. (Supported in part by USDA-T-STAR Grant 2006-04674).

Key Words: AI, Prostaglandin, Estrous synchronization

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65   Day of the estrous cycle (DOC) at initiation of a Select Synch + CIDR® synchronization protocol affects protocol response in suckled Angus (AN) and Brangus (BN) cows. R. D. Esterman*, B. R. Austin, S. A. Woodall, E. N. McKinniss, and J. V. Yelich, *University of Florida*, *Gainesville*.

Postpartum AN (n=25) and BN (n=25) cows were used to evaluate DOC effects at initiation of a Select Synch + CIDR® protocol on ovulation rate, follicle development, and pregnancy rates. Mean days postpartum and body condition score (Scale 1-9) at the start of the experiment (d 0) for AN and BN were 59.2 ± 1.9 and 54.7 ± 1.9 d and 5.3 ± 0.1 and 5.4 ± 0.1, respectively. Cows were pre-synchronized to be d 2, 6, 10, 14, and 18 DOC on d 0 (AN = 5; BN = 5 per DOC group). On d 0, cows received GnRH (100 μg; Cystorelin®) and CIDR® followed by PGF2α (25 mg; Lutalyse®) with CIDR® removal on d 7. Estrus was detected for 3 d using HeatWatch® and cows were AI 8 to 12 h after detected

in estrus. Cows not exhibiting estrus by 73 h post PGF2α were timed-AI + GnRH at 73 to 75 h. Ovaries were examined by ultrasonography and blood samples were collected daily from d 0 to d 10. Breed had no effect (P > 0.05) on ovulation rate to GnRH (AN = 56%; BN = 52%) and ovulatory follicle size on d 0 (AN = 13.9 ± 1.8 mm; BN = 14.1 ± 2.4 mm). DOC affected (P < 0.05) ovulation rate to GnRH and ovulatory follicle size (mm) for 2 (0%), 6 (100%; 13.2 ± 2.1), 10 (30%; 15.7 ± 1.5), 14 (70%; 15.7 ± 1.5), and 18 (70%; 15.6 ± 1.5) DOC groups, respectively; but there was no (P > 0.05) breed × DOC effect. On d 7, eventual ovulatory follicle size was similar (P > 0.05) for AN and BN, and for DOC groups. Total ovulation rate following PGF2α was similar (P > 0.05) for AN (88%) and BN (92%) and DOC groups (d 2 = 70%; d 6 = 90%; d 10 = 90%; d 14 = 100%; d 18 = 100%). Estrous response (ER) was greater (P < 0.05) for BN (48%) compared to AN (28%), but conception rate (CR), timed-AI pregnancy (TAIPR), and synchronized pregnancy rate (SPR) were similar (P > 0.05) for AN and BN. However, DOC affected (P < 0.05) ER, CR, TAIPR, and SPR for DOC groups 2 (0, 0, 10, 10%), 6 (10, 100, 11, 20%), 10 (30, 100, 57, 70%), 14 (60, 33, 100, 60%), and 18 (90, 44, 0, 40%), respectively. (Supported by USDA-T-STAR 2006-04674).

Key Words: Synchronization, GnRH, CIDR

66 The effect of serum supplementation, medium volume, and oil overlay on cleavage and blastocyst formation of bovine embryos cultured in vitro. S. Jung* and S. T. Willard, *Mississippi State University*, *Mississippi State*.

The objective of this study was to compare the developmental competence of bovine in vitro fertilized embryos in different culture systems; the microdrop (with oil overlay) compared to a large volume of medium (with or without oil overlay), and to examine the influence (with or without) Fetal Calf Serum (FCS) in the culture systems. Bovine oocytes (n=1696) were matured and fertilized in vitro. The presumptive zygotes were cultured in synthetic oviductal fluid supplemented with 8 mg/ml BSA and amino acids at 39 °C and 5% CO_2 in humidified air and they were randomly allocated into groups. The following six groups of culture systems were used: (Group 1) 50 µl microdrop of medium covered with mineral oil and supplemented 10% (v:v) of FCS at day 5 pi (post insemination); (Group 2) 50 µl microdrop of medium with oil overlay without FCS; (Group 3) 1 ml medium with oil overlay and FCS at day 5 pi; (Group 4) 1 ml medium with oil overlay without FCS; (Group 5) 1 ml medium not covered with mineral oil and FCS supplemented at day 5 pi; (Group 6) 1ml medium not covered with oil and no FCS. Cleavage rate of embryos was assessed on day 2 pi and blastocyst rate was determined on day 9 pi. The experiment was replicated three times and data were analyzed by one-way ANOVA. There were no differences (P >0.10) among groups in cleavage rates (78.7, 77.8, 73.2, 78.1, 75, and 74.8% for groups 1 though 6 respectively). However, rates of blastocysts produced were significantly (P <0.05) lower in Group 6 (6.3%) than in the Group 1 and 3 (36.6% and 22.2% respectively). Regardless of FCS supplementation, rates of blastocyst formation in the microdrop culture system (30.5%) were significantly higher (P <0.05) than those in the large volume of medium without oil (9.8%). There were no differences between groups with and without FCS in blastocyst rates (P >0.10). These results indicated that the highest blastocyst rates were obtained by microdrop with oil overlay and serum addition. Overall, the microdrop method was the optimum culture system among groups; however serum supplementation did not significantly affect the blatocyst rate.

Key Words: Culture, Embryo

67 Effect of antioxidants on *in vitro* production of pig embryos. B. D. Whitaker* and J. W. Knight, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

This study evaluated the effects of antioxidants glutathione (GSH), N-acetyl-cysteine (NAC), and N-acetyl-cysteine-amide (NACA) supplemented (1.0 mM) to porcine maturation and fertilization medium on intracellular GSH concentrations (n=180), nuclear maturation (n=60), fertilization success (n=60), and embryo development (n=150). Intracellular GSH concentrations were determined at 48 h of maturation, and nuclear maturation and fertilization were analyzed 12 h after fertilization. Embryo development was analyzed at 48 h and 144 h after fertilization or intracytoplasmic sperm injection (ICSI) (n=150). Supplementa-

tion of 1.0 mM NAC and NACA to the fertilization medium during the thawing procedure was also studied by evaluating sperm motility and viability at 2 h after thawing. Supplementing either 1.0 mM NAC (5.0 ± 4.1%) or NACA (5.0 ± 4.1%) to the fertilization medium reduced sperm motility (P < 0.05) compared to the control (35.0 ± 4.1%). Supplementation had no effect on sperm viability at 2 h compared to the control. Supplementing antioxidants to the maturation medium had no effect on intracellular levels of GSH, nuclear maturation or fertilization traits. Blastocyst formation following NAC (35.0 ± 7.4%) and NACA (40.0 ± 7.4%) supplementation was higher (P < 0.05) than control (20.0 ± 7.4%) and GSH (20 ± 7.4%) supplemented oocytes. The same pattern was seen for ICSI-derived embryos: blastocyst formation for NAC (22.0 ± 5.9%) and NACA (25.0 ± 4.6%) supplementation was higher (P < 0.05) than control (10 ± 6.0%) oocytes. There were no differences between NAC and NACA supplementation and there were no differences between the cleavage rates for any of the treatment groups. These results indicate that supplementing 1.0 mM of NAC or NACA to the oocyte maturation medium and the ICSI medium increased the percentage of viable embryos reaching the blastocyst stage of development, but supplementation with these antioxidants during thawing reduced sperm motility.

Key Words: Embryo, Glutathione, Antioxidants

68 A novel approach to the cryopreservation of equine and porcine embryos by vitrification after blastocoelic micromanipulation. L. Ray*[1], J. Scherzer[1], W. Graves[1], G. Heusner[1], and J. Coverdale[2], [1]*University of Georgia*, *Athens*, [2]*Texas A & M University*, *College Station*.

Vitrification of equine embryos shows fairly consistent success rates when they are frozen at ≤300 µm about 6.5 d after ovulation. In this study, the effects of the reduction of blastocoelic fluid and the passive diffusion of a cryoprotectant prior to vitrification were examined on 8 d embryos. The equine embryos used for this project were 805µm (1), 820µm (2), 1120µm (3), 1286µm (4), and 979µm (5). All embryos were graded excellent (1) according to IETS guidelines. Three (1-3) embryos were assigned to a control group in which no micromanipulation occurred and were subjected to five minutes in Vitrification Solution 1 (VS 1) (1.4 M glycerol in PBS), followed by five minutes in VS 2 (1.4 M glycerol + 3.6 M ethylene glycol) and transferred into VS 3(3.4 M glycerol + 6.6 ethylene glycol), then vitrified. Two embryos (4-5) were assigned to the experimental group which entailed passive diffusion of VS1 (1.4 M glycerol in PBS; 4-5) after aspiration of blastocoelic fluid. The straws were placed in a cooled plastic goblet surrounded by liquid nitrogen vapors for 1 minute and then finally immersed into the liquid nitrogen. Digital pictures were taken throughout the process. The equine embryos failed to yield a pregnancy with the exception of one (5) which formed an embryonic vesicle at d 15 after ovulation. Ultrasonography at d 28 revealed resorption of the embryo, possibly due to heat stress. Due to the low number of equine embryos recovered, porcine embryos were used as a model in a second trial. Forty-four porcine embryos were vitrified using identical procedures to those described above. The porcine embryos were cultured for a period of 24 hrs and digital images were also taken. Twenty-four embryos were frozen using the control method and 20 were assigned to the experimental group and treated as described earlier. Initial reexpansion was complete in 16 of the treated and 7 of the control embryos. This showed a significant difference in treatment and control (p<.0001). All embryos were completely degenerated at 24 hrs.

Key Words: Vitrification, Cryopreservation, Equine and porcine embryos

69 Development of a rapid automatable test system for determining antimicrobial susceptibility testing *in vitro* using bioluminescent *Salmonella typhimurium*. K. Moulton*[1], C. Scanes[2], S. Willard[1], D. Moore[1], S. Laird[1], A. Harris[1], K. Necaise[1], B. McClenton[1], and P. Ryan[1], [1]*Mississippi State University*, *Mississippi State*, [2]*University of Wisconsin at Milwaukee*.

In vitro antimicrobial susceptibility testing requires a minimum of 24 to 48 h to achieve results using standard techniques of disc susceptibility testing. Inhibitory growth over time in antimicrobial broth can not be evaluated with this technique. This study involves using bioluminescence of bacteria to evaluate susceptibility to antimicrobial compounds in broth over timed incubations. Each experiment consisted of four concentrations of *Salmonella typhimurium* pAK1-lux (*S. typh-lux*) in broth (2 tubes each; 4, 2, 1, 0.25 % bacteria). Compounds were added to

one set of tubes: tetracycline (2 μg/ml), alimet (1.5mg/ml) and methionine (150 μg/ml) while the other set had none (NA). From each tube a 100 μl aliquot was drawn at time 0, 2, 4 and 6 h post incubation (37°C) and transferred to 96-well plate (replicates of 8 wells/treatment) and imaged for 5 sec using a Stanford Photonic imaging system. Each well was serially diluted in 1 ml of broth, plated on Brilliant Green agar and incubated overnight. Agar plates were counted and bacterial concentrations calculated, while photonic images were analyzed using Image J software (NIH). Photonic emission data were analyzed as a repeated measure and correlations between photonic emissions and bacterial concentrations were analyzed using Pearson Correlations. Photonic emissions increased from 0 to 4 h and remained stable at 6 h for the NA, alimet and methionine-treated broth (P<0.05). However, photonic emissions decreased from 0 to 6 h for the tetracycline-treated broth (P<0.05). Photonic emissions were positively correlated with bacterial concentration (R=0.79, 0.81, 0.90, 0.79, 0.85 (P<0.05) and 0.62 (P=0.053); NA 1, NA 2, NA 3, alimet, methionine, and tetracycline, respectively). These data indicate that concentrations of *S.typh*-lux are highly correlated with photonic emissions, and may be utilized to rapidly evaluate antimicrobials over bacterial incubation times for susceptibility testing *in vitro* using the Stanford Photonic imaging system. [USDA-ARS funded Biophotonic Initiative #58-6402-3-0120]

Key Words: *Salmonella*, Bioluminescence, Antimicrobial susceptibility

70   Modification of lipid composition of poultry egg from hens fed water-leaf (Talinum triangulare) supplements. M. O. Ezekwe*[1], F. F. Jeewani[1], S. A. Besong[2], and C. Okere[1], [1]*Alcorn State University*, *Alcorn State, MS*, [2]*Delaware State University*, *Dover*.

The efficacy of vegetable waterleaf (Talinum triangulare) supplement with its high content of omega-3 fatty acids, crude protein, and antioxidant vitamins, in reducing cholesterol in eggs was evaluated in laying hens fed the freeze dried vegetable. Twenty four white leghorn layers, placed in separate cages, were randomly assigned into three treatment groups: control, 5 and 10% waterleaf supplemented diet were fed for 6 weeks. A significant reduction (P<.05) in egg yolk total cholesterol and total lipids in the whole egg were observed in hens consuming 5 and 10% waterleaf supplements. High-density lipoprotein (HDL)-cholesterol was higher in egg yolks from 5 and10% groups at week-2 than in control group with no significant differences between 5 and 10% groups. Low-density lipoprotein(LDL)-cholesterol was significantly (P<.05) lower in 10% group, but not in 5% and the controls. Waterleaf improved the egg-yolk color in 5% and 10% groups, imparting a deeper yellow color often preferred by consumers. The concentration of omega-3 fatty acid (linolenic acid) was greater in (P<.05) in eggs from 10% waterleaf group with no differences between controls and 5% groups. Dietary supplements did not affect serum total cholesterol, triglycerides or HDL- cholesterol. Overall hen-day production was higher in (P<.05) in control hens, followed by 5% and 10% groups. However, at week-6, hen-day production was similar among the treatment groups, suggesting a possible adaptation by the birds to the diets. Taste panel evaluation showed similar aroma, texture and overall eating quality. Waterleaf supplementation of poultry diet improved the nutritional quality of eggs and may improve functional food qualities of table eggs for health conscious consumers.

Key Words: Waterleaf, Cholesterol, Egg

71   Use of unique collection device improves conception rates of Angus based heifers. K. Evenson*, L. Penrose, J. Weathers, J. Clay, and S. Prien, *Texas Tech University*, *Lubbock*.

Previous research in the canine and equine demonstrated that semen collected in the BreedMaX, then fresh extended, remained fertile for extended periods as compared to samples collected using standard techniques. The object of the present study is to perform a controlled breeding trial comparing semen collected in the BreedMaX to a traditional control. Following collection, all semen samples were processed using a standard extender and technique to produce a sample with an initial motile concentration of 40 million cells per mL (a planned breeding dose of 20 million motile cells). Each sire was collected in both BreedMaX and traditional devices, the standard 15mL conical tube. The cells were then stored overnight at 5 C and the samples were used the next day to breed a maximum of 5 animals. The 2 treatments were preformed with 5 replications per treatment,

replications being a new sire; thus a maximum of 25 animals were used per treatment. All animals were synchronized with the 2-Shot prostaglandin protocol. Hormones were administered as follows, prostaglandin F2alpha was injected with 25mg/animal i.m. on d0 and d14. Conception rates for the BreedMaX were as follows ([60%], Bull A; [100%], Bull B; [100%], Bull C; [80%], Bull D; [50%], Bull E). Conception rates for the control were ([60%], Bull A; [60%], Bull B; [40%], Bull C; [100%], Bull D; [0%], Bull E). The research suggests that there is a strong trend of the BreedMaX device improving conception rates (19/22, 86%) compared to the traditional collection technique (13/21, 62%; P=0.063). However, additional research with a larger sample size will be needed to confirm this observation.

Key Words: Semen collection, AI, Conception

72   Effects of Max-Q or KY-31 fescue pastures on development and pregnancy rates in replacement beef heifers. A. G. Liles*, S. P. Greiner, L. Wright, and J. B. Hall, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

The objectives of this study were to determine the effects of Max-Q or Kentucky 31 fescue pastures on performance and reproduction in beef heifers. Two trials were conducted in April to August, 2006 and 2007. Crossbred heifers (n=45, yr 1; n=52, yr 2) were blocked by body weight and randomly assigned to rotationally graze endophyte-infected KY-31 tall fescue or novel endophyte Max-Q® fescue pastures (n=2 replicates/treatment/yr). Heifers were fed 1.36 kg of corn gluten feed per animal per d from synchronization through the end of the breeding season. Monthly pasture samples were analyzed for CP, TDN, ADF, and NDF. In yr 1, heifers were synchronized using CO-Synch + CIDR® (100μg GnRH at CIDR insertion on d 0 with 25mg PGF2α at CIDR removal on d7 and fixed-time AI with GnRH at 60h after CIDR removal). The 5 d CO-Synch + CIDR system (a modification of CO-Synch + CIDR with CIDR removal and PGF2α on d5 with additional PGF2α 12 h later and fixed-time AI at 72 h after CIDR removal) was used in yr 2. Forage CP, TDN, ADF, and NDF did not differ among treatments (P > 0.10). The ADG for yr 1 was greater for heifers grazing Max-Q than KY-31 (P < 0.03) pastures (0.59 kg and 0.49 kg, respectively), but not in yr 2 (P > 0.10). Body temperature at AI and at resynchronization in yr 1 was not affected by treatment (P > 0.10). Pregnancy rates (yr 1) were greater for heifers grazing Max-Q compared to KY-31 pastures after first AI (P < 0.09) and second AI (P < 0.04). However, overall pregnancy rates did not differ (P > 0.10). When combined with data from yr 2, pregnancy rates did not differ after first AI, second AI, or overall (P > 0.10). Significant differences in rainfall existed between yr 1 and yr 2. The impacts of the novel endophyte fescue on heifer performance appear to be dependent on environmental conditions. Therefore, further research in subsequent years and locations is warranted.

Key Words: Heifer, Reproduction, Fescue

73   Effects of bovine somatotropin and suckling on ovarian follicles, reproductive performance and concentrations of ghrelin, GH, and IGF-I in postpartum Brahman-influenced cows. R. Flores*[1], M. L. Looper[2], R. W. Rorie[3], C. R. Bailey[4], D. M. Hallford[5], S. T. Reiter[3], and C. F. Rosenkrans, Jr.[3], [1]*University of Arkansas for Medical Sciences*, *Little Rock*, [2]*USDA-ARS, Booneville, AR*, [3]*University of Arkansas*, *Fayetteville*, [4]*Arkansas Tech University*, *Russellville*, [5]*New Mexico State University*, *Las Cruces*.

Effects of bovine somatotropin (bST) and calf suckling on number of follicles, reproductive performance, and serum concentrations of ghrelin, GH, and IGF-I were examined in postpartum Brahman-influenced beef cows. Cows (n = 100; mean BCS = 5.7 ± 0.1; mean BW = 571.8 ± 8.5 kg) were blocked by suckling status (n = 71 suckled; n = 29 not suckled) and treated with bST or no bST (control) every 2 wk for 4 wk beginning at 28 d prior to breeding. Blood was collected at each bST treatment and initiation (d 0) of a 70-d breeding season. Ultrasound was performed on d 0 to determine number of follicles ≥ 8 mm. Concentrations of ghrelin were greater (P < 0.05) on d -14 and 0 than d -28. Cows treated with bST had greater (P < 0.05) concentrations of GH on d -14 and 0 than control cows. On d -28, non-suckled cows (126.2 > 107.8 ± 4.5 ng/mL) had greater (P < 0.05) concentrations of IGF-I than suckled cows. On d -14 and 0, bST-non-suckled cows (284.9 ± 9.1 and 289.9 ± 13.7 ng/mL, respectively) had greater (P < 0.05) concentrations of IGF-I than bST-suckled cows (227.0 ±

12.3 and 227.3 ± 8.9 ng/mL, respectively), and bST-suckled cows had greater (P < 0.05) concentrations of IGF-I than control-non-suckled (121.8 ± 19.8 and 134.1 ± 14.2 ng/mL, respectively) and control-suckled (102.5 ± 12.5 and 119.6 ± 9.0 ng/mL, respectively) cows. Suckling and bST did not influence number of follicles ≥ 8 mm. Pregnancy rates tended (P = 0.08) to be greater for control-suckled (100%) and bST-suckled (92%) cows than control-non-suckled (86%) and bST-non-suckled (80%) cows. Treatment with bST increases concentrations of IGF-I in suckled beef cows; however, the influence of GH on reproduction may be mediated differentially depending on suckling status.

Key Words: Insulin-like growth factor-I, Somatotropin, Suckling

74 Influence of body condition and forage type on estrus, intramuscular and rib fat, and reproductive performance of postpartum Brahman-influenced cows. M. L. Looper*[1], S. T. Reiter[2], S. Nabhan[2], R. Flores[3], C. R. Bailey[4], A. H. Brown, Jr.[2], and C. F. Rosenkrans, Jr.[2], [1]*USDA-ARS, Booneville, AR*, [2]*University of Arkansas, Fayetteville*, [3]*University of Arkansas for Medical Sciences, Little Rock*, [4]*Arkansas Tech University, Russellville*.

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 estrous characteristics, intramuscular fat percentage (IMF), rib fat (RF), and reproductive performance. Cows within each BC were randomly assigned to graze either common bermudagrass (CB; n = 3 pastures) or endophyte-infected tall fescue (EI; n = 3 pastures) during a 60-d breeding period. Body weight and BC were recorded during the breeding period (d 0, 30 and 60). Estrous behavior was monitored by radiotelemetry during the first 30 d of the breeding period. Cows were palpated for pregnancy at weaning. Cow IMF and RF were measured via ultrasonography at initiation and termination (d 60) of the breeding period. At initiation of breeding, BW of cows did not differ (*P* > 0.10) between forage type; however, cows grazing EI pastures had lower (*P* < 0.05) BW at d 30 and 60 than cows grazing CB. Cows grazing CB tended (*P* = 0.07) to have an increase in BCS during the breeding period than cows grazing EI. Cows in marginal BC (1.0 ± 0.1 cm) had less (*P* < 0.001) RF at the initiation of breeding than moderate (2.1 ± 0.1 cm) BC cows. At d 60, IMF and RF were less (*P* < 0.001) in marginal BC cows compared with cows in moderate BC. Cows grazing CB had increased RF (0.13 ± 0.08 cm) during the breeding period while cows grazing EI had reduced RF (-0.13 ± 0.08 cm; *P* < 0.05). Number of mounts, duration of estrus, and quiescence between mounts did not differ (*P* > 0.10) between forage type, BC, or both. Percentage of cows (73%) exhibiting estrus during the first 30 d of the breeding period was not influenced by forage type, BC, or both. Pregnancy rates were similar (*P* > 0.10) among moderate (90%) and marginal (87%) BC cows grazing CB and moderate BC cows grazing EI (88%); however, marginal BC cows grazing EI tended (*P* = 0.09) to have decreased pregnancy rates (68%). Cows grazing EI during the breeding period lost adipose stores, and pregnancy rates tended to be lower in marginal BC cows grazing EI.

Key Words: Beef cows, Fescue, Pregnancy rate

75 Effects of heat stress on gestation length of beef cows. E. C. Wright*, M. J. Prado-Cooper, N. M. Long, and R. P. Wettemann, *Oklahoma Agricultural Experiment Station, Stillwater*.

Angus × Hereford cows were AI to calve in August or October to evaluate the effect of heat stress on length of gestation. Cows grazed native grass pasture in Oklahoma and had a body condition score of 6.0 ± 0.5 at calving. Length of gestation for cows that calved in August during yr 4 was shorter (278.2 ± 0.8 d, n = 38, P < 0.05) than for cows that calved in October (281.5 ± 0.9 d, n = 32). Commencing 2 wk prior to the expected calving date in yr 5, blood plasma samples were taken by puncture of the tail vein every 2 to 3 d until 2 d postpartum. Concentrations of progesterone and cortisol were quantified by RIA. Cows that calved in August had shorter gestations (275.2 ± 1.3 d, n = 14, P = 0.07) compared with cows that calved in October (278.8 ± 1.4 d, n = 10). Maximum daily ambient temperature during the last 8 d of gestation was greater (P < 0.001) during August (36.3 C ± 4.5) than during October (25.2 C ± 7). Concentrations of progesterone in plasma during the last 10 d of gestation were not influenced by month of calving. Concentrations of cortisol in plasma during the last 4 d of gestation were greater (P < 0.05) in cows that calved in August (12.5 ± 0.9 ng/

mL) compared with October cows (9.5 ± 1.0 ng/mL). Shorter gestation in beef cows during heat stress was associated with greater concentrations of cortisol in plasma during the last 4 d of gestation.

Key Words: Gestation length, Heat stress, Beef cow

76 Relationship of rumen temperature of beef cows to parturition and estrus. M. J. Prado-Cooper*, N. M. Long, E. C. Wright, C. J. Richards, and R. P. Wettemann, *Oklahoma Agricultural Experiment Station, Stillwater*.

Angus x Hereford spring calving cows (n = 29) were used to evaluate changes in rumen temperature (RT) related to parturition and estrus. Temperature boluses (SmartStock, LLC) were placed in the rumen at 7 mo of gestation. Boluses were programmed to transmit RT every 15 min. Cows (BW = 620 ± 51 kg, BCS = 5.4 ± 0.4) calved within a period of 3 wk, and estrus was synchronized at 77 ± 7 d postpartum with PGF2α. Cows were observed at 12 h interval to detect estrus. Ranges of daily average ambient temperatures were 2 to 22 °C during parturition and 17 to 27 °C at estrous detection. Rumen temperature from 7 d before to 3 d after parturition, and from 32 h before to 32 h after visual detection of estrus, were analyzed using the MIXED procedure (SAS). Rumen temperatures less than 37.72 °C were considered the consequence of water consumption and were excluded from the analyses. Mean RT from d -7 to d -2 relative to parturition (38.94 ± 0.06 °C) did not differ (P = 0.40). Rumen temperature decreased (P < 0.001) from d -2 to d -1 before parturition (38.88 to 38.55 ± 0.05 °C, respectively). Rumen temperature was constant (P = 0.54) from d -1 before parturition to d 0 (parturition). After parturition, RT decreased (P = 0.03) from d 0 to d 1 (38.58 to 38.45 ± 0.05 °C, respectively) and remained constant (P = 0.58) until d 3 (38.43 ± 0.05 °C). Rumen temperature at 8 h before to 8 h after estrus was first observed (38.89 ± 0.07 °C) was greater (P < 0.001) compared with RT 16 to 32 h before estrus (38.49 ± 0.08 °C) or 16 to 32 h after estrus (38.29 ± 0.07 °C). Rumen temperature was not correlated with average ambient temperature. Rumen temperature significantly decreased the day before parturition and increased at visual estrous detection in spring calving beef cows. Additional studies are needed to evaluate the potential use of rumen temperature boluses to predict parturition and estrus in beef cows.

Key Words: Temperature, Parturition, Estrus

77 Relationship of cortisol and immunoglobulin G concentrations to temperament and growth performance in beef calves. K. R. Parker*[1], A.N. Musselwhite[2], S. T. Willard[2], R. D. Randel[3], T. H. Welsh[4], and R.C. Vann[1], [1]*MAFES-Brown Loam Experiment Station, Raymond, MS*, [2]*Mississippi State University, Mississippi State*, [3]*Texas A & M University Agriculture Research and Extension Center, Overton*, [4]*Texas A & M University, College Station*.

The purpose of this study was to assess the relationships of cortisol and immunoglobulin G (IgG) concentrations, temperament, and growth performance in beef cattle. The parameters used to qualify temperament are chute score (CS), pen score (PS), and exit velocity (EV: m/s). An overall temperament score (TPS) was assigned to each animal by averaging PS and EV over four time periods beginning 28 d pre-weaning and ending 56 d post-weaning. Calves were ranked based on their TPS as follows: calves 1 SD above the mean were considered temperamental (T), calves ranked 1 SD below the mean were considered calm (C), all other calves were considered intermediate (I). Parameters used to determine growth performance were BW and ultrasound measurements (rib eye area, REA; intramuscular fat, IMF; fat thickness, FT; and rumpfat, RF) recorded at weaning and 56 d post-weaning. Cortisol measurements and BW were collected 4 times at 28 d intervals starting 28 d pre-weaning and ending 56 d post-weaning. Plasma IgG concentration at 24h, 48 h, 14 d, and 84 d of age was determined by ELISA. Calves were classified based on IgG concentrations with calves 1 SD lower than the mean ranked low (L), calves 1 SD above the mean were ranked high (H), and the remaining calves were ranked Intermediate (I). There is a moderate correlation between cortisol and TPS (r=0.19; P<0.02) with both sharing a linear decrease over time. Calves with a TPS rank T had higher cortisol concentrations (P<0.001) relative to C calves. REA and %IMF increased from weaning to d 56 post-weaning in all calves (P<0.001). Heifers had greater %IMF and higher cortisol concentrations compared to bulls (P<0.001). Calves with IgG classification of H were heavier over the 4 time periods than those classified as L (P<0.007). Calves with a TPS rank of T had heavier BW at weaning than calves

ranked C (P<0.007). These data confirm that temperament is related to growth performance in beef calves.

Key Words: Temperament, Beef calves, Cortisol

78   Relationship between residual feed intake and age at puberty in Brahman bulls. N. D. Ramirez*[1], D. A. Neuendorff[3], A. W. Lewis[3], S. T. Willard[4], T. D. A. Forbes[5], R. L. Stanko[1,2], and R. D. Randel[3], [1]*Texas A&M University-Kingsville*, [2]*Animal Reproduction Laboratory, Texas A&M University Agricultural Research Station, Beeville, TX*, [3]*Texas A&M University Agricultural Research and Extension Center*, *Overton*, [4]*Mississippi State University*, *Mississippi State*, [5]*Texas A&M University Agricultural Research and Extension Center*, *Uvalde*.

Residual feed intake (RFI) is a measure of feed efficiency that is moderately heritable and not influenced by growth traits. The objective of this study was to determine the relationship between RFI and the age at puberty in spring-born, Brahman bulls. Bulls (n=38) were randomly allocated to either be limit- (LF) or ad libitum (AL) fed and then blocked by body weight and assigned to pens (n=11, 2 to 5 bulls/pen) equipped with Calan-gate feeders. Mean (±SEM) age and body weight at the beginning of the trial were 341 ± 6 d vs. 341 ± 4 d and 322 ± 10 kg vs. 333 ± 10 kg for LF and AL, respectively. Bulls were individually fed twice daily a 12% CP (NEm=0.291 Mcal/kg and NEg=0.272 Mcal/kg) pelleted ration for 70 d. Orts were collected and weighed daily. Bull BW was recorded and amounts fed were adjusted daily for AL and weekly for LF bulls. RFI was calculated as the residual from the linear regression of DMI on mid-test $BW^{0.75}$ and ADG. Scrotal circumference (SC) was measured weekly and once the bulls exhibited a SC ≥ 25 cm they were electro-ejaculated bi-weekly. Bulls exhibiting an ejaculate with sperm count $\geq 50 \times 10^6$ cells were considered to be pubertal (PUB). Feeding method did not effect (P>0.1) ADG, DMI, or age at PUB. Mean (±SEM) ADG, DMI, and age at PUB were 1.1 ± 0.04 kg/d, 8.4 ± 0.2 kg/d, and 386 ± 6 d, respectively. LF bulls were more efficient (RFI=-0.56 ± 0.14 vs. 0.80 ± 0.4, P<0.01) and had improved (P<0.01) feed efficiency (FE; G:F, g of ADG/kg of DM) as compared to AL bulls (118.3 $\pm$ 5.0 g/kg and 98 $\pm$ 7 g/kg, respectively). Regardless of feeding method, RFI tended to be correlated with age at puberty (-0.44, P<0.08). RFI was correlated (P<0.01) with DMI (0.69) in AL but not LF bulls. RFI was correlated (P<0.05) with FE (-0.52) in LF but not AL bulls. In addition, initial BW was correlated with DMI (0.942, P< 0.001) in LF but not AL bulls. FE was correlated (P<0.05) with ADG in both AL and LF (0.86 and 0.47, respectively). These data suggest that method of feeding can affect measures of feed efficiency and selection for efficiency (low RFI) may increase the age at puberty in spring-born, Brahman bulls.

Key Words: Residual feed intake, Reproduction, Brahman bulls

79   Genetic influences on the bovine acute phase protein response following an endotoxin challenge. J. A. Carroll*[1], J. D. Arthington[2], C. C. Chase, Jr.[3], S. W. Coleman[3], D. G. Riley[3], D. E. Spiers[4], and R. R. Reuter[5], [1]*USDA-ARS, Lubbock, TX*, [2]*University of Florida-IFAS, Ona*, [3]*USDA-ARS, Brooksville, FL*, [4]*University of Missouri*, *Columbia*, [5]*The Noble Foundation, Inc.*, *Ardmore, OK*.

Previously we reported that the pro-inflammatory cytokine response following an endotoxin challenge differs between diverse *Bos taurus* breeds [i.e., Angus (AG) and Romosinuano (RO)]. Our current objective was to elucidate potential genetic differences in the acute phase protein (APP) response following an endotoxin challenge. Eighteen steers (n = 9 steers/breed; 299.4 ± 5.2 Kg BW) were acclimated to environmentally controlled chambers maintained at 19.7 °C and then fitted with indwelling jugular catheters one day prior to LPS challenge. The following day, blood samples were collected at 30-min intervals from -2 to 8 h. At 0 h, all steers received an i.v. injection of LPS (2.5 μg/Kg BW). Serum was stored at -80 °C until analyzed for acid soluble protein (ASP), ceruloplasmin (CPN), and serum amyloid A (SAA). Data were analyzed using an ANOVA specific for repeated measures. Of the 3 APP evaluated, only SAA concentrations increased (*P < 0.01*) following the LPS challenge. By 4 h post-LPS, SAA concentrations increased (*P < 0.01*) above baseline and remained elevated throughout the remainder of the study. While the overall SAA response profiles were similar between AG and RO steers, the response was greater (*P < 0.02*) in AG as compared to RO steers. As with SAA, CPN response profiles were similar in AG and RO steers, however, a breed effect (*P < 0.01*) was observed such that

CPN concentrations were greater in the RO steers compared to AG steers. Prior to LPS challenge, CPN concentrations tended (*P < 0.06*) to be greater in RO steers. While serum concentrations of ASP decreased throughout the sampling period (*P < 0.01*), there was no effect of breed. Given that SAA concentrations may be more indicative of the stress an animal is experiencing, as opposed to a direct indicator of acute inflammation, the lower concentrations of SAA in the Romo steers may indicate that they were more resilient to the LPS challenge. Continued efforts to elucidate potential genetic differences in cattle breeds as they relate to overall health and productivity will aid in our ability to more effectively manage cattle throughout the production cycle.

Key Words: Cattle, Acute phase proteins, Breed effects

80   Evaluation of stress in horses in hippotherapy programs. A. A. Pyle, H. A. Brady*, J. J. McGlone, L. D. Thompson, and D. E. Lawver, *Texas Tech University*, *Lubbock*.

The objective of this study was to measure potential stress mechanisms in the therapy horse, as little is known about the thresholds of stress during hippotherapy. Stress in mammals can be monitored by a combined analysis of blood cortisol levels (flight or fight reaction), heart rate, and white blood cell values. Five Quarter Horses from the Texas Tech Therapeutic Riding Center each completed two treatments in the study. The control included measurements of each horse tied and at rest from 12:00 to 5:00 p.m. The hippotherapy treatment included measurements of stress measured during pre-session (12:00 to 1:00 p.m.), three consecutive hippotherapy sessions (1:00 to 4:00 p.m.) and post-session (4:00 to 5:00 p.m.). The selection of three consecutive hours was chosen in this study due to the NARHA limitation of horse usage to three consecutive hours. For all horses, heart rate was measured every three minutes by a heart rate meter and downloaded to the computer. Blood samples were collected at the beginning of each hour to assess cortisol levels and white blood cell measurements including neutrophil, lymphocyte, monocyte, basophil, and eosinophil counts. The behavior of each horse was assessed by a NARHA instructor who was blinded to treatment groups using a modified behavior scale.

Horses differed in plasma cortisol concentrations. Horses showed heart rate changes over time. Some horses showed changes in stress responses due to treatment, whereas others showed no effect of participation in hippotherapy. Two of the horses may have been stressed based on the physiological parameters of increased cortisol and lymphocyte levels. One of these horses scored poorly on the behavior scale and was removed from the program due to increased agitation. However, the other horses were ideal based on desired behavioral traits. Both physiological measurements and the behavioral survey may allow therapeutic riding centers to better assess potential therapy horses and determine if current horses are being worked the appropriate amount based on horse responses or if adjustments need to be made.

Key Words: Stress, Equine, Hippotherapy

81   Relationships between plasma proteins and hematological values in Thoroughbred and Miniature horses. C. Bokina*, K. Jogan, and C. Rosenkrans, Jr., *University of Arkansas*, *Fayetteville*.

Serum proteome analysis has the potential to facilitate diverse diagnosis and therapeutic monitoring of the health status of individuals. Our objective was to investigate the relationships between plasma proteins and hematological values in Thoroughbred and Miniature horses. Samples were collected from Thoroughbred (n = 25) and Miniature horses (n = 34) at 0700-0800. Hematological values were determined using Cell-Dyne 3500 hematological analyzer. Plasma proteins were separated using SDS-PAGE with a linear gradient from 4-20 %. Twenty two bands (ranging from 8 kDa to 264 kDa) were detected. Differential blood cell distributions and blood chemistry were analyzed using a separate least-squares procedure for each protein band. The main effects in the model were breed, gender, and their interaction. Red blood cells, HGB and HCT were negatively correlated with bands 13 and 17 (r < -0.29, P < 0.05); but positively correlated (r > 0.40, P < 0.01) with band 3. A negative correlation (r < -0.27, P < 0.05) was calculated between bands 1, 8 and lymphocytes. Neutrophils were positively correlated (r < 0.27, P < 0.05) with bands 1 and 8. Basophils had a positive correlation with band 12 (r = 0.36), and negative correlations with band 11 (r = -0.30) and 13 (r

= -0.48). Platelets had positive correlations (r > 0.24, P < 0.10) with bands 3, 4, 5, 10, 14, 19, and 22. The relative intensities of protein bands 1, 4, 5, 16, and 22 were affected (P < 0.10) by an interaction of breed and gender. Protein band 8 was altered by breed, Thoroughbreds had a (P < 0.05) greater relative intensity than Miniatures (0.14 vs. 0.12, respectively). Gender and breed effects were detected for band 11. Thoroughbreds had a lower (P < 0.05) relative intensity than Miniature (0.9 vs. 0.13, respectively). Males had a greater (P < 0.05) percentage of band 11 than females (0.13 vs. 0.09, respectively). This study provides the foundation for proteomic studies related equine health status.

Key Words: Equine, Plasma proteome, Immune function

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82   IGF-I dependent gene expression in cultured porcine granulosa cells. J. A. Grado-Ahuir*[1], P. Y. Aad, L. Hulsey, D. Lagaly, and L. J. Spicer, *Oklahoma State University, Stillwater*.

Production of ovarian steroids by rapidly dividing granulosa and thecal cells in response to gonadotropins and IGF-I is required for normal oocyte development and hormonal feedback signaling to the hypothalamus and pituitary. However, the various cellular changes involved are not completely understood. Our objective was to characterize granulosa cell gene expression in response to IGF-I treatment. Porcine granulosa cells were pooled in four biological replicates and treated with FSH (baseline) or FSH+IGF-I during 24 h after 48 h of cell culture. RNA was collected and hybridized to eight Affimetrix Porcine GeneChips (Affymetrix, Santa Clara, CA) in a paired design. Differentially regulated gene sequence element sets (P<0.01) were used as queries in the UniGene database searching for annotated genes. Abundance of mRNA for genes differentially expressed in the microarray analysis was determined through multiplex assays of one-step real-time RT-PCR and further analyzed under a statistical model including the fixed effect of treatment. 388 gene sequence element sets were differentially expressed and 31 matched annotated genes in the UniGene database. Six target genes were selected for further analysis: Serotonin 2B receptor (5-HT2B), FGF receptor 2 III c (FGFR2IIIc), and frizzled 8 (FZD8), (1.34, 1.32, and 1.22 fold change relative to the baseline, respectively); thrombospondin 1 (THBS1), contactin 4 (CNTN4), and integrin beta 8 (ITG-B8), (-1.91, -1.74,and -1.41 fold change, respectively). Expression patterns for genes detected as up-regulated in the microarray analysis were consistent with the quantitative analysis, whereas for down regulated genes, ITG-B8 had a positive fold change in the RT-PCR analysis (P<0.01). The role of 5-HT2B, FGFR2IIIc, FZD8, THBS1, CNTN4, and ITG-B8 on granulosa cell steroidogenesis and growth during follicular development will require further study.

Key Words: IGF-I, Porcine granulosa cells, Gene expression

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83   Effects of soy-derived phytoestrogen and estradiol exposure on reproductive development in neonatal pigs: a model for infants fed soy-based formula. K. Necaise*[1], K. Moulton[1], D. Christiansen[1], M. Crenshaw[1], C. Scanes[2], and P. Ryan[1], [1]*Mississippi State University, Mississippi State*, [2]*University of Wisconsin at Milwaukee*.

The objective of this study was to evaluate effects of orally administered soy-derived extracts on normal reproductive development in neonatal pigs as a model for infants on soy formula. Yorkshire-Landrace crossbred sows (100 d gestation) were randomly assigned to a lactating diet (2.3 kg/sow/d) supplemented with either Novasoy 70, an isoflavone extract, (NOV, n=4; 1.5 mg/kg/BW/d) or without (CON, n=4). Mean BW for CON and NOV sows was 276.8 ± 11 kg and 273.8 ± 9 kg, respectively. Feed was top-dressed 2 x d with the NOV from d 100 of gestation through to farrowing. Female neonatal pigs (NPs) were weighed on post natal day (PND) six then randomly assigned to one of four treatments (n=5 to 7/treatment): 1) control (vehicle = VEH), 2) estradiol (E_2, 50 µg/kg BW) as a positive control, 3) low genistein dose (LG, 3 mg/kg BW) and 4) high genistein dose (HG, 9 mg/kg BW). NPs were dosed by oral gavage 2 x d for 7 d commencing on PND 7 as a suspension in Re-Sorb, an oral hydration electrolyte product. Doses were adjusted daily according to BW change. On PND 14, NPs were euthanized and the pituitary, ovaries, uterus, and cervix were recovered, grossly examined, wet tissue weights recorded. Wet tissue weights were analyzed using GLM mixed model procedures. There was a sow x NP interaction for cervix wet weight as a % of BW (P<0.05). Estradiol treatment of NP increased intact reproductive tract and uterus wet weight as a % of BW (P<0.05) irrespective of sow treatment. However, novasoy treatment of sows increased pituitary weight of NPs (CON; 45.0 ± 3.0 mg, NOV; 55.0 ± 3.0 mg; P<0.05), but no effect was observed on ovarian wet weight or % of BW regardless of sow or NP treatment. This study demonstrates that oral exposure of NPs to estradiol but not genistein alters reproductive tract development and that this effect may be amplified from *in utero* exposure to sow diets with elevated concentrations of phytoestrogens. Thus, the neonatal pig may provide a useful model for assessing effects of dietary phytoestrogens on reproductive development in infants on soy-based formulas.

Key Words: Pigs, Phytoestrogens, Reproductive development

Ruminant Animal Production

84   Effects of two commercially available modified live virus vaccines on carcass traits of beef steers. W. J. Horne*[1], K. S. Barling[2], S. F. Cunningham[1], D. S. Hale[1], A. D. Herring[1], J. F. Hudek[1], D. K. Lunt[3], J. W. Savell[1], A. Thomas[2], and J. E. Sawyer[1], [1]*Texas A&M University, College Station*, [2]*Novartis Animal Health US, Inc, Larchwood, IA*, [3]*McGregor Agricultural Research Center, McGregor, TX*.

An experiment was conducted to investigate effects of two commercially available multi-valent modified live viral vaccines (MLV) on growth and carcass characteristics of beef steers. Naïve (confirmed seronegative to IBR and BVD Types 1 & 2) steers (n = 107) were stratified by BW (d -7) and randomly assigned to treatment within strata. Treatments consisted of either vaccine A (Type 1 BVD, IBR, PI3, BRSV), vaccine B (Types 1 & 2 BVD, IBR, PI3, BRSV), or control (saline) administered SQ on day 0 of the 42-d growing phase. Beginning on d 43, animals were adapted to a finishing diet and fed ad libitum. Animals were fed to a common backfat endpoint based on visual appraisal. Animals were slaughtered in 3 groups. Data were analyzed using the mixed procedures of SAS with TRT as a fixed effect and slaughter group as a random block. Day 0 BW was included as a covariate in the model. No clinical signs of morbidity were observed. A treatment by covariate interaction (P < 0.05) occurred for ADG during the finishing period. Estimates of TRT differences in ADG were computed at the mean covariate weight, and mean ± 1 standard deviation (lightweight and heavyweight). In lightweight cattle, control treated animals had lower (P < 0.05) ADG (0.74 ± 0.20 kg/d) than those receiving either vaccine (1.06 ± 0.17 kg/d). At mean initial weight, animals receiving Vaccine A had greater (P = 0.04) ADG (1.04 ± 0.17 kg/d) than those receiving control (0.88 ± 0.17); ADG (1.02 ± 0.17 kg/d) in animals receiving vaccine B were intermediate (P > 0.10) to those receiving other treatments. In heavyweight cattle, all treatments yielded similar (P > 0.21) ADG (0.94, 1.03, and 1.03 kg/d for Vaccine A, Vaccine B, and Control respectively). No treatment effects were found for dressing percentage (P = 0.86), yield grade (P = 0.98), quality grade (P = 0.33), rib-eye area (P = 0.70), or hot carcass weight (P = 0.25). Results suggest that in lightweight cattle, administering a respiratory vaccine before the growing phase may result in increased ADG during finishing, but carcass traits are not affected by vaccination.

Key Words: Modified live, Vaccine, Bovine

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85   Effect of dietary boron on physiological responses in growing steers inoculated with bovine herpesvirus type-1. R. S. Fry*, T. T. Brown, Jr., K. E. Lloyd, S. L. Hansen, L. R. Legleiter, W. P. Robarge, and J. W. Spears, *North Carolina State University, Raleigh*.

An experiment was conducted to determine the effects of dietary boron (B) on physiological responses in growing beef steers following a bovine herpesvirus type-1 (BHV-1) challenge. Thirty-six Angus and Angus × Simmental steers with an initial average body weight of 284 kg were fed one of three dietary treatments: 1) control (no supplemental B), 2) 5 mg supplemental B/kg DM, and 3) 15 mg supplemental B/kg DM from sodium borate for 47 d. The control diet analyzed 13.3 mg B/kg DM. Jugular blood was obtained from all

steers on d 0 (pre-inoculation; d 34 of study), 2 and 4 following an intranasal BHV-1 inoculation for plasma B analysis, acute phase protein concentration, and cytokine concentration. Rectal temperatures were taken at 0900 h prior to inoculation and for 8 consecutive days following inoculation. The change in feed intake from d 0 differed ($P < 0.05$) on d 1 and 2 among the control steers and those supplemented with 15 mg B/kg DM. The rectal temperature change from d 0 values for steers supplemented with 15 mg B/kg DM was greater ($P < 0.01$) on d 7 and 8 post challenge compared to steers supplemented with 5 mg B/kg DM. Inoculation with BHV-1 increased ($P < 0.01$) plasma concentrations of ceruloplasmin, serum amyloid A, and haptoglobin by d 4 post challenge. Inoculation with BHV-1 decreased ($P < 0.05$) plasma interferon-γ concentrations on d 4 and increased ($P < 0.05$) plasma concentrations of tumor necrosis factor-α (TNF-α) on d 2 post inoculation; however by d 4 TNF-α concentrations were lower ($P < 0.05$) than d 0 concentrations. Plasma concentrations of acute phase proteins and cytokines were not affected by dietary B. Supplementation of dietary B increased ($P < 0.01$) plasma B concentrations in a dose responsive manner. However, neither the duration nor severity of the viral challenge was affected by B supplementation to steers. This is likely due to the relatively high B content in the control diet.

Key Words: Boron, Bovine Herpesvirus Type-1, Cattle

86   Water intake and factors affecting water intake in growing beef cattle. M. N. Brew*[1], R. O. Myer[2], J. N. Carter[2], and G. R. Hansen[2], [1]*University of Florida*, *Gainesville*, [2]*North Florida Research and Education Center*, *Marianna*.

The objectives of this study were to determine daily water intake for growing beef cattle, to detect breed and gender differences in water intake, and to examine the relationship between water intake, feed intake, and growth performance. Feed and water intake data from growing beef cattle (n=147; 276±67kg) was collected over a 13 wk period in the fall of 2006 in N. Florida (30.5 N lat.). Cattle were fed in identical pens and allowed *ad libitum* water and feed (12% CP, 44 Mcal/cwt NE_g, 78 Mcal/cwt NE_m). Feed and water intake data was collected on an individual animal basis using GrowSafe, a feed intake data acquisition system. Cattle were weighed weekly and ambient temperature was recorded by Florida Automated Weather Network. Water and feed intake was calculated on a metabolic body size (MBS) basis. Mean water intake was 29.9±9.8 L/d or 0.5±0.2 L/kg MBS. Mean feed intake was 9.7±2.1 kg/d or 0.09±0.01 kg/kg. Brangus and Romosinuano influenced cattle (n=101) had lower (P<0.001). adjusted water intake when compared with Angus, Charolais, and Simmental influenced cattle (n=46). No differences (P>0.05) in total or adjusted water intake were detected between bulls, steers, and heifers. Water intake was positively correlated with feed intake (P<0.0001; R^2= 0.13), and ADG (P= 0.016; R^2 = 0.0098). No relationship between water intake and feed efficiency was detected (P= 0.755; R^2 = 0.0098). Ambient temperature remained in the thermo-neutral zone throughout the trial and had no correlation with water intake. Average daily consumption of water was similar to predicted NRC (1996) values for growing beef cattle. As expected, water intake was highly related to feed intake but not with feed efficiency.

Key Words: Beef cattle, Water intake

87   Actual versus predicted water intake in growing beef cattle. M. N. Brew*[1], R. O. Myer[2], J. N. Carter[2], and G. R. Hansen[2], [1]*University of Florida*, *Gainesville*, [2]*North Florida Research and Education Center*, *Marianna*.

An equation developed by Murphy and colleagues is commonly used to predict drinking water intake in dairy cattle based on DM intake, Na intake, environmental temperature, and milk production. The Murphy equation has previously been used to estimate water intake in beef cattle, however this use may not be appropriate. The objective of this study was to determine the accuracy of the Murphy equation to predict water intake in growing beef cattle. Feed and water intake data from growing beef cattle (n=147; 276±67 kg) was collected over a 13 wk period. Cattle were fed in identical pens and allowed *ad libitum* water and feed (12% CP, 44 Mcal/cwt NE_g, 78 Mcal/cwt NE_m). Feed and water intake data was collected on an individual animal basis using GrowSafe, a feed intake data acquisition system. Animal BW were measured weekly and environmental temperature was recorded by Florida Automated Weather Network. External temperature, DM intake, and Na intake, were used to calculate expected drink-

ing water intake. The Murphy equation predicted a daily mean water intake of 48 L/d. Observed mean water intake was 29.9±9.8 L/d. The Murphy equation over-estimated water intake by an average of 18.2 L/d. This study demonstrates a need for the development of novel equations to predict water intake specifically in beef cattle.

Key Words: Beef cattle, Prediction equation, Water intake

88   Relative value of five byproducts as supplements to stocker cattle. E. M. Whitley, R. R. Reuter*, and J. T. Biermacher, *The Noble Foundation, Agricultural Division*, *Ardmore, OK*.

Body weight gain resulting from supplementation of stocker steers with one of five byproducts was determined. Each byproduct (soybean hulls, SBH; dried corn distillers grains, DDG; wheat middlings, WMD; barley malt sprout pellets, BMP; corn gluten feed, CGF) was fed daily at 0.75% of BW with ad libitum medium-quality hay to 2 pens in each of 3 years. Each pen housed from 8 to 24 steers (245 to 341 kg initial BW); pen size was consistent within year but varied across years. Steers were weighed individually on 14-d intervals for 84 d. Dried corn distillers grains increased ($P = 0.04$; Table 1) ADG of the steers as compared to BMP and WMD by 0.15 and 0.25 kg/d, respectively. Although cost per day was greater for DDG than CGF, net returns favored DDG when value of gain exceeded $55 / kg of gain. In the final year, DDG also reduced (P = 0.04) apparent voluntary hay intake by 1.4 kg/steer/d as compared to the other treatments. Additional data is required to fully characterize the relative value of these byproducts for commercial cattle production. Type of cattle, basal diet, and length of feeding period can all affect relative economic value of these byproducts.

Table 1. ADG and net returns of steers fed one of five byproduct feeds at 0.75% of BW with ad libitum hay

Item[1]	ADG	$/kg	Feed cost $/d	NR-110	NR-55
DDG	0.99[a]	$0.171	$0.48	$0.23	$0.09
CGF	0.88[a,b]	$0.149	$0.42	$0.16	$0.09
SBH	0.85[a,b]	$0.154	$0.43	$0.12	$0.06
BMP	0.84[b]	$0.165	$0.46	$0.08	$0.02
WMD	0.74[b]	$0.154	$0.43	---	---

[1]Values in a column with different superscripts differ ($P < 0.05$). $/kg = assumed cost of byproduct. NR-110 & NR-55 = net return per d when additional ADG is valued at $110 or $55/kg.

Key Words: Byproducts, Net return, Steers

89   Level of cottonseed cake supplementation for beef calves fed tall fescue hay. P. Beck*[1], M. Morgan[1], S. Gadberry[1], T. Hess[1], D. Hubbell[1], B. Rudolph[2], M. Smith[2], and J. Butterbaugh[2], [1]*University of Arkansas*, *Little Rock*, [2]*Furst-McNess Company*, *Freeport, IL*.

This research was conducted at the University of Arkansas Livestock and Forestry Branch Station near Batesville to determine the effect of supplementation level of cottonseed cake (33% CP, 10% fat, 58% TDN) on performance of beef calves fed tall fescue (Festuca arundinacea, cv Jesup infected with AR542 endophyte) hay. Forty-eight steers (BW = 261 ± 8.9 kg) were randomly allocated to six 0.4-ha pens, offered ad libitum tall fescue hay (13.9% CP, 57.9% NDF, 33.7% ADF, and 64.9% TDN), and randomly assigned supplementation rates of 0.3, 0.6, or 1.2% of BW. Steers were weighed at 28-d intervals following a 16-h removal from feed and water and supplement amounts offered was adjusted. Hay was delivered in round bales, which were weighed prior to feeding and replaced when approximately 10% of initial mass was remaining. Hay intake was estimated using the initial weight and estimation of hay wastage. Data were analyzed using the mixed procedure of SAS, initial BW was used as a covariate, pen within treatment was in the random statement, and least-squares means were separated using orthogonal contrasts for linear and quadratic effects of supplementation rate. Body weight at the end of the study was increased with increased level of supplementation (linear effect, $P = 0.04$), averaging 328, 336, and 345 ± 3.9 kg for 0.3, 0.6, and 1.2% BW supplementation rates, respectively. Likewise, ADG

increased linearly ($P = 0.04$) with increased supplementation rate, averaging 0.83, 0.94, and 1.05 ± 0.05 kg/d, respectively. Hay DMI was estimated to be 3.5, 4.5, and 3.1 kg DM/steer daily for the 0.3, 0.6, and 1.2% BW supplementation rate, respectively and an average of 1.0, 1.77, and 3.5 kg of supplement/steer was offered daily, resulting in total feed efficiencies of 5.4, 6.7, and 6.3 kg feed/kg gain, for 0.3, 0.6, and 1.2% BW supplementation rates. Under the conditions of this study, cottonseed cake can be efficiently supplemented at rates up to 1.25% of BW to steers fed medium quality grass hay.

Key Words: Beef calves, Cottonseed cake, Supplementation rate

90   Frequency of supplementation with a mix of soyhulls and corn gluten feed does not affect performance of growing cattle fed a hay based diet. M. E. Drewnoski*, M. H. Poore, and G. A. Benson, *North Carolina State University*, *Raleigh*.

A 50:50 mix of soyhulls and corn gluten feed has become a common feed supplement due to these two byproducts complementing each other in mineral and protein content. For small producers the labor cost of feeding is often very high. Feeding a supplement less frequently would reduce labor and could therefore have the potential to increase profit. The objective of this study was to determine the effect of supplementing hay with a mixture of soyhulls and corn gluten feed (SH/CGF) daily or 3 times a week (Monday, Wednesday, and Friday) on steer performance. The 86 day feeding trial was replicated over two consecutive yr. Each yr, 40 steers (BW = 263 kg and 285 kg for yr 1 and 2, respectively) were blocked by weight into eight groups (5 steers per group) and randomly assigned to treatment. Dietary treatments consisted of ad-libitum fescue hay (9.9% CP, 67.9% NDF and 40.2% ADF) that was supplemented daily (7X) with 2.73 kg/head (3 groups), supplemented three days a week (3X) with 6.36 kg/head (3 groups) or not supplemented (H) with SH/CGF (2 groups). The supplement contained 47% soyhull pellets, 47% corn gluten feed pellets, 2 % feed grade limestone and 4% liquid yeast and was 16.3 % CP, 45.5% NDF and 26.1 % ADF. Average daily gain was greater ($P < 0.01$) in supplemented steers compared to non-supplemented steers, but did not differ due to feeding frequency ($P = 0.45$). Average daily gains were 0.15, 0.69 and 0.66 kg/d (SEM ± 0.03) for H, 7X and 3X, respectively. Hay intake was reduced ($P < 0.01$) by supplementation and was higher ($P < 0.01$) for 7X compared to 3X. Hay intake was 6.47, 6.11, 5.04 kg/head/d (SEM ± 0.13) for H, 7X and 3X, respectively. Gain to feed of supplemented steers was higher ($P < 0.01$) than H (0.06), and 3X (0.19) tended to be higher ($P = 0.09$) than 7X (0.17) (SEM ± 0.007). The results of this study suggest that when given the same amount of supplement per week, supplementation of growing steers with SH/CGF mix three times a week will not reduce performance compared to daily supplementation.

Key Words: Supplementation frequency, Cattle

91   Effects of supplementation frequency on development of yearling Brahman-crossbred heifers: I. Performance, reproductive, and physiological responses. R. F. Cooke*[1,2], D. B. Araujo[1,2], A. D. Ealy[2], and J. D. Arthington[1], [1]*University of Florida-IFAS*, *Ona*, [2]*University of Florida-IFAS*, *Gainesville*.

The objective of this experiment was to investigate the effects of supplementation frequency on BW gain, plasma metabolites and hormones, and reproductive performance of yearling heifers. Fifty-six heifers (Brahman x British; avg. age = 10 mo) were stratified by initial BW and age, and randomly allocated to 14 bahiagrass (*Paspalum notatum*) pastures. Pastures were randomly assigned to receive an energy-based supplement daily (S7) or 3x/week (S3), at a daily rate of 2.6 kg of DM per heifer. Heifer shrunk BW was obtained before the start (d -11) and at the end of the experiment (d 109). Blood samples were collected weekly to determine onset of puberty via progesterone concentration. From d 0 to 45, blood samples were also collected on four consecutive days, every other week, starting at 4 h after feeding for determination of glucose, blood urea nitrogen (BUN), insulin, and IGF-1 concentrations. On d 46, heifers were re-allocated by treatment into two bahiagrass pastures and exposed to mature Angus bulls for a 60-d breeding season. Pregnancy was determined via trans-rectal ultrasonography 70 d after the end of breeding season. Mean BW gain was greater ($P < 0.05$) for S7 vs. S3 (0.41 and 0.33 kg/d, respectively; SEM = 0.02). Treatment x sampling day interactions were detected ($P < 0.01$) for all blood measurements. On days that both treatments were offered, S7 heifers had greater concentrations of BUN and IGF-I ($P < 0.05$), and tended to have greater glucose concentrations ($P = 0.12$) compared to S3 heifers. However, on days that only S7 heifers were offered supplements, concentrations of glucose and BUN were greater ($P < 0.05$) for S3 heifers. Puberty attainment and pregnancy rates were greater for S7 heifers vs. S3 heifers ($P < 0.05$). In this experiment, offering an energy-based supplement daily instead of 3x/week improved growth and reproductive performance of grazing Brahman-crossbred heifers.

Key Words: Heifers, Development, Supplementation frequency

92   Effects of supplementation frequency on development of yearling Brahman-crossbred heifers: II. Liver and muscle gene expression. R. F. Cooke*[1,2], D. B. Araujo[1,2], A. D. Ealy[2], and J. D. Arthington[1], [1]*University of Florida-IFAS*, *Ona*, [2]*University of Florida-IFAS*, *Gainesville*.

The objective of this experiment was to investigate the effects of supplementation frequency on the expression of liver and muscle genes associated with nutritional metabolism and growth of yearling heifers. Fifty-six heifers (Brahman x British; avg. age = 10 mo) were stratified by initial BW and randomly allocated to 14 bahiagrass (*Paspalum notatum*) pastures. Pastures were randomly assigned to receive an energy-based supplement daily (S7) or 3x/week (S3), at a daily rate of 2.6 kg of DM per heifer. Heifers within pasture were randomly assigned to either muscle or liver needle biopsy, on d 35 or 36 of the experiment, starting at 4 h after supplements were offered. Consequently, two liver and two muscle samples were obtained from each pasture unit. After RNA isolation, quantitative real-time RT-PCR was used to assess mRNA levels of IGF-1, IGFBP-3, pyruvate carboxylase (PC), cytosolic phosphoenolpyruvate carboxykinase (PECK-C), and mitochondrial PEPCK (PEPCK-M) in liver samples, and IGF-1, IGF1BP-3, IGF1BP-5, and myostatin (MYO) in muscle samples. Cyclophilin mRNA levels were used as internal control for the analysis of both tissues. Data were analyzed using the MIXED procedure of SAS. Heifers from S7 group had greater ($P < 0.05$) expression of liver IGF-1, and tended ($P = 0.09$) to have greater expression of liver PEPCK-M compared to S3 heifers. Treatment x day interactions were detected ($P < 0.05$) for liver IGF1BP3, PC, PEPCK-C, and muscle MYO. Expression of these proteins were greater in S3 heifers when both treatment groups were offered supplements (d 35), but greater in S7 heifers when only S7 group was supplemented (d 36). Results observed in this experiment indicate that offering an energy-based supplement daily instead of 3x/week positively affects the expression pattern of liver and muscle genes associated with nutrient metabolism and growth of grazing Brahman-crossbred heifers.

Key Words: Heifers, Gene expression, Supplementation frequency

93   Effects of supplementation frequency on gene expression and physiological responses of Brahman-crossbred cows. R. F. Cooke*[1,2], D. B. Araujo[1,2], A. D. Ealy[2], G. C. Lamb[3], and J. D. Arthington[1], [1]*University of Florida-IFAS, Range Cattle Research and Education Center*, *Ona*, [2]*University of Florida-IFAS, Department of Animal Sciences*, *Gainesville*, [3]*University of Minnesota, North Central Research and Outreach Center*, *Grand Rapids*.

The objective of this experiment was to investigate the effects of supplementation frequency on plasma metabolites and hormones, and expression of hepatic genes associated with nutritional metabolism and status of beef cows. Twelve non-pregnant, non-lactating, multiparous Brahman-crossbred cows were stratified by BW and age, housed in individual pens, and randomly assigned to receive an energy-based supplement daily (C7) or 3x/wk (C3), at a daily rate of 2.9 kg of DM. Stargrass (*Cynodon nlemfuensis*) hay was offered in amounts to ensure ad libitum intake. Blood samples were collected immediately prior to and 4, 8, 24, 30, and 34 h after the first supplement feeding of the week, when cows from both treatments were offered supplements, during a three week period (d 1, 8 and 15). Blood samples were analyzed for glucose, blood urea nitrogen (BUN), insulin, and IGF-I concentrations. Liver samples were collected on d 15 and 16 via needle biopsy, concurrently with blood sampling at 4 and 30 h after supplement feeding, and analyzed with quantitative real-time RT-PCR to assess mRNA levels of IGF-1, IGF1BP-3, and gluconeogenic enzymes (pyruvate carboxylase, cytosolic and mitochondrial phosphoenolpyruvate carboxykinase). Concentrations of BUN were generally greater for C7 cows during the study, resulting in a treatment x time interaction ($P < 0.05$). A similar interaction was observed for insulin concentrations because a time effect was significant ($P < 0.01$) for C3

cows, but not for C7 cows. Concentrations of IGF-1 increased from wk 1 to 3 for C7 (P < 0.01) but not for C3 cows (trt x wk interaction; P < 0.05). The combined expression of gluconeogenic enzymes was greater (P < 0.05) for C3 when cows from both treatments were supplemented (d 15), but greater (P < 0.01) for C7 when only C7 cows were supplemented (d 16) (treatment x day interaction; P < 0.01). In this experiment, offering an energy-based supplement daily instead of 3x/wk improved the nutritional status of mature Brahman-crossbred cows.

Key Words: Cows, Supplementation frequency, Gene expression and physiology

94   Relationships between residual feed intake and apparent nutrient digestibility in growing calves. W. K. Krueger*[1], G. E. Carstens[1], P. A. Lancaster[1], L. J. Slay[1], J. C. Miller[1], and T. D. A. Forbes[2], [1]*Texas A&M University, College Station*, [2]*Texas Agriculture Extension Service, Uvalde, TX.*

The objective of this study was to determine if animal variation in residual feed intake (RFI) was associated with variation in apparent nutrient digestibilities. A three-year study was conducted with Brangus heifers (N = 114-116/yr) from the Camp Cooley Ranch with initial ages and BW of 232 ± 13 d and 273 ± 27 kg. Heifers were fed a high-roughage diet (ME = 2.1 Mcal/kg DM), and individual DMI and BW measured for 70 d following a 28-d adaptation period. RFI was calculated as the residual from the linear regression of DMI on mid-test $BW^{0.75}$ and ADG. Within year, heifers were ranked by RFI and those with the lowest (n = 18–20) and the highest (n = 18–20) RFI selected to measure apparent nutrient digestibilities. Daily fecal and ort samples were collected for 10 (yr 1) or 7 consecutive d (yr 2, 3) and AIA used as a internal marker to estimate diet DM (DMD), NDF (dNDF) and CP (dCP) digestibilities. Overall mean (± SD) ADG, DMI and RFI were 0.99 ± 0.18, 9.6 ± 1.6, and 0.04 ± 1.08 kg/d, respectively. As expected, RFI was not correlated with initial BW or ADG, but was correlated (P < 0.001) with DMI (0.66) and feed:gain ratio (0.66). During the 70-d study periods, heifers with low RFI (n = 58) consumed 23% less DMI and had 20% lower feed:gain ratios than heifers with high RFI (n = 57). Heifers with low RFI had higher (P < 0.05) DMD (731 vs. 705 ± 12 g/kg DM) and dCP (691 vs. 657 ± 13 g/kg DM), and tended to have higher (P = 0.07) dNDF (670 vs. 642 ± 14 g/kg DM) than heifers with high RFI. DMI was used as a covariate to assess the effect of intake on digestibility, but was found to be nonsignificant (P > 0.6). Estimates of total manure and nitrogen excretions were 33 and 35% lower (P < 0.001), respectively, in heifers with low vs. high RFI. Results from this study suggest that inter-animal variation in apparent digestibility contributes to observed phenotypic differences in RFI. Selection to improve RFI in cattle will reduce feed cost and mitigate the environmental impact of beef production systems through reductions in manure nitrogen excretion.

Key Words: Residual feed intake, Dry matter digestibility

95   Predicting back fat thickness in beef cattle using A-mode ultrasound technology. W. A. Phillips*[1], S. W. Coleman[2], C. C. Chase, Jr.[2], and D. G. Riley[2], [1]*USDA-ARS, El Reno, OK*, [2]*USDA-ARS, Brooksville, FL.*

Because fat thickness in feedlot cattle can be a predictor of carcass quality and yield grade, estimates of fat thickness during the later stages of the finishing period could be used to make marketing decisions. Ultrasound technology is a nondestructive and humane technique used to estimate fat thickness in live animals. Currently, real time ultrasound (B-mode) technology is used to create an image from which fat thickness and many other carcass characteristics are calculated. However, B-mode equipment is expensive. Although amplitude mode (A-mode) ultrasound provides less information than B-mode, equipment cost is less. The objective of this experiment was to determine if A-mode ultrasound could be used to predict carcass fat thickness in beef cattle. Ultrasound measures of fat thickness (FTU) were taken on 81 feedlot steers and 11 feedlot heifers just prior to harvesting and correlated with carcass fat thickness (FTC). Calves used in this study were sired by Angus (A), Brahman (B) or Romosinuano (R) bulls. Dams were A, B, R, AB, AR, BA BR, RA, or RB. Calves were born in late winter at the Subtropical Agricultural Research Station, weaned in late September of 2006 and shipped 2025 km to El Reno, OK for growing (October through April) and finishing (April through August). Calves were fed a high energy finishing diet for 122 d ± 20 SD. Calves were considered finished when visual estimates of fat thickness over the 12th to 13th rib section was >10mm. A-mode ultrasound

measures of fat thickness were made the day before harvesting and FTC measurments were made made 72 h after harvesting. Fasted pre-harvest BW and hip height (mean ± SD) were 529 ± 60 kg and 136 ± 7.4 cm. Hot carcass weight, dressing percentage, FTC were 331 ± 41.3 kg, 62.4 ± 1.91%, and 15.4 ± 6.15 mm, respectively. Estimate fat thickness (mean ± SD) using ultrasound was 13.4 ± 2.38 mm. Correlation coefficients for FTC and FTU were 0.624 (P < 0.01). This correlation coefficient is slightly lower that previous values reported by other labs derived using B-mode ultrasound. We concluded that A-mode could be a useful tool for estimating fat thickness in feedlot cattle.

Key Words: Beef cattle, Fat thickness, Feedlot

96   Relationship between body fat deposition and postweaning growth in beef steers. C. H. Ponce*, R. D. Rhoades, F. R. Ribeiro, D. K. Lunt, S. B. Smith, and J. E. Sawyer, *Texas A&M University, College Station.*

An experiment was conducted to determine the relationship of adipose tissue accretion and growth as influenced by dietary energy source. Twenty five Angus steers (223 ± 25 kg) were randomly assigned to either a grain-based (CORN) or hay-based (HAY) diet after weaning (8 mo.) for 120 d. One group of steers (n=4) was slaughtered at day 0, which served as starting point, and then steers were serially slaughtered at 120, 240 and 300 days. After 120 d on treatments, all steers were fed a grain-based diet, and were targeted to reach similar hot carcass weight (HCW) and fat thickness endpoints. For each group, HCW was recorded at slaughter; marbling score and fat thickness were recorded after a 48-h chill. Data were analyzed using linear regression analysis with diet as fixed effect. The model contained HCW and HCW^2 as an independent variables and marbling score or fat thickness as dependent variables. Hot carcass weight of animals fed the corn based diet accounted for approximately 80% of the variation in marbling or fat thickness; the quadratic term was significant only for marbling. In the hay-based group, marbling and fat thickness increased linearly with increased HCW and the coefficients of determination were 0.91 and 0.88 respectively. Analysis of pooled data indicated a linear relationship between responses and HCW, and an interaction between diet and HCW was observed (P < 0.05). An outlier was recognized in the group of cattle fed corn. Removal of this observation obviated the quadratic effect of HCW on marbling as well as the interaction. The pooled linear equations were: Fat thickness = -0.6 + 0.007 (HCW); and Marbling = 177.5 + 1.3 (HCW). Results from this experiment suggest that a modest degree (500 ± 47.2) of marbling was obtained at similar HCW independently of diet fed early in the growing phase.

Key Words: Adipose tissue, Hot carcass weight, Postweaning

97   Effects of forage type and anabolic implantation of steers on growth and subsequent carcass characteristics. C. R. Bailey*[1], M. L. Looper[2], A. H. Brown, Jr.[3], and C. F. Rosenkrans, Jr.[3], [1]*Arkansas Tech University, Russellville*, [2]*USDA-ARS, Dale Bumpers Small Farms Research Center, Booneville, AR*, [3]*University of Arkansas, Fayetteville.*

A 2 x 2 factorial treatment arrangement was used in a multi-year study to examine the effects of forage type and implant status during the stocker phase on performance (3 yr; n = 142 steers) and carcass characteristics (2 yr; n = 88) of crossbred steers. Animals were stratified by weight and randomly assigned to receive no implant or a Synovex S implant (20 mg estradiol benzoate; 200 mg progesterone) on d 0 and 56, and graze either common bermudagrass (CB; 4 pastures/yr) or pearl millet (PM; 4 pastures/yr) for 97, 84 or 92 d for yr 1, 2 and 3, respectively. Overall ADG for the grazing period was calculated, and, following a finishing phase in a commercial feedlot, cattle were slaughtered and HCW was recorded immediately. Following a 48 h chill, 12th rib backfat (BF) and LM area were measured, KPH and marbling score (MS; 30 = slight; 40 = small) were visually estimated, and yield grade (YG) was calculated. Initial BW (d 0) was similar across treatments (294 ± 16 kg). No forage x implant interaction (P > 0.13) was observed for any variables. Neither final BW nor ADG was affected (P > 0.41) by implant or forage type (P > 0.77). Implant treatment did not influence (P > 0.22) HCW, BF, LM area, KPH or YG. However, MS tended (P = 0.17) to be lower in implanted (38.8 ± 1.9) than non-implanted (41.2 ± 1.9) calves. Forage type did not affect (P > 0.19) HCW, BF, LM area, KPH, or MS, but YG was reduced (P = 0.06) in CB (2.7 ± 0.24) compared to PM (3.1 ± 0.24) grazed calves. Anabolic implants did not improve the growth of stocker

steers grazing either CB or PM. However, MS tended to be reduced in implanted steers at slaughter compared to non-implanted steers, and steers grazing PM had a higher YG than those grazing CB.

Key Words: Steers, Forage type, Anabolic implantation

98   Effects of feeding whole cottonseed on ultrasonic body composition measures in beef cows. T. L. Perkins* and J. Buck, *Missouri State University*, *Springfield*.

Whole cottonseed (WCS) is an effective supplemental feed to poor quality hay in cows because it supplies both energy and protein in a single feed ingredient. The supplement is generally high in protein, fat and fiber. In addition, because of the high energy content, WCS can improve reproductive performance in cattle. Therefore, the objective of this study was to examine changes in ultrasonic body composition measures in the relationships to body condition score (BCS) in beef cows offered 2.27 kg of WCS daily. British and Continental influenced cows (n= 25) were assigned BCS and scanned ultrasonically for ribeye area (REAU), fat thickness (FTU), percent intramuscular fat (%FatU) and rumpfat (RFU). Ultrasound measurements were taken on d 0 and at trial conclusion (d = 38). All ultrasound measurements were taken by an Ultrasound Guidelines Council field and laboratory certified technician using the Beef Image Analysis image capturing software. Cows were offered 2.27 kg WCS daily along with free choice mineral, water and fescue hay. Over the feeding period, BCS, REAU, FTU, %FatU and RFU did not differ (P = 0.95). Pearson correlations between BCS and REAU, FTU, %FatU and RFU were 0.45, 0.81, 0.74 and 0.87, respectively. However, the supplement did not adequately maintain BCS in thinner cows (BCS < 4) because the percent change in BCS (P = 0.22), REAU (P = 0.14), FTU (P = 0.09), %Fat (P = 0.20) and RFU (P = 0.81) were 6.4, -3.67, -30, -3.88 and -12.8, respectively. The WCS adequately maintained BCS in fatter cows (BCS 7 or greater) because the percent change in BCS, REAU, FTU, %Fat and RFU were 1.18, 5.12, 1.75, 5.42 and 3.28%, respectively. Treatment group 2 (BCS 4 - 6.5) were intermediate because the percent change in BCS, REAU, FTU, %Fat and RFU were 12.6, 0.75, -11.77, 1.99 and 1.59%, respectively. Based on our results, 2.27 kg WCS offered daily was a suitable feed source for maintaining BCS in BCS 4 or higher beef cows with no adverse effects on body composition characteristics. However, daily intake of WCS must be increased in thinner (BCS < 4) beef cows.

Key Words: Beef cattle, Ultrasound, Whole cottonseed

99   Dietary energy source impact on in vitro substrate utilization and dose response to insulin additions of subcutaneous adipose tissue of Angus steers. R. D. Rhoades*, J. E. Sawyer, C. H. Ponce, D. K. Lunt, and S. B. Smith, *Texas A&M University*, *College Station*.

Angus (n=12) steers were used to test effects of dietary energy source on subcutaneous adipose tissue metabolism and response to increasing levels of insulin. Steers were assigned to either a grain-based (CORN) or hay-based (HAY) diet and fed to common d on feed. Steers fed CORN had 2.44 cm fat thickness (FT) while HAY-fed steers had 1.04 cm FT. At slaughter, s.c. adipose samples were collected. Portions of s.c. were cultured with ^{14}C-acetate to quantify fatty acid (FA) synthesis, or ^{14}C-glucose to assess glucose utilization in the presence of 0, 100 or 500 ng/ml insulin. Additional s.c. samples were used to evaluate glycolytic intermediate concentrations as indicators of glucose flux. Data were analyzed as a split-plot with diet in the main plot and insulin level and its interaction with diet in the sub-plot. Within diet linear and quadratic contrasts of insulin level were tested. Plasma and tissue glucose concentrations and glycolytic metabolite concentrations were similar (P>0.17) among diets. Diet had minimal effect (P>0.11) on glucose response variables or acetate utilization (P=0.11). Insulin had no affect (P>0.19) on glucose conversion to CO_2, lactate, and total lipids; nor did it affect (P=0.19) acetate conversion to fatty acids. No diet by insulin interactions (P>0.23) were observed for substrate responses. When steers were fed CORN, there were no linear (P>0.12) or quadratic (P>0.29) effects of increasing insulin level. However, when steers were fed HAY, a positive linear (P=0.05) effect for glucose oxidation and a tendency (P=0.08) for a quadratic effect of insulin increasing acetate incorporation into fatty acids were observed. These results suggest that s.c. adipose tissue may become resistant to stimulation by insulin in steers fed to an excessive s.c. fat thickness.

Key Words: Beef, Adipose tissue, Insulin

100   Effect of dietary energy source during backgrounding on in vitro substrate utilization and insulin sensitivity of adipose tissue of Angus steers. R. D. Rhoades*, C. H. Ponce, F. R. B. Ribeiro, D. K. Lunt, S. B. Smith, and J. E. Sawyer, *Texas A&M University*, *College Station*.

An experiment was designed to test effects of dietary energy source and compositional endpoint on adipose tissue metabolism and insulin sensitivity. Angus steers (n=17; 223 kg) were randomly assigned to either a grain-based (CORN) or hay-based (HAY) diet after weaning (8 mo) for 120 d, after which all steers were fed a CORN diet. Steers were serially slaughtered at 120, 240 and 300 d to achieve two common endpoints (A and B) based on similar BW and fat thickness. At slaughter, s.c., and i.m. samples were collected. Portions of s.c., and i.m. were incubated with ^ {14-C glucose and with ^{14}-C acetate to quantify utilization in vitro with 0 or 500 ng/mL insulin. Data were analyzed as a split-split plot with diet, endpoint, and their interaction in the main plot; tissue and its interaction with main plot effects in the sub-plot, and insulin and its interaction with sub-plot effects in the sub-sub plot. There was greater (P<0.01) glucose oxidation in i.m. from HAY-fed steers. Endpoint B HAY-fed steers converted 28% and 50% more (P<0.04) glucose to CO_2 and lactate than CORN-fed steers. Insulin increased (P=0.06) glucose conversion to lipid in endpoint A steers, but had minimal impact in endpoint B steers. Insulin increased (P=0.06) glucose conversion to lipid in i.m. from CORN-fed steers, but had limited impact on i.m. from HAY-fed steers or s.c. from steers fed either diet. HAY-fed steers incorporated 204% more (P=0.05) acetate into fatty acids (FA). Insulin increased (P=0.02) acetate incorporation into FA in s.c., but not i.m. Results suggest that feeding HAY during backgrounding may have differential effects on tissue lipogenesis. Feeding HAY increased both glucose oxidation and incorporation of acetate into FA; in i.m. insulin failed to stimulate glucose conversion to lipid. Additionally, as physiological maturity increases, glucose conversion to CO_2 and lactate increased, but the ability of insulin to stimulate lipid synthesis from glucose maybe reduced.

Key Words: Beef, Adipose tissue, Insulin

101   Feeding value of peanut skins for sheep. G. Abdelrahim*[1], J. Khatiwad[1], D. Rankins[2], and N. Gurung[3], [1]*Alabama A & M University*, *Normal*, [2]*Auburn University*, *Auburn, AL*, [3]*Tuskegee University*, *Tuskegee, AL*.

The peanut industry is a multi-million dollar industry in the United States. Peanut skin is a by-product of the peanut processing industry, with Texas leading in its production. Approximately 20,000 to 30,000 metric tons of peanut skins are produced in the United States annually; most of it used as animal feed. Peanut skins contain appreciable quantities of both protein and fat which makes them an excellent feed source. Peanut skins are rich antioxidants such as phenolics, which can be extracted for use in industrial and pharmaceutical applications thereby adding value to the peanut industry. The factors that limit their usefulness are their light weight (very fluffy) and their potential for containing tannins. However, small ruminants such as goats have been shown to be especially adept at handling moderately high levels of tannins in their diet. Thus peanut skins need to be fully evaluated as a potential low-cost feedstuff for ruminants. The objective of this experiment was to determine the effect of feeding increasing levels of peanut skins on sheep feed intake and growth. Twelve Gulf Coast ewes similar in age were used in a completely randomized block design experiment which lasted twelve weeks. After an acclimatization period of two week, lambs were blocked by weight and randomly assigned to three treatments (4 lambs/treatment). The three treatments of peanut skins fed to lambs were 0%, 20%, and 40%. All treatments were mixed of 50% hay and 50% feed mixed with peanut skins. Our results indicated that feed intake of lambs fed 40% peanut skins, 2.04 lb/day, was less (P<0.05) compared to those lambs fed 0% and 20% peanut skins, where they consumed an average of 2.29 lb/day, and 2.38 lb/day, respectively. However, the results showed that weight gain was greater (P<0.05) in lambs fed 40% peanut skins than weight gain in lambs fed 0% and 20% peanut skins. There was no significant difference (P>0.05) in feed intake of lambs fed 0% and 20% peanut skins. However, weight gain was greater (P<0.05) in lambs fed 20% peanut skins than weight gain in lambs fed 0%. The results of this experiment demonstrate that feeding increasing level of peanut skins to sheep significantly impacted weight gain.

Key Words: Peanut skins, Growth, Sheep

102 Influence of breed and mineral trough visitation on copper status of beef heifers. K. Guidry*, J. Rowntree, G. Lum, and D. Skeans, *Louisiana State University Agricultural Center*, *Baton Rouge*.

Copper status and metabolism differences have been reported between Continental and British breeds of cattle. However, reported differences comparing *Bos taurus* and *Bos indicus* breeds are minimal. Therefore, a study was conducted to determine the effects of breed on mineral trough visitation and Cu status of Angus, Brahman, and Braford heifers. Angus (n=17), Brahman (n=10), and Braford (n=12) yearling heifers were stocked on Bermudagrass (*Cynodon dactylon*). Heifers were offered access to a complete vitamin and mineral supplement containing 2,000 mg/kg Cu. The supplement was offered in a trough equipped with a motion detecting CamoCam Camera (J&L Products, Ringgold, LA.) to monitor visitation. Mineral disappearance and trough visitation were recorded weekly. Blood was collected from heifers via jugular venipuncture in March, June, September, and November. Liver samples were taken from five heifers from each breed, in June (initial) and November (final). Inductively Coupled Spectrophotometry (Optima 300, Perkin Elmer, Norwalk, CT) was used to measure Cu concentrations of plasma, liver, and forage samples. A breed x month interaction ($P < 0.001$) was observed with visitations. In August, Braford ($P < 0.01$) and Brahman ($P < 0.05$) heifers increased visitation compared with Angus heifers. Plasma Cu concentrations were significant for breed ($P < 0.05$). Braford heifers (0.7826 mg/kg) had greater circulating Cu concentrations in plasma relative to Angus (0.7048 mg/kg) and Brahman heifers (0.6959 mg/kg). Initial liver Cu concentrations (223.65 mg/kg) were significantly higher ($P < 0.05$) compared to final liver Cu concentrations (160.04 mg/kg). Although Angus heifers rarely visited the mineral trough in August and the Brafords maintained greater circulating plasma Cu concentration, all breeds of cattle had adequate Cu status.

Key Words: Copper status, Mineral trough visitation, Heifers

103 Evaluation of external and internal parasite control with spring calving cows and calves. S. DeRouen*[1], J. Miller[2], L. Foil[2], C. Younger[2], G. Gentry[3], and J. Pitchford[3], [1]*Louisiana State University Agricultural Center*, *Homer*, [2]*Louisiana State University Agricultural Center*, *Baton Rouge*, [3]*Louisiana State University Agricultural Center*, *St. Gabriel*.

This study assessed the effects of horn fly and internal parasite control on calf growth and cow performance. A total of 758 cow-calf records were collected from two locations over a 3 yr period. Cow and calf pairs were allocated by cow age, calf sex, birth date, sire breed, and sire(sire breed) to treatments (TRT). The TRT were: CON–no horn fly (HF) or internal parasite (IP) control; HF–HF control (on cows only) administrated in late May with insecticidal ear tags; IP–IP control (on calves only) administrated in late May, mid-July, and late August (each calf received fenbendazole at the rate of 10 mg/kg BW); and HFIP–both HF and IP control administrated as stated above. Length of the trials ranged from 118 to 127 d (late May to early October (weaning)). Weekly horn fly counts were conducted. Calf fecal samples were collected at the start of trial, mid-July, late August, at weaning and 7-14 d after the start of trial and after late August collections (efficacy assessments). Fecal egg counts (EPG) were normalized with a log 10(X + 1) transformation. Statistical analyses were conducted using a generalized linear mixed model procedure. Overall horn fly counts (per animal) for CON, HF, IP, and HFIP were 310, 136, 296, and 138 flies (SE = 4.3), respectively, and were different (CON, IP > HF, HFIP; P < 0.001). Calves from IP and HFIP had lower (P < 0.001) log EPG than calves from CON and HF for both efficacy assessments (> 96% efficacy). Calf BW gains did not differ from start of trial to mid-July (P = 0.48); however, BW gains from mid-July to weaning were greater (P < 0.05) for calves from IP (65 kg) and HFIP (66 kg) than calves from CON and HF (both 61 kg). This resulted in total BW gains being greater (P < 0.05) for calves from IP and HFIP than calves from CON and tended to be greater (P < 0.10) than calves from HF. Cow BW and body condition score changes and pregnancy rates did not differ (P > 0.38) among TRT. These data suggest that greater benefits in calf growth resulted when calves were dewormed during the summer and no improvement in cow-calf performance was realized with horn fly control.

Key Words: Cow-calf, Horn flies, Internal parasites

104 Factors associated with pregnancy rate in first exposed, crossbred heifers. J. G. Powell*, A. H. Brown, Z. B. Johnson, R. A. Rorie, C. A. Tucker, J. L. Reynolds, and J. A. Hornsby, *University of Arkansas*, *Fayetteville*.

A single experiment was conducted to evaluate factors associated with pregnancy rate in first exposure, crossbred heifers. Angus based yearling heifers (n=104) were evaluated in the study. Heifers were born between September 3 and December 27, 2005. Heifers were weaned on May 15, 2006 and assembled at the University of Arkansas Beef Research Unit near Fayetteville, AR. Heifers were grazed on pastures consisting of 40% warm season and 60% cool season forages and given a supplemental soy hull ration and ad libitum mineral supplement. Prior to breeding in December of 2006, several traits were measured including reproductive tract score (RTS), pelvic area, BW, and hip height. Reproductive tract scores were determined via transrectal ultrasonography and assigned one of the following ranks: 1 = immature reproductive tract, no uterine tone, and no palpable ovarian structures; 2 = ovary exhibiting 8 mm follicle, and uterine horn diameter of 20-25 mm with no uterine tone; 3 = ovarian follicle from 8-10 mm, with uterine tone and uterine horn diameter of 25-30 mm; 4 = uterine horns 30 mm in diameter with good tone, ovarian follicle > 10 mm and possible corpus luteum; 5 = cycling heifer with a functional corpus luteum. Average BW was 346.6 ± 33.6 kg at the time of determining RTS. All heifers were exposed to fertile bulls and bred by natural service in a 63 d period. Pregnancy status was determined with the use of transrectal ultrasonography after breeding. Pregnancy rate was 77.14%. These data were analyzed using a logistic procedure to determine factors that were related to pregnancy rate. For every 25 kg increase in body weight, pregnancy rate increased by a factor of 1.47. For every unit increase in RTS, pregnancy rate increased by a factor of 1.54. Pelvic area, animal age and hip height were factors not found to be related to pregnancy rate in this study. These data suggest that RTS can be utilized to determine likelihood of pregnancy outcome.

Key Words: Reproductive tract score, Heifers, Pregnancy rate

105 Effects of temperature, temperament, and Brahman influence on feedlot performance of weaned heifers wintered on corn silage. W. A. Storer*, F. M. LeMieux, and T. H. Shields, *McNeese State University*, *Lake Charles, LA*.

This experiment was conducted to evaluate the influences of temperature, temperament, and Brahman influence on the performance of heifer calves maintained in a corn silage-based feedlot under the relatively mild winter conditions of Southwest Louisiana. Spring born crossbred heifer calves (n=148, 231 ± 33 kg) were received from October to November and acclimated to feedlot conditions for 2 to 4 wk before the start of the experiment. All heifers were processed with routine procedures prior to arrival at the feedlot. Upon arrival, heifers were visually assessed for temperament and percentage of Brahman influence by two independent observers. Brahman influence was classified as light (LI, < 50% Brahman; n = 75) or heavy (HI, ≥ 50% Brahman; n = 73) based on ear length and shape, hair type, coat color, and length of sheath. Temperament scores were assigned in a squeeze chute and denoted as 1: calm, no movement 2: restless shifting 3: squirming, and 4: continuous vigorous movement. Weight and ADG were calculated on d 0, 21, 58, 91, and 153, 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. Average low temperatures for the experimental period ranged from -4 to 21 °C. Weight gains in HI heifers fell (P < 0.05) below LI heifers after d 58. Temperament did not affect (P > 0.1) ADG in LI heifers, but HI heifers had decreased (P < 0.05) ADG as temperament score increased. Overall, ADG was directly correlated (r^2 = 0.97) to average low temperatures. Average daily gains in heifers classified as HI were more correlated (r^2 = 0.79) to low temperatures than LI heifers (r^2 = 0.36). These data suggest that heavily Brahman influenced heifers will not perform as well as those less influenced by the Brahman breed during mild winter feedlot conditions. Also, temperament may have a greater effect on ADG in heavily Brahman influenced heifers.

Key Words: Beef cattle, Temperament, Brahman influence

106   Relationship of temperament to production traits in a commercial cowherd.   B. R. Kutz*[1], M. L. Buchanan[2], M. L. Looper[3], A. H. Brown, Jr.[1], Z. B. Johnson[1], C. F. Rosenkrans[1], S. T. Reiter[1], and S. Nabhan[1], [1]*University of Arkansas*, *Fayetteville*, [2]*Arkansas Cooperative Extension Service`*, *Van Buren, AR*, [3]*USDA/ARS*, *Booneville, AR*.

Objective of this study was to determine the relationship of temperament to production traits in a commercial cowherd in west central Arkansas. Calves (n = 85) were the progeny of mixed-breed dams mated to Angus sires. Sires were selected on the basis of a balanced approached to EPDs. Calves were winter born and weaned in the fall. Cow traits determined at calf weaning were BW, BCS, chute temperament score (CTSCO), chute exit velocity (EVCO), LDH forward (LDHF), intramuscular fat percentage (IMF) and rump fat (RF). Calf traits recorded were sex, BW, chute temperament score (TSCA), hip height, and chute exit velocity (EVCA). Relationships among these traits were determined using simple correlation. Traits significantly correlated were evaluated using regression analysis. Cow RF was highly related (P < 0.001) to cow BW at calf weaning. For each centimeter increase in RF cow BW increased 52 ± 19 kg. Cow chute temperament score was correlated (r = 0.36, P < 0.001) with TSCA. For each score increase in TSCO, TSCA increased 0.46 ± 0.13 score. Chute exit velocity of the cow was highly inversely related (P < 0.01) to TSCA (r = -0.34). For each second increase in EVCO, TSCA decreased 0.27 ± 0.08 score. Cow chute exit velocity was correlated with EVCA (r = 0.21, P < 0.05). For each second increase in EVCO, EVCA increased 0.15 ± 0.08 sec. Chute exit velocity of the calf was negatively related (P < 0.01) to TSCA (r = -.22). For each second increase in EVCA, TSCA decreased 0.24 ± 0.12 score. Cow chute exit velocity was negatively correlated (r = -0.29, P < 0.01) with TSCO. Each second increase in EVCO resulted in a decrease of 0.17 ± 0.06 in TSCO. Serum LDHF was significantly (P < 0.05) related to cow BW (r = -0.21). For each IU/ml increase in LDHF, cow BW decreased 0.18 ± 0.1 kg. These data suggest that there is a relationship between measures of disposition in crossbred beef cattle.

Key Words: Beef cattle, Chute exit velocity, Chute temperament score

107   Near infrared reflectance spectroscopy to predict dry matter and organic matter in feedlot manure.   C. Miller*[1], S. Prince[1], K. Banik[1], D. Tolleson[1], A. Graham[2], M. Kitten[2], T. Sliffe[3], R. Taylor[3], J. Sweeten[4], and K. Heflin[4], [1]*Texas A&M University*, *College Station*, [2]*Panda Hereford Ethanol LP*, *Hereford, TX*, [3]*Perten Instruments*, *Springfield, IL,*, [4]*Texas Agricultural Experiment Station*, *Amarillo*.

Near infrared reflectance spectroscopy (NIRS) is a successful way to quantify the chemical makeup of a manure sample. This procedure has been reported for beef cattle, poultry, dairy, and swine manure in confinement feeding operations. Cattle manure may be used as a bio-fuel in the production of ethanol. Calibration models are used to predict the value of a constituent of interest in unknown samples by applying regression techniques to manure with known chemical analysis paired with near infrared spectra. An experiment was designed to determine the ability of NIRS to predict dry matter (DM) and organic matter (OM) in feedlot manure for the purpose of utilizing these constituents in the prediction of fuel value. One hundred seventy nine samples were collected from feedlots in the Hereford, Texas area. Samples were taken from random individual pens populated with cattle varying in breed type and sex, as well as from composited stock piles of varying age. Samples were collected during winter, spring, and summer and transported on ice to the Texas A&M campus. As-received weights were obtained and NIRS (950 to 1650nm) was performed with a Perten DA7200 NIR Analyzer®. After drying 12 h at 60 C in a forced air oven, samples were ground to 1mm, re-weighed and re-scanned. AOAC procedures for DM and OM were performed on the dry, ground material. Multiple coefficient of determination (R^2) and root mean square error (RMSE) values for as-received DM, DM, OM, and random numbers between 1 and 100, were 0.88, 14.74; 0.68, 0.50; 0.90, 16.24, and 0.20, 131.40, in the as-received samples respectively. In the dry, ground samples, similar values for R^2 and RMSE were 0.74, 26.42; 0.80, 0.36; 0.93, 10.87, and 0.22, 123.27, respectively. Prediction of as-received DM was more successful in as-received samples than in dry ground samples. Prediction of DM and OM was more successful in dry, ground samples than in as-received samples. Prediction of random numbers was unsuccessful in either type of sample. NIRS of feedlot manure can be used to determine characteristics which will ultimately affect the value of this material as a bio-fuel.

Key Words: Feedlot manure, Bio-fuel, Near Infrare spectroscopy

Small Ruminant Production

108   The effect of time of day of feeding on growth and body temperature of hair sheep lambs in the tropics.   R. W. Godfrey* and R. C. Ketring, *University of the Virgin Islands, Agricultural Experiment Station*, *Kingshill, VI*.

Previous work in our lab has shown that when ewes are fed during the afternoon they have an elevated body temperature. This study was conducted to evaluate the growth and body temperature of St. Croix White and Blackbelly lambs fed a split ration after weaning. Lambs were assigned to treatment at weaning (63 d of age) based on weight, breed, sex and litter size. All males were castrated 1 week prior to the start of the study. Lambs were group fed for 100 days starting at 2 wek after weaning. Treatments consisted of feeding concentrate (16.4 % CP, 68 % TDN) in the morning (AM), afternoon (PM), or split between the morning and afternoon (AM-PM) at 4% of BW starting in February 2006 (n = 30) or May 2007 (n = 26). Rectal temperature (RT) was taken right before feeding and right after feeding in the AM and PM from half the lambs in each treatment on d 28, 49, 70 and 91 of feeding. At the end of the feeding period the AM-PM lambs were heavier (P < 0.0001) than the AM or PM lambs (25.5 ± 0.2 vs. 22.7 ± 0.2 vs. 22.6 ± 0.2 kg, respectively). Total gain was greater (P < 0.01) for the AM-PM lambs compared to the AM or PM lambs (26.5 ± 1.1 vs. 22.7 ± 1.1 vs. 22.4 ± 1.1 kg, respectively). The ADG was higher (P < 0.0008) for AM-PM lambs than for AM or PM lambs (131.1 ± 5.1 vs. 105.4 ± 5.1 vs. 105.9 ± 4.9 g/d, respectively). Wether lambs had higher total gain (P < 0.02) than ewe lambs (25.3 ± 0.8 vs. 22.5 ± 0.9 kg, respectively). The ADG was higher (P < 0.001) for wether lambs than for ewe lambs (124.1 ± 4.0 vs. 104.2 ±4.2 g/d, respectively). Rectal temperature of AM lambs in the morning was lower (P < 0.002) prior to feeding than it was after feeding on day 28 (39.0 ±0.2 vs. 39.7±0.2 °C, respectively). There was no other significant change in RT in any group on any day (P > 0.10). A split feeding regimen increased gain and ADG in hair sheep lambs without causing any detectable changes in body temperature. It may be feasible to utilize feeding a split ration to increase gain in these breeds under tropical conditions if the economics of the added labor are feasible.

Key Words: Hair sheep, Lambs, Feeding

109   Growth of lambs and meat goat kids grazing warm season grasses with or without protein supplement.   S. R. Nusz*[1], K. Weathers[1], E. L. Walker[2], and M. A. Brown[3], [1]*Redlands Community College*, *El Reno, OK*, [2]*Missouri State University*, *Springfield*, [3]*USDA-ARS*, *El Reno, OK*.

Grazing provides most nutrients for normal physiological function in ruminants, however; there are times when nutritional needs of the animals exceed the nutritional quality of forages. Bermudagrass is an economically important grass grown on pastures throughout the South and Midwest, however; it may be insufficient in crude protein to meet the demands of lambs and meat goat kids, particularly after late June. The objectives of this study were to test the effects of protein supplementation on growth of lambs and kids grazing 1.22 ha Bermudagrass pastures. Boer influenced (BI) and Savanna × Spanish (SP) kids (n = 10 and 13; respectively) and Katahdin (KK), Katahdin × Suffolk (KS), Suffolk × Katahdin (SK), and Suffolk (SS) lambs (n = 23, 14, 14, and 21; respectively) were grouped by weight, breed, and sex and randomly assigned to one of two forage treatments: 1) Common bermudagrass supplemented with a 21% natural protein block (n = 2) and 2) Common bermudagrass with no supplement (n = 2). Animals were weighed every two weeks for the 62 day duration of the study. During the timeframe of the study, there were 29 continuous days of rainfall which may have affected performance. Sheep had greater ADG than goats (82 ± 6 g/d vs 43 ± 9

g/d; P = 0.0001). Protein supplementation increased ADG of the BI kids (68 ± 22 g/d vs 27 ± 9 g/d; P = 0.12) but not SP kids (40 ± 12 g/d vs 36 ± 16 g/d; P = 0.82). Numerically, protein supplementation benefited SS × KK (98 ± 13 vs 80 ±14; P = 0.34), and SS (72 ± 10 vs 58 ± 12; P = 0.38) but not KK (88 ± 10 vs 86 ± 11; P = 0.87) or KK × SS (84 ± 11 vs 88 ± 15; P = 0.82). Katahdin, normally considered a breed with less genetic growth potential than SS, had higher ADG (P = 0.06) with no supplement. However, with protein supplementation, differences between KK and SS was smaller (P = 0.16). Results of this research suggest that protein supplementation on common bermudagrass may be beneficial for breed groups of goats or sheep with potentially higher growth potential.

Key Words: Lambs, Kids, Bermudagrass

110   Endophyte-infected tall fescue affects intake-equalized weight gain in yearling meat goat does. R. Browning, Jr.*, B. Donnelly, L. Moore, and J. Carlise, *Tennessee State University*, *Nashville*.

Yearling does were fed tall fescue seed to assess the effect of tall fescue endophyte (*Neotyphodium coenophialum*) infection on meat goat weight gain when intake is equalized. In 2006 and 2007, straightbred Boer (n=39; 35.2 ± 0.7 kg), Kiko (n=26; 29.8 ± 0.9 kg), and Spanish (n=19; 26.8 ± 1.0 kg) yearling does were fed orchardgrass hay for *ad libitum* consumption and 455 g/hd/d of concentrate during the spring pretreatment period (62 d in 2006, 97 d in 2007). Afterwards, 227 g/hd/d of endophyte-infected (EI) tall fescue seed or variable amounts of endophyte-free (EF) tall fescue seed were added to the diet for 10 wk in the summer. The EI and EF diets were similar for TDN and CP content. Ergovaline content of the EI seed was greater than 2 ppm. Diets were fed to four pens per treatment per year. Breeds were evenly distributed across pen replicates. Orts were weighed daily. The EF diet was adjusted daily based on EI seed orts from 227 g offered to equalize intake. Orts for the EI diet averaged 11 g/hd/day in 2006 and 57 g/hd/day in 2007. Pretreatment weight gain did not differ between EF and EI does (54.8 ± 7.5 vs. 56.2 ± 7.1 g/d, respectively). Breed of doe affected weight gain (*P* < 0.05), but did not interact with treatment. Pretreatment period weight gains were greater (*P* < 0.01) for Kiko (72.7 ± 8.9 g/d) and Spanish (69.5 ± 10.4 g/d) than for Boer (24.4 ± 7.4 g/d). Treatment period weight gains were greater (*P* < 0.01) for Kiko (72.4 ± 6.9 g/d) than for Spanish (45.1 ± 8.1 g/d) and Boer (34.2 ± 5.7 g/d). Diet affected (*P* < 0.05) weight gain during the summer treatment period. Does on EF diet gained 66.6 ± 5.8 g/d whereas does on EI diet gained 34.6 ± 5.5 g/d. Data indicate that tall fescue endophyte can adversely affect meat goat weight gain after correcting for altered intake levels.

Key Words: Tall fescue, Meat goats, Growth rate

111   Prediction of dietary crude protein in sheep and goats with near infrared reflectance spectroscopy of feces (FNIRS): An independent validation. D. R. Tolleson*, S. D. Prince, K. K. Banik, K. L. Rater, and E. J. Earlywine, *Texas A&M University*, *College Station*.

Prediction of diet quality using FNIRS has been reported for several species of grazing herbivore, including sheep (*Ovis aries*) and goats (*Capra hircus*). Few evaluations of the technique for small ruminants in the US are found outside of the original calibration research. The objective of this study was to determine the ability of FNIRS to predict dietary CP in pen-fed sheep and goats. Seven sheep (63 ± 5.0 kg) and seven goats (50 ± 5.0 kg) were maintained in individual concrete floored (1.5m x 1.5m) pens with ad libitum water. Each animal was sequentially offered 1 of 7 experimental diets in 7-day feeding trials until each animal received each diet. Diets consisted of either timothy (*Phleum pratense*), bermudagrass (*Cynodon dactylon*), or alfalfa (*Medicago sativa*) forages, all equal combinations of each pair of forages, and an equal combination of all three. Diets were offered at ~ 3 % BW and adjusted to supply ~10 % over voluntary intake. Forages were chopped to ~ 9.8 cm length prior to mixing. Each forage was analyzed for CP. Diet CP was calculated based on proportion of each forage in a diet. Orts were visually assessed but not collected. Fresh fecal samples were collected from the pen floor on day 7 and processed for FNIRS. Spectra (1100 to 2500nm) were obtained on a Foss® 6500 scanning monochrometer. Published FNIRS calibrations for dietary CP in both sheep and goats were applied to the respective spectra. Relationships between observed diet and FNIRS predicted CP

were analyzed by simple linear regression. The r[2] and SE of prediction were 0.97 and 0.75 for sheep and 0.77 and 2.19 for goats respectively. Individual animal variation ranged from 4 to 27 % of the mean FNIRS predicted CP for each diet in sheep and from 10 to 37 % in goats. Goats exhibited greater selectivity for leaf over stem in the low CP diet than did sheep. FNIRS successfully predicted dietary CP in pen-fed sheep and goats. Individual animal variation in FNIRS predicted dietary CP was greater in goats than in sheep.

Key Words: Near infrared spectroscopy, Small ruminants, Diet quality

112   Assessing the potential of mixed grazing goats with beef cattle to increase the utilization of marginal pasturelands in Virginia. D. M. Webb*, A. O. Abaye, C. Teutsch, and G. Scaglia, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

Post-mined land reclamation in the Appalachian coal region has resulted in successful establishment of pasture for beef cattle production. These areas are becoming increasingly underutilized by cattle as invasive plant species such as sericea lespedeza (SL) (*Lespedeza cuneata*) and autumn olive (AO) (*Eleaganus umbellata*), have encroached. The steep topography and low economic returns from cattle make conventional control options of these species difficult. In late May 2006, a study was initiated at the Powell River Project near Wise, VA to compare the effects of an un-grazed control (CONT), cattle alone grazing (CAG), and mixed grazing goats with cattle (MIX) on vegetation utilization patterns. Pastures were sampled three times (spring, summer, and fall) during the grazing season. Forage mass was determined by clipping 4, 0.25m² areas per CONT and 8, 0.25m² areas per grazing treatment. Prior to harvest, botanical composition was determined visually using the Double DAFOR scale. Branch length was determined by measuring from the branch base to the end tip. Shrub survival was determined by counting dead, partially dead, and alive trees within each paddock. Forage availability was lowest for MIX at all sampling dates in 2007 (P<0.01). By the end of the 2007 grazing season, no differences between treatments in groundcover percentage were noted. Also, the percentage of grass and weeds, including SL, was not affected by treatment. At the end of the grazing season, legumes, other than SL, remained relatively abundant (P<0.09) in the grazed treatments but declined to zero in CONT. In 2006, AO branch length (growth) was affected (P<0.01) by MIX but no difference in branch length/growth was observed in the subsequent year. Reduced branch growth in the second year is likely due to the severe drought conditions that occurred. Shrub survival was lower after two years of MIX (61.0%; P<0.01) compared to the CONT (98.5%) and CAG (92.8%) treatments. In summary, adding goats to cattle improves pasture utilization and provides effective invasive species control on steep pasturelands.

113   The effect of breed type and year on real-time ultrasound carcass traits, performance and scrotal circumference of bucks enrolled in the Kentucky Buck Development Program. K. May*, B. Galbreath, R. Pitzer, P. Prater, and T. Wistuba, *Morehead State University*, *Morehead, KY*.

Bucks were weighed, scrotal measured, and ultrasonically scanned to study breed and year differences for performance, scrotal circumference, and 12th rib fat depth, in August of 2005, 2006 and 2007. Boer and commercial bucks (24 hd in 2005, 30 hd in 2006, and 30 hd in 2007) were delivered to Bowling Green , KY for the Kentucky Buck development program. Bucks were acclimated for 14 d with minimal supplementation and were then fed for 60 d in a performance type test. At the end of the test scrotal measurements were taken by an experienced veterinarian and carcass measurements were obtained by a CUP certified ultrasound technician. Measures of 12th rib fat depth and longissimus muscle area were taken with an ALOKA 500V ultrasound unit equipped with a 17.2 cm, 3.5 MHz linear transducer. Ultrasound images were then submitted to the ILIA lab (Gustine, TX) for determination of 12th rib fat depth and longissimus muscle area. There were no statistical differences for breed or the breed by year interaction, therefore data were combined and analyzed for year differences. On test weights were greatest for 2005 (P < 0.05) followed by 2007 and the 2006. Mid-test weights followed the same trend where weights were greatest for 2005 (P < 0.05) followed by 2007 and the 2006. However, there were differences in total gain and ADG in that the bucks in the 2007 test had increased total gain

and ADG than in the other years (P < 0.05). There were no consistent results for scrotal circumference although the bucks on test in 2005 did have larger (P < 0.05) scrotal circumferences than 2006 or 2007 bucks.

Key Words: Goats, Ultrasound, Performance

114   Carcass composition of Polypay versus White Dorper x Polypay crossbred lambs.   D. K. Aaron*, D. G. Ely, E. Fink, B. T. Burden, and M. M. Simpson, *University of Kentucky*, *Lexington*.

The objective of this study was to compare carcass characteristics of wether lambs differing in percentage White Dorper (WD) breeding and raised on pasture. Polypay (PP; n = 26), 1/2 WD x 1/2 PP (1/2 WD; n = 30), 3/4 WD x 1/4 PP (3/4 WD; n = 28), 7/8 WD x 1/8 PP (7/8 WD; n = 12) and 15/16 WD x 1/16 PP (15/16 WD; n = 6) lambs were selected for harvest from those produced in a grading-up mating scheme. Lambs were born in April, creep fed, and weaned at 70 d of age. Postweaning, lambs were managed on pasture and supplemented with grain at 2 to 3% BW. Lamb carcasses were harvested at a live target weight of 54 kg. Data were analyzed using mixed model procedures. Orthogonal polynomials were used to partition differences among lamb genetic types (0, 1/2, 3/4, 7/8, and 15/16 WD). Weaning weights were heaviest for PP, 1/2 WD and 3/4 WD and lightest for 15/16 WD lambs (Quadratic, P < 0.10). Postweaning ADG decreased as percent WD increased (Linear, P < 0.05). There were no lamb genetic type differences in age at harvest, but PP and 1/2 WD lambs were heaviest (55.8, 56.2, 55.3, 54.4, and 50.8 kg for 0, 1/2, 3/4, 7/8, and 15/16 WD, respectively; Quadratic, P < 0.01) and had the heaviest carcasses (25.9, 26.9, 26.4, 26.2, and 25.4 kg; Quadratic, P < 0.05). Rack weight increased as percent WD increased (1.92, 1.99, 2.25, 2.13, and 2.13 kg; Linear P < 0.10). There were no differences in leg or shoulder weights. Carcasses from 7/8 WD were fattest while carcasses from 15/16 WD lambs were leanest (Quadratic, P < 0.01). Longissimus muscle area was largest for 15/16 WD and smallest for PP lambs (Linear, P < 0.01). Yield grades were lowest for 15/16 WD lambs (2.2, 2.6, 2.8, 3.1, and 2.0; Quadratic, P < 0.01). Percent closely trimmed boneless retail cuts increased as percent WD breeding increased (47.6, 47.7, 47.7, 47.9, and 49.3%; Linear, P < 0.01). Results from this study indicate carcasses of WD crossbred lambs compare favorably to those of PP lambs for most traits.

Key Words: White Dorper, Polypay, Carcass characteristics

115   Induced copper deficiency by elevated molybdenum on growth performance and carcass characteristics of goat kids.   K. Beguesse*, S. Solaiman, S. Roper, N. Gurung, and K. Copedge, *Tuskegee University*, *Tuskegee, AL*.

An experiment was conducted to determine the effect of induced copper deficiency by increasing levels of molybdenum (Mo) on growth performance and carcass characteristics of male goat kids. Eighteen goat kids (avg BW = 25.6 ± 1.03 kg) were housed in individual pens and randomly assigned to three different treatment groups; 1) control (no additional Mo), 2) 5 ppm Mo and 3) 10 ppm Mo added. Animals were fed ad libitum twice daily a 50:50 hay:grain diet to meet daily nutrient requirements. Feed intake and refusals were monitored and intake was adjusted weekly. Body weights were recorded after a 4-h withdrawal from feed and water every 14 d. Blood samples were collected at the beginning, mid and last wk of the experiment to determine Cu, zinc (Zn), iron (Fe), and Mo as well as other metabolites. After 84-d, animals were slaughtered, liver tissue samples were collected and carcass traits were measured. Serum Cu did not change (P > 0.10); however, liver Cu reduced (linear, P = 0.003) as Mo increased in the diets. Serum Fe tended to decrease (linear, P = 0.09) and it was lowered (linear, P = 0.002) in the liver. Serum Zn tended to increase (linear, P = 0.09) but it did not change (P = 0.50) in the liver as Mo increased in the diet. Although Mo could not be detected in the serum, liver Mo tended to increase (linear, P = 0.07) as Mo increased in the diet. No differences were observed in blood urea nitrogen (P = 0.654), glucose (P = 0.722), or cholesterol (P = 0.360). However, serum total protein (linear, P = 0.034) and triglycerides (linear, P = 0.027) were reduced as Mo increased in the diets. No differences in ADG (P = 0.427) or G:F (P = 0.362) were observed. No differences in dressing percentage (P = 0.717), HCW (P = 0.609), cold carcass weight (P = 0.690), and body fat (P = 0.865) were observed among the treatment groups. Results of this study indicated that low copper diets with increasing levels of molybdenum did not negatively affect serum Cu, animal performance or carcass characteristics; however, it may alter some of the blood metabolites in goat kids.

Key Words: Copper, Goat, Molybdenum

116   Effectiveness of Regumate in synchronizing and inducing out-of-season breeding in goats.   J. L. Eierman*[1], R. A. Barczewski[1], N. C. Whitley[2], and D. J. Jackson[1], [1]*Delaware State University*, *Dover*, [2]*University of Maryland Eastern Shore*, *Princess Anne*.

The increased demand for goat meat and its by-products has placed a greater emphasis on elevating production levels. However, because some goats are seasonal breeders, the availability of goat products is variable throughout the year. The objective of the present study was to examine the effectiveness of using the synthetic progestagen, altrenogest (commercially available as Regumate™), in combination with the male effect, when compared to no hormonal priming before buck introduction in inducing out-of-season breeding in goats during the summer (May). Fifty-two Boer and Boer-crossbred meat-type does and 4 bucks located at Delaware State University were used in the experiment. To facilitate the use of the buck effect, males were removed from sight, sound and smell of females for 3 weeks prior to the beginning of the study. All goats were housed in a dry lot and group-fed a 12% CP corn-soybean meal based diet with ad libitum grass hay and water. For a period of 7 days, the treatment group (n = 26) received the dosage of Regumate™ labeled for horses (REG; 1ml/50kg) given orally, while the control group (CON; n = 26) received a similar dose of water. Following the treatment period, females were grouped for mating (= day 0) with bucks wearing marking harnesses for 15 days. Females were checked twice daily for mating and number of does marked was recorded to determine days to first mating and percentage mated. The percentage of does mated was similar for CON (100%) and REG treated does (100%). However, REG treatment reduced (P ≤ 0.001) the total number of days to mating when compared to the CON group (2.9 ± 1.8 and 6.3 ± 4.1 days, respectively). In summary, altrenogest decreased days to first mating, but all females were mated within 15 days after buck introduction, regardless of treatment. Therefore, under the conditions of this study, the buck effect alone was sufficient for inducing and synchronizing estrus in meat goats during the summer.

Key Words: Goats, Estrus induction, Altrenogest

117   Use of short-duration progestagen treatment combined with prostaglandin to synchronize estrus in hair sheep ewes.   S. Wildeus and J. R. Collins*, *Virginia State University*, *Petersburg*.

Accelerated mating systems can be managed more efficiently when ewes conceive early during the mating period. This experiment evaluated the estrous response and conception rate in hair sheep ewes during the transition to seasonal breeding following short-duration melengestrol acetate (MGA) feeding in combination with prostaglandin $F_2\alpha$ (PGF; Lutalyse®) at the end of MGA feeding. Mixed breed (Barbados Blackbelly, Katahdin, and St. Croix), adult ewes (n=104) were allocated to three treatment groups balanced by breed, and fed either corn/soybean meal supplement (1% of BW;16% CP) for 5 d without (control), with MGA (5 µg/kg BW/d), or with MGA followed by an injection of PGF (20 mg; i.m.) 24 h after end of MGA feeding. At time of PGF treatment ewes were allocated to single sire mating groups (7 groups, 11-17 ewes/group) of the same breed, balanced by treatment, and joined with fertile rams of the same breed equipped with marking harnesses. Estrus was detected in 8-h intervals for 5 d, and then daily for the remainder of the 30-d mating season. Pregnancy was determined by transrectal ultrasonography at the end and 25 d after the mating season. Effect of treatment on estrous response and pregnancy rate was determined by chi-square analysis. The incidence of synchronized estrus (within 4 d of onset of mating) was higher (P<0.001) in MGA+PGF (97.1%) than MGA (45.7%) and control (17.6%) ewes. Pregnancy rate to the synchronized estrus was also higher (P<0.001) in MGA+PGF (74.3%), than MGA (31.4%), than control (11.8%) ewes. However, overall pregnancy rates at the end of mating were similar for the three groups (85.5%), but were affected (P<0.01) by service sire (range: 53-100%). Time to first estrus was shorter (P<0.001) in MGA+PGF (2.1 d) than MGA (5.4 d), than

control (11.0 d) ewes. Results indicate that short-duration MGA feeding, combined with an injection of prostaglandin can be an effective means to synchronize estrus in hair sheep ewes during the transitional season.

Key Words: Hair sheep, Melengestrol acetate, Prostaglandin

118 Sperm motility, viability, and fertility of sheep and goat semen after extended solid storage at 4°C. S. Wildeus*, J. L. Mook, and J. R. Collins, *Virginia State University*, *Petersburg*.

Extended storage of semen without freezing can provide opportunities for expanded use of artificial insemination in small ruminants. This experiment evaluated the quality of ram and buck semen stored in solid state (gel) at 4°C for up to 96 h. Semen was collected on consecutive days by artificial vagina in hair sheep rams and meat goat bucks (4 males/species) and pooled. Semen was diluted in a Tris-egg yolk (2.5%) extender with or without gel (1g/100ml) to a concentration of 400 million sperm/ml, packaged in 0.25 ml straws, and stored horizontally at 4°C. Straws were evaluated for motility (Minitube SpermVision CASA) and viability (Giesma staining) at 24 h intervals for 96 h immediately after warming and after incubation at 37°C for 6 h. Fertility was assessed in semen stored for 72 h using timed, intrauterine artificial insemination in 50 nulliparous yearling ewes and does, following estrus synchronization with flurogestone acetate sponges (40 mg, 12-14 d) and eCG (400 IU) at sponge removal. Pregnancy rate and fetal numbers were determined by transrectal ultrasonography 20 d after AI. Data were analyzed for the effect storage (liquid vs. solid), length of storage, and incubation. In rams, motility decreased (P<0.001) linearly (83.6 to 63.7%), but was not affected (P>0.1) by type of storage. Sperm viability also decreased (P<0.001) linearly (78.1 to 52.9%), but was higher (P<0.05) in liquid (66.3%) than solid stored (59.5%) semen. In bucks, motility decreased (P<0.001) from 0 to 96 h, but more rapidly than in rams (83.5 to 50.2%). Neither motility nor viability were affected (P>0.1) by type of storage in bucks. There was no interaction (P>0.1) of type of storage with incubation for motility or viability in either species. Pregnancy rates were generally low (goats: 16.7%; sheep: 29.6%), and not affected (P>0.1) by type of storage (solid: 23.1%; liquid: 24.0%). Data suggest that solid storage of semen did not improve retention of motility and viability, or enhance fertility compared to conventionally processed semen after 4 d of cold storage.

Key Words: Semen, Hair sheep, Goats

119 Effect of egg yolk level, washing and extended pre-freeze equilibration on post-thaw motility of buck semen. J. L. Mook* and S. Wildeus, *Virginia State University*, *Petersburg*.

There is some evidence that egg yolk in extenders may negatively impact buck semen through interactions with a coagulating enzyme in seminal plasma. This experiment evaluated the effect of egg yolk concentration and removal of seminal fluid on post-thaw motility of semen frozen immediately or after storage at 5°C for 24 h. Semen was collected by artificial vagina in two trials during the breeding season. Ejaculates from three bucks exceeding 70% motility were pooled for each trial. Pooled semen was extended in Tris-based extender containing 4% glycerol and either 14% (HEY) or 2.5% (LEY) egg yolk. Samples were either directly extended to a final concentration of 400 mil/ml and loaded into 0.25 ml straws, or seminal fluid was removed by centrifugation and washing in Tris twice prior to extension. Straws were cooled to 5°C over 3 h and frozen immediately (T0), or held for 24 h before freezing (T24). Straws were frozen in liquid nitrogen vapor for 7-8 min, 4 cm above the liquid phase, and stored frozen for 14 d. Straws were thawed at 37°C, diluted in Tris-BSA, allowed to equilibrate for 5 min, and analyzed using a Minitube SpermVision CASA system. Data were analyzed in a model with trial, egg yolk level, washing, and holding as main effects. Motility (TMOT) of pooled fresh semen was different between trials (78.5 vs. 74.1%; P<0.05), but as there were no significant interactions of trial with other main effects, data were pooled for subsequent analysis. Post-thaw TMOT was higher (P<0.001) for HEY (53.0%) than LEY (40.9%), and higher (P<0.001) in T24 (60.4%) than T0 (33.5%). Washing increased post-thaw TMOT in T24 (64.3% vs. 56.5%; P<0.05), but not in T0 semen (33.4 vs. 33.6%). Progressive motility mirrored TMOT, whereas linear motility was only affected by egg yolk concentration. These results indicate that a high egg yolk extender and inclusion of

seminal plasma had no detrimental effect on post-thaw motility of buck semen, and that an extended period of equilibration at 5°C prior to freezing can improve the recovery of motility in cryopreserved goat semen.

Key Words: Goat, Semen, Cryopreservation

120 Evaluation of average fiber diameter of mohair fleeces prior to shearing using a field- portable Near-infrared Reflectance Spectroscopy instrument. S. D. Prince*[1], D. R. Tolleson[1], C. J. Lupton[2], J. W. Walker[2], K. L. Rater[1], and E. E. Wiedower[1], [1]*Texas A&M University*, *College Station*, [2]*Texas A&M University System*, *San Angelo*.

Two trials were conducted to determine the ability of a portable Near-Infrared Reflectance (NIR) Spectroscopy instrument to predict average fiber diameter (AFD) of mohair fleeces from Angora goats prior to shearing. Trials were conducted over two consecutive shearings of the same flock of mixed age Angora goats maintained by Texas Agricultural Experiment Station (TAES) scientists at the Read Ranch, Crockett County. NIR spectra (~850 to 1750nm) were collected with an Ocean Optics NIR512® spectrometer fitted with a fiber optic reflectance probe. In trial 1 (N= 134), NIR spectra were collected from a single location on the mid-section of individuals of varying fleece AFD prior to shearing. In trail 2 (N= 194), NIR spectra were collected from three separate locations on the animal (shoulder, mid-section, and hindquarter) of individuals of varying fleece AFD prior to shearing. The three spectra were then averaged to create one spectrum/animal. After scanning, all the animals were shorn and AFD was determined for individual fleeces at the TAES Wool and Mohair Research Lab, San Angelo using a standard instrument for measuring animal fiber fineness (the Optical Fiber Diameter Analyzer 100). Spectra from trial 1 were assigned to three groups based on AFD. Group1 = AFD<25.0, Group2 = AFD≥25.0 and ≤34.0, Group3 = AFD>34.0; the same grouping was done with the spectra from trial 2. A discriminant analysis algorithm was developed in SAS® and applied to mathematically pretreated 1st derivative with boxcar smoothing spectra from both of the trials. In trial 1, percentages of correct groupings were 82.22% for group 1, 79.50% for group 2, and 80.00% for group 3. In trial 2, percentages of correct groupings were 100% for group 1, 86.78% for group 2, and 83.33% for group 3. An averaged spectrum from three sampling areas per animal may glean more robust information than that of one spectrum from one area on the animal. Portable NIR spectrometers show potential in evaluating mohair AFD prior to shearing.

Key Words: Near infrared spectroscopy, Mohair, Angora

121 Use of the FAMACHA system to evaluate gastrointestinal nematode resistance in offspring of Katahdin rams. J. Burke*[1] and J. Miller[2], [1]*USDA*, *Booneville, AR*, [2]*Louisiana State University AgCenter*, *Baton Rouge*.

High levels of anthelmintic resistance in gastrointestinal nematodes (GIN) of small ruminants have created the need for animals with greater resistance to these parasites. The objective of this experiment was to evaluate the effectiveness of the FAMACHA system in identification of parasite resistant offspring, thus identification of stud rams with greater resistance. Katahdin ewes bred in separate groups to two Katahdin sires to lamb in spring (2004, 2005: rams 106 and 2178; 2006, 2007: rams 10 and 4067) at the USDA, Agricultural Research Station in Booneville, Arkansas produced 20 to 40 offspring/sire each year. Ewes and lambs grazed mixed grass (predominantly bermudagrass and ryegrass) pastures and were supplemented with corn/soybean meal between 30 d pre- and 60 d post-lambing (ewes) and 45 d of age until weaning (lambs) at 95 d of age. Lambs were supplemented (up to 500 g) post-weaning when forage quality became poor. Blood samples and feces were collected to determine blood packed cell volume (PCV) and fecal egg counts (FEC) and FAMACHA scores were determined at 90, 120, and 150 d of age. Lambs were dewormed if anemic (PCV < 19% or FAMACHA score >2) and data removed within 30 d after deworming. Data were analyzed for the 2004/2005 and 2006/2007 groups using general linear models with yr, sex of lamb, and sire nested within yr as variables. There tended (*P* < 0.10) to be sire differences for FEC at 90 and 120 d of age, but not at 150 d of age. Sire differences were detected (*P* < 0.05 or less) for PCV and FAMACHA at all time points. Rams producing offspring that were less anemic were dewormed less by 150 d of age. The FAMACHA system can be used to identify superior sires of

parasite resistance. Thus, resistance in the flock can be increased by selecting replacement animals with greater resistance.

122   On-farm integrated management of Katahdin lambs for gastrointestinal nematodes (GIN). A. Wells[1], P. Casey*[2], J. Burke[3], J. Miller[4], and C. Trice[2], [1]*Springpond Holistic Animal Health*, *Prairie Grove, AR*, [2]*Heifer International*, *Perryville, AR*, [3]*USDA*, *Booneville, AR*, [4]*Louisiana State University AgCenter*, *Baton Rouge*.

There is a growing interest in production of organic livestock and a demand for meat animals raised without chemicals. The greatest challenges in raising these animals in the southeastern US are management of GIN and adequate nutrition. To maintain organic status of lambs, chemical anthelmintics are prohibited and only certified organic feeds can be used as supplements. The objective of this experiment was to examine two grazing strategies and three deworming treatments for control of gastrointestinal nematodes. Katahdin lambs (n = 96) born in mid-March to mid-April, along with their dams (n = 61), rotationally grazed cool season forages (vetch, chicory, clovers) or mixed warm season grasses, clover and broad leaf forbs during early to late summer 2007 at the Heifer International Ranch in Perryville, AR. Sheep were rotated every 1 to 2 d. Lambs were weaned at 120 d of age. One group of lambs (n = 28) with their dams grazed a paddock of primarily chicory for a 7 d period every 28 d. FAMACHA scores (1 = red or healthy; 5 = severely anemic) were determined and fecal samples collected for fecal egg count (FEC) determination every 14 d from approximately 42 d of age until weaning. When FAMACHA scores were 4 or 5, lambs were treated orally with 1 g copper oxide wire particles (COWP; n = 2 of 25; chicory group, n = 2 of 25), 50 ml Garlic Barrier (Garlic Research Labs, Inc., Glendale, CA; diluted to 150 ml with water; n = 3 of 21), or 45 g papaya seeds administered twice three d apart (n = 3 of 22). FEC increased over time and was similar among treatment groups. However, number of lambs that required deworming was low (12%) and none was treated before 120 d of age. Garlic and papaya failed to reduce FEC. Rotational grazing management and GIN resilience of the Katahdin breed likely attributed to low number of lambs that required treatment for GIN. Further research is needed on alternatives to chemical anthelmintics.

123   Evaluation of parasite load in hair- or wool-type lambs on drylot or wheat pasture. L. A. Appeddu*[1], G. Poudyal[1], A. Hughes[1], M. A. Brown[2], and S. P. Hart[3], [1]*Southwestern Oklahoma State University*, *Weatherford*, [2]*USDA-ARS, El Reno, OK*, [3]*E (Kika) de la Garza Institute for Goat Research, Langston University*, *Langston, OK*.

This research evaluated effects of breed type and diet on parasite load during Spring 2006 and 2007 in fall-born lambs. Lamb were purebred St. Croix (hair; H), Dorset (wool; W), and crossbreeds (HxW). In 2006, lambs were on drylot (H: n=6; W: n=6) and sampled on Mar 10, Apr 7, and Apr 28. In 2007, lambs grazed wheat (H: n=3; W: n=3; HxW: n=4) and sampled on Feb 16, Mar 9, Mar 30, and Apr 20. In 2007, half were supplemented with corn. Plasma was evaluated for red blood cell percentage (RBC%) and serum for total protein (2007 only). A sugar flotation technique was used to count coccidian oocysts (*Eimeria*) and stomach worm eggs (*Haemonchus, Ostertagia, Trichostrongylus*) in feces. Prior to analysis, data for fecal parasite counts were normalized via log transformation, and geometric means are presented on a per gram basis. In 2006, no differences (P>0.36) were found between H and W sheep for RBC% (35 vs 36 ± 2.7%) or oocysts (2033 vs 1493, CV=245%). Oocysts decreased (P=0.02) from 2772 and 2218 to 861 over collection dates. In 2007, RBC% decreased (P<0.001) over the grazing season; time had no effect (P>0.28) on other measures. Neither supplement (P>0.61) nor breed type (P>0.40) affected RBC% and total serum protein. Egg counts were higher (P=0.02) in supplemented (995 eggs, CV=113%) versus unsupplemented lambs (357 eggs, CV=376%). Breed type affected oocyst (P=0.01) and egg (P=0.12) counts. The W lambs had higher parasite loads (2693 oocysts, CV=82%; 975 eggs, CV=208%) as compared to H (979 oocysts, CV=139%; 328 eggs, CV= 96%) and HxW (1005 oocyts, CV=162%; 644 eggs, CV=201%) lambs. In 2006, drylot lambs had a higher overall coccidian load which declined as lambs grew older. In 2007, close quarters of supplementation

may have increased exposure of stomach worm eggs to grazing lambs, and hair-type breeds tended to have lower parasite counts. Results suggest genetics and management impact parasite load and type in weaned lambs.

124   Effect of vaccinating grazing ewes with H-11/H-gal-GP antigens from intestinal membrane cells on established *Haemonchus contortus* infection. J. E. Miller*[1], K. P. Shakya[1], and W. D. Smith[2], [1]*Louisiana State University AgCenter, Baton Rouge*, [2]*Moredun Research Institute, Edinburgh, Scotland, UK*.

Vaccination of lambs with H-11/H-gal-GP antigens has been effective in preventing *Haemonchus contortus* initial infection under experimental conditions. These antigens have not been tested against established infection under continuous grazing conditions. Antigens were purified from the intestinal membrane cells of adult worms and combined with Quil A (adjuvant). Ten grazing naturally infected crossbred ewes were randomly assigned to 2 groups (n=5 each). The vaccinate group received the antigens on Day 0, 21 and 42, and the control group received Quil A only. Infection was monitored weekly by fecal egg count (FEC) and blood packed cell volume (PCV) over an 84 d period. Mean FEC of the vaccinated group was significantly (P<0.05) lower than the control group from Day 28 to the end of the study, and PCV remained similar between the groups. Results of this study indicated that H11/H-gal-GP vaccination effectively prevented reinfection. H11/H-gal-GP antigens show promise for controlling *H. contortus* under grazing conditions in ewes.

125   The effect of sericea lespedeza, fed as pellets, on established infection of *Haemonchus contortus* in sheep. J. E. Miller*[1], J. A. Mosjidis[2], T. H. Terrill[3], and J. M. Burke[4], [1]*Louisiana State University AgCenter*, *Baton Rouge*, [2]*Auburn University*, *Auburn, AL*, [3]*Fort Valley State University*, *Fort Valley, GA*, [4]*USDA-ARS*, *Booneville, AR*.

Control of *Haemonchus contortus* has traditionally relied on the use of anthelmintics. The development of anthelmintic resistance dictates that alternative approaches are needed. Grazing sericea lespedeza (SL, a forage containing condensed tannin), and feeding it as hay and ground hay has reduced fecal egg count (FEC) and worm burden in sheep and goats. This study evaluated the effect of SL, fed as pellets, on naturally acquired *H. contortus* infection in lambs. Twenty lambs were removed from pasture and randomly allocated to two treatment groups (n=10 each). SL pellets were fed over a 35 d period to one group while the other group was fed bermudagrass hay (control). After the 35 d feeding period, both groups were fed bermudagrass hay for an additional 14 d. The control group FEC continually increased while the SL fed group FEC decreased 50% by d 7 and remained significantly (P<0.05) reduced over the SL feeding period. During the course of the study, four control animals had to be dewormed (one each on d 14, 21, 35 and 42) due to clinical signs of haemonchosis. After the SL feeding period, FEC did not increase in the SL fed group. This indicated a lack of effect on female worm fecundity which is contrary to previous studies. Due to deworming, there was no difference in FEC between groups at the end of the study; therefore, worms were not recovered. Results indicated that SL, fed as pellets, reduced the worm burden (based on FEC) of naturally acquired infections which could help reduce pasture contamination.

126   Use of sericea lespedeza hay to reduce worm burden in goats. S. A. Shaik*[1], T. H. Terrill[1], J. A. Mosjidis[2], G. S. Dykes[1], J. E. Miller[3], B. Kouakou[1], G. Kannan[1], and J. M. Burke[4], [1]*Fort Valley State University*, *Fort Valley, GA*, [2]*Auburn University*, *Auburn, AL*, [3]*Louisiana State University AgCenter*, *Baton Rouge*, [4]*USDA, ARS, Booneville, AR*.

Infection with parasitic gastrointestinal nematodes (GIN) is a major health challenge in goats produced in warm, humid climates, such as the southern United States, and these parasites have developed resistance to available anthelmintic drug treatments. A natural alternative treatment is feeding dried sericea lespedeza [SL, *Lespedeza cuneata* (Dum.-Cours. G. Don)], a perennial warm-season

forage legume rich in condensed tannins. Although effective against *Haemonchus contortus*, a blood-feeding GIN, when fed at 75% of daily intake, information on efficacy of lower levels of SL hay in the diet of goats is needed. A feeding trial was completed with 32 Spanish/Boer/Kiko cross yearling bucks given four treatment diets of 75% hay and 25% concentrate (n = 8, two pens per treatment, 4 goats/pen). The hay part of each diet consisted of a combination of ground SL (0, 25, 50, and 75%) and bermudagrass (BG, *Cynodon dactylon* (L.) Pers.; 75, 50, 25, and 0%). The bucks acquired a natural GIN infection on pasture and then were moved to pens. After a 3-wk adjustment period, the goats were stratified by fecal egg count and blood packed cell volume, randomly assigned to pens and treatments, and then fed the diets for six weeks. At the end of the trial, the goats were slaughtered and adult GIN recovered from the abomasum and small intestines for counting and identification to species. Goats fed SL hay at 75, 50, and 25% of the diet had reduced adult H. contortus in the abomasum by 75 (P<0.05), 44 (P=0.13), and 58% (P<0.05), respectively, but had no effect on *Trichostrongylus colubriformis*, a small intestinal GIN. With relatively high efficacy against *H. contortus*, which is by far the most pathogenic GIN in small ruminants, even when fed at only 25 % of the diet, ground SL hay has excellent potential as a natural alternative to chemical anthelmintics.

Key Words: Sericea lespedeza, Gastrointestinal nematodes, Goats

127   Control of *Haemonchus contortus* infestation in ewes with copper sulfate. M. M. Simpson*, D. K. Aaron, E. Fink, B. T. Burden, and D. G. Ely, *University of Kentucky*, *Lexington*.

The objective of this study was to determine efficacy of CuSO4 within a management program for control of Haemonchus contortus infestation in ewes at weaning.Lambs sired by White Dorper rams and born to 65 Polypay and White Dorper x Polypay ewes were weaned on March 16 at 60 d of age. Ewes were evaluated the day before weaning for eye color (FAMACHA), hematocrit (PCV, %), and fecal egg count (FEC, eggs/g feces) to identify ewes requiring a 1% $CuSO_4$ drench for control of a naturally occurring *Haemonchus contortus* infestation. After lambs were separated, all ewes were maintained in drylot for 24 h without feed or water. Then, ewes were provided 0.45 kg grass hay/hd and had ad libitum access to water. Those (43 hd) with FEC < 6,000 were turned to pasture after hay consumption (ND = nondrenched). Ewes with FEC > 6,000 remained in drylot (D = drenched) and received another 0.45 kg grass hay/ hd. Forty-eight hours after lamb removal, drylot ewes (22 hd) were drenched with 100 ml of $CuSO_4$ solution, fasted for 6 h, and fed an additional 0.45 kg grass hay/hd. Ewes were fed 0.9 kg grass hay 24 h later and joined ND ewes on grass pasture. FAMACHA, PCV, and FEC were repeated on all ewes 12 d after weaning lambs. FAMACHA score and PCV increased 16 and 3% in ND ewes. Increases of 20 and 7% were found for D ewes. FEC of ND ewes averaged 3,200 at weaning and 1,900 eggs/g feces 12 d later. FEC of D ewes averaged 9,900 and 2,900 eggs/g feces on the same dates (P < 0.05). In a second study, 73 Hampshire ewes were subjected to the same weaning regime from March 27 to April 9. Forty-two were ND; 31 had FEC > 6,000. FAMACHA scores of ND and D decreased 7 and 16%. PCV increased 13 and 26% in ND and D ewes. FEC of ND ewes increased from 3,000 on March 27 to 4,000 on April 9 (P < 0.01) as FEC of D ewes decreased from 10,000 at weaning to 3,700 on April 9 (P < 0.01). These results show CuSO₄ treatment can control *Haemonchus contortus* infestation in ewes at weaning.

Key Words: Ewes, Weaning, *Haemonchus contortus*

128   Comparison of sheep and goats for efficacy of copper oxide wire particles against gastrointestinal nematodes. F. A. Soli*[1], T. H. Terrill[1], W. R. Getz[1], S. A. Shaik[1], M. Vanguru[1], A. K. Vuggam[1], J. E. Miller[2], and J. M. Burke[3], [1]*Fort Valley State University*, *Fort Valley, GA*, [2]*Louisiana State University AgCenter*, *Baton Rouge*, [3]*USDA, ARS, Booneville, AR*.

Copper oxide wire particles (COWP), when given as a bolus, can effectively control gastrointestinal nematode (GIN) infection in sheep and goats, but species differences may exist. Past trials with sheep and goats given COWP have been completed at various locations, often using different dosages. To allow a direct comparison, a trial was designed comparing efficacy of a 2-g dose of COWP against GIN in 6-month-old lambs (Dorper-cross, intact males) and kids (Spanish, intact males) grazing the same pasture area (predominantly bermudagrass;

Cynodon dactylon (L.) Pers). Half the kids and lambs were given no COWP as controls, for a total of four treatment groups (n = 12/group). Fecal and blood samples were collected weekly from individual animals for four weeks posttreatment for determination of fecal egg count (FEC) and packed cell volume (PCV), respectively, after which half the animals in each treatment group were slaughtered for recovery of adult GIN from the abomasum and small intestines. Blood and feces were sampled in the remaining animals for an additional two weeks. Treatment with COWP reduced (P<0.01) FEC in lambs and kids by 94 and 75 %, respectively, within a week, and these differences remained throughout the trial (83 and 91 % reduction in lambs and kids, respectively, at time of slaughter, and 87 and 83 % reduction in remaining animals two weeks post-slaughter). Blood PCV was higher in COWP-treated animals at the time of slaughter, with a greater difference in kids (11.6 and 18.9 % for controls and COWP-treated animals, respectively; P<0.01) than lambs (20.1 versus 23.9 %; P<0.08). Although there were some species differences in efficacy against GIN, with an apparently more rapid effect in lambs than kids, COWP was highly effective in both species and has great potential as a non-chemical parasite control strategy for small ruminants.

Key Words: Copper oxide wire particles, Sheep, Goats

129   Efficacy of copper oxide wire capsules as an anthelmintic for weanling kids. S. Hart* and Z. Wang, *E.(Kika) de la Garza American Institute for Goat Research*, *Langston, OK*.

The efficacy of copper oxide wire capsules as an alternative anthelmintic was studied in weaned Boer × Spanish cross kids 12-16 weeks of age with an average weight 12.5 kg. Kids were weaned and the following day, 60 kids with FAMACHA eye scores greater than 3 were selected and randomly assigned to treatments. Treatments were N (control, no treatment), C (a gelatin capsule containing 1.9 g of copper oxide wires) or L (12 mg/kg levamisole anthelmintic orally). After treatment, kids were moved to a native grass pasture that had not been grazed for 6 weeks. They were supplemented with .21 kg/hd of 16% CP concentrate per day. Following weaning, a number of kids had diarrhea due to coccidiosis and all animals were treated with amprolium in the drinking water. Fecal samples were not taken from any animal that had diarrhea. This resulted in 13 to 18 animals per treatment. Fecal samples were taken immediately prior to treatment and 9 days later. Fecal samples were analyzed for fecal egg counts by a modified McMaster procedure. Fecal egg counts were normalized using the natural log function prior to statistical analysis. The SAS model used the pretreatment fecal egg count as a covariate for treatment effect. Least square means were separated using the PDIFF function of SAS. Copper oxide wire capsules and L were equally effective in reducing fecal egg counts as compared to the control (C=78.7%, L=82.7%, N=53.4%, P<.002). There was no difference between C and L (P>.20). The fecal egg count reduction for the control could be attributed to low intakes the day after weaning elevating initial fecal egg counts. The less than 95% fecal egg count reduction with levamisole indicated anthelmintic resistance. Copper oxide wire particles hold promise as an alternative anthelmintic.

Key Words: Goat, Anthelmintic, Copper

130   Using the FAMACHA© system to control internal parasites in meat goats grazing summer pastures. S. Schoenian*[1], J. Semler[4], M. B. Bennett[3], D. L. Jackson[2], and J. Dietz-Band[5], [1]*University of Maryland Cooperative Extension*, *Keedysville*, [2]*Delaware State University*, *Dover*, [3]*West Virginia University Cooperative Extension*, *Martinsburg*, [4]*University of Maryland Cooperative Extension*, *Boonsboro*, [5]*Many Rocks Farm*, *Keedysville, MD*.

Gastro-intestinal parasites, especially the barber pole worm (Haemonchus contortis), limit the profitability and expansion of the meat goat industry in many states. Past parasite control programs which relied primarily upon anthelmintic treatments are no longer effective and/or sustainable, due to the widespread emergence of drug-resistant worms. FAMACHA© is a novel system for assessing barber pole worm infection in small ruminants and determining the need for deworming individual animals. In 2006 and 2007, the FAMACHA© system was used to control internal parasites in male goats participating in the Western Maryland Pasture-Based Meat Goat Performance Test. From early June until early October, the goats were rotationally grazed on 10 to 12 acres of pasture, composed primarily of cool season grasses. The goats were dewormed upon arrival

to the test site, and fecal samples were collected at d-0, d-28, and d-56. While on test, the goats were handled every 14 d to determine their FAMACHA© and body condition scores. Goats with FAMACHA© scores of 4 or 5 were dewormed with an anthelmintic, while those with scores of 1 or 2 were not treated. Some with scores of 3 were treated, depending upon other factors. Body weights were determined every 14 to 28 d. In 2006, 51 anthelmintic treatments were administered to the 31 goats for an average of 1.65 treatments per animal (excluding the initial deworming). Four goats did not require deworming during the testing period. Thirteen were treated once. Seven were dewormed twice. Only seven goats required 3 or more anthelmintic treatments. The need for anthelmintic treatment peaked on August 4 when two thirds of the goats required deworming. ADG was 86 ± 20 g per day. Only 4 anthelmintic treatments were administered to the 47 goats participating in the 2007 meat goat test (excluding the initial treatment). The lack of need for deworming was attributed to drought conditions. ADG was 115 ± 16 g per day. The FAMACHA© system proved to be an effective tool for monitoring and controlling internal parasitism in meat goats grazing summer pastures in Western Maryland.

Key Words: Meat goats, Internal parasites, FAMACHA

131 Herbal dewormer fails to control gastrointestinal nematodes (GIN) in goats. A. Wells[1], P. Casey*[2], J. Burke[3], and R. Kaplan[4], [1]*Springpond Holistic Animal Health*, *Prairie Grove, AR*, [2]*Heifer International*, *Perryville, AR*, [3]*USDA*, *Booneville, AR*, [4]*University of Georgia*, *Athens*.

Chemical dewormers are prohibited from use in organic livestock and anthelmintic resistance is an issue for conventional producers. Herbal dewormer may be an alternative to chemical dewormers for GIN control. The objective of this experiment was to examine the effectiveness of a commercially available herbal dewormer to control GIN in goats. Dairy goats of mixed age groups grazed one of two poor quality mixed grass pastures between March and July 2006 at the Heifer International Ranch in Perryville, AR. Goats were supplemented with grass hay and concentrate (at least 500 g/d dependent on milk production of does). Goats were untreated or administered herbal dewormer (Molly′s Finest; Fias Co Farm; http://fiascofarm.com; n = 12/treatment) according to manufacturer recommendations. FAMACHA scores (1 = red or healthy; 5 = severely anemic) were determined and fecal samples collected for fecal egg count (FEC) determination every 14 d between 0 d (first day of grazing) and 112 d. Once FAMACHA score escalated to 5, goats in both groups were dewormed with moxidectin (1 ml/22 kg body weight). Data were analyzed using a mixed model procedure (SAS) with treatment group, sex, and pasture rep as variables repeated over days. FEC were log transformed. FAMACHA scores were greater ($P < 0.005$) for the herbal treated goats and increased after March for all groups. FEC were greater for herbal treated goats on Pasture A compared with B by 42 d, but similar among groups thereafter. The herbal dewormer failed to control GIN in these goats.

Key Words: Goats, Herbal dewormer, Haemonchus contortus

Undergraduate Student Competitionn

132 Fabrication method of the *infraspinatus* muscle affects WBSF. C. A. Ahrens*, J. W. S. Yancey, and J. K. Apple, *University of Arkansas*, *Fayetteville*.

The *infraspinatus* (INF), the second most tender muscle in the beef carcass, has been underutilized due to its location and large piece of connective tissue that runs through the middle of the muscle. New methods of fabrication have generated the flat-iron steak increasing its popularity to consumers. It is not known whether fabrication method affects the results of mechanical measures of tenderness. Therefore, the objective of this study was to determine if fabrication method (flat-iron vs. traditional) affected Warner-Bratzler Shear Force (WBSF) of INF steaks cooked to 65.5° and 71.1°C and to determine differences between anatomical locations of flat-iron steaks. Thirty INF muscles were randomly assigned to a combination of age (7 or 21 d) and end point temperature (65.5°C or 71.1°C). After aging, each muscle was fabricated into 2 traditional (top-blade) and 2 flat-iron steaks, then frozen. Flat-iron steaks were identified for their anatomical location; the medial portion was closest to the scapula, whereas the lateral portion was covered with subcutaneous fat. Steaks were cooked on a Star Pro-Max 2 sided grill using thermocouples to monitor internal temperature. After cooling to room temperature, 6 cores were removed parallel to the fiber direction and sheared with a WBSF attachment using the Instron Universal testing machine. Traditional steaks had higher WBSF values than flat-iron steaks (3.30 vs. 2.96, *P*<0.05) and a higher within-steak SD (0.817 vs. 0.505, *P*<0.05). Endpoint temperature did not have an effect (*P*>0.05) on the WBSF on either the traditional or flat-iron steaks. Medial flat iron steaks had higher WBSF values (3.77 vs. 2.47, *P*<0.05) after 7 d aging; however, the medial and lateral sides had a very similar (*P*>0.05) WBSF after 21 d aging. This study indicated that traditional, flat-iron steaks were more tender and had less within-steak variation than top-blade steaks. Furthermore, after 7 d aging, the medial side of the INF was more tender than the lateral side, and the lateral side required an additional 14 d of aging to produce steaks with WBSF comparable to the medial side.

Key Words: Beef, *Infraspinatus*, Warner-Bratzler shear force

133 Characterization of a QTL for disposition on BTA8. C. R. Boldt*, C. A. Abbey, and C. A. Gill, *Texas A&M University*, *College Station*.

In any production setting, cattle temperament impacts handling and performance. We have previously identified a partially paternally imprinted QTL at 0cM on BTA8 that overlaps a region on HSA8 associated with Schizophrenia in humans. The objective of this study was to identify candidate genes for this QTL. *BMP1* and *BIN3* are paternally imprinted genes in the human Schizophrenia region predicted to map to BTA8. *BMP1* encodes a metalloprotease involved in embryonic patterning and the *BIN3* protein is involved in cytokinesis. Primers were designed to amplify a 366bp product from exons 15 to 16 of *BMP1* and a 436bp product from exons 7 to 8 of *BIN3*. The TAMU bovine bacterial artificial chromosome (BBAC) library was screened by PCR with the *BMP1* and *BIN3* primers. Sequencing verified that 224R4C8 was positive for *BMP1* and both 318R1C8 and 14.66R4C2 contained *BIN3*. Amplicons from 19 Angus and 15 Brahman grandparents of the Angleton resource herd were sequenced using the *BMP1* and *BIN3* primers. No SNP were found for *BMP1*, while there were 3 SNP in the *BIN3* amplicon. In intron 7, G/A and C/T transitions were detected at positions 46,961 (SNP1) and 47,053 (SNP2) from the start codon, respectively. In exon 8, a silent T/G transversion was found at position 47,165 (SNP3), which will be used to evaluate the imprinting status of *BIN3*. Brahman grandparents were homozygous GG for SNP1 and in the Angus grandparents the genotype frequencies for GG, GA, and AA were 26.3%, 68.4% and 5.3%, respectively. SNP2 and SNP3 were in complete linkage disequilibrium. Angus grandparents were homozygous CCTT and in the Brahman grandparents the genotype frequencies for TTGG, CTGT and CCTT were 53.3%, 33.3% and 13.3%, respectively. *BMP1* and *BIN3* both mapped outside of the most likely location of the disposition QTL on BTA8 and we are currently characterizing *FTFD1* and *CTSB* as 2 additional candidate genes for this QTL. A more complete understanding of the genes that affect cattle temperament will facilitate their incorporation into breeding programs to improve performance in typical livestock production settings.

Key Words: Disposition, SNP, QTL

134 Determining ruminant dietary overlap via near-infrared reflectance spectroscopy (NIRS) of feces: I. calibration development. K. L. Rater*, S. D. Prince, D. R. Tolleson, E. J. Earlywine, K. G. Kreuger, K. K. Banik, and J. C. Miller, *Texas A&M University*, *College Station*.

NIRS of feces has been used to determine the nutritional value of an animal's diet. Our hypothesis is that animals with similar diets will have similar fecal NIR spectra. An experiment was conducted to create a calibration for using NIRS of feces to determine dietary overlap of sympatric small ruminants. Calibration development is the first step in creating an NIRS application that can potentially determine both the existence and extent of competition for forage among free-ranging ruminants. Sheep (*Ovis aries*, n=7) and goats (*Capra hircus*, n=7) were fed 7 unique diets consisting of various combinations of timothy (*Phleum pratense*, ~6.3 CP), bermuda (*Cynodon dactylon*, ~13.9 CP), and alfalfa (*Medicago sativa*, ~22.1 CP) forages. Sheep and goats were randomly paired and given the same diet for 7 days. The trial continued for 7 weeks until each pair received every diet. Fecal samples were collected in the morning and evening of days 6 and 7 of each trial. Three individual pellets from each animal at each collection were scanned using an OceanOptics NIRS 512® portable spectrometer, and an average was taken of the three scans to make specific comparisons. Comparisons in order of expected decreasing similarity were: AM vs. PM, Day 6 vs. Day 7, sheep vs. goat (consuming the same diet), and sheep vs. goat (consuming different diets). Difference spectra were obtained for each comparison and these values were then ranked from least to greatest to create difference ranked (DR) spectra. Linear regression was used to create a predictive equation for percent diet similarity (0 to 100%) using DR spectra at the 80th percentile (DR80). The resulting equation was: % diet similarity=-324.62*DR80+157.31 (RSQ=0.97, SE=9.68). The use of portable NIR with DR spectra did indicate differences in fecal chemistry and the equation developed could be used to evaluate dietary overlap of free-ranging ruminants.

Key Words: Near infrared reflectance spectroscopy, Dietary overlap, Difference ranked spectra

135 Determining ruminant dietary overlap via near-infrared reflectance spectroscopy (NIRS) of feces: II. Field application. E. J. Earlywine*, D. R. Tolleson, S. D. Prince, K. L. Rater, J. C. Miller, M. J. Kennedy, W. R. Shaw, B. R. Thomas, and T. A. Brown, *Texas A&M University*, *College Station*.

NIRS of feces had been applied to ungulates to determine diet quality. In this study, NIRS was used to determine diet overlap of small ruminants. This technique has not been previously used to determine diet overlap. We compared the fecal chemistry between sheep (*Ovis aries*; 56.41 kg) and goats (*Capra hircus*; 41.91kg) in a pasture setting, to evaluate the dietary overlap calibration developed by part one of this study. These animals grazed a one-hectare pasture for six weeks. A pre-grazing vegetation transect indicated that there was 3440 kg/ha total standing crop, 704 kg/ha in forbs, 276 kg/ha in arboreals and 2458 kg in grasses. A post grazing vegetation transect indicated that there was 3771 kg in total standing crop, 662 kg/ha in forbs, 276 kg/ha in arboreals, and 3060 kg/ha in grasses. Three individual fecal pellets per animal at each collection were scanned using an OceanOptics NIRS 512® portable spectrometer and an average calculated to make specific comparisons. Difference spectra were obtained for each comparison and these values ranked from least to greatest to create difference ranked (DR) spectra. Linear regression was used to create a predictive equation for percent diet similarity (0 to 100%) using DR spectra at the 80th percentile (DR80). The resulting equation was: % diet similarity = -324.62*DR80+157.31 (RSQ = 0.97, SE = 9.69). DR spectra were calculated by subtracting week 2, 3, 4, and 5, from week 1 respectively. In addition, the average goat spectra were subtracted within each week from the average sheep spectra. The results indicate that DR spectra from week 2 was 70.75% similar, week 3 was -32.65% similar, week 4 was 57.61% similar, and week 5 was 17.16% similar to week 1 respectively. The percent similarity between sheep and goat DR spectra was 71.28, 53.74, 90.28, 81.17, and 88.13 for week 2 to 5 respectively. Expected differences in diet similarity were observed between week and species. Portable NIRS can determine diet overlap between sympatric ruminants.

Key Words: Near infrared spectroscopy, Diet overlap, Small ruminant

136 Changes in thermal gradients of the external genitalia of neonatal pigs after oral exposure to soy-derived phytoestrogen genistein and estradiol. W. C. Brookshire*[1], K. W. Necaise[1], K. Moulton[1], D. L. Christiansen[1], M Crenshaw[1], C. G. Scanes[2], and P. L. Ryan[1], [1]*Mississippi State University*, *Mississippi State*, [2]*University of Wisconsin at Milwaukee*.

Thermal imaging is frequently used to assess physiological or pathological changes in soft tissues. As part of a larger study investigating the role of phytoestrogen exposure of neonatal pigs (NP) on reproductive tract development, a subset of NP were monitored to determine whether external genitalia thermal signature changes correlated with potential physiological changes. Eight Yorkshire-Landrace sows (100 d gestation) were randomly assigned to a diet supplemented with Novasoy 70% (NOV, n=4; 1.5 mg/kg BW/d) an isoflavone extract or without (CON, n=4) for 14 d and allowed to farrow. On post natal day 7 (PND 7), male and female NP were assigned to one of four treatments: 1) control (VEH), 2) low genistein (LG; 3 mg/kg BW/d), 3) high genistein (HG; 9 mg/kg BW/d), and 4) estradiol (E$_2$, positive control; 50 µg/kg BW/d). Treatments suspended in Re-Sorb (an electrolyte) were administered (2x d) for 7 d by oral gavage. Thermographic images of NP scrotal and vulva areas were recorded using a FLIR S60 camera each morning of PND 7, 9, 11 and 14. Thermal images were saved to disks for identification of regions of interest (ROI), measurement of maximum, minimum, average temperature and standard deviation of temperatures within ROI. Data was analyzed using ANOVA and repeated measures to determine differences in temperature parameters within ROI during the course of the trial. Neither sow or genistein treatment of NP had an effect on genital temperatures of males or females (testes; CON, 36.9±0.2 vs. NOV, 37.2±0.2 and vulva; CON, 37.5±0.2 vs NOV, 37.3±0.2). However, a day by NP effect on temperature standard deviation (i.e., a measure of temperature variation) for vulva (P<0.02) and scrotal temperatures (P<0.07) was associated with E$_2$ treatment. Additionally, vulva width increased (P<0.0001) in E$_2$ compared with control or genistein-treated females. This study demonstrates that oral administration of E$_2$ is bioactive in NP, but that thermal imaging did not consistently reflect physiological changes in tissue with tissue temperatures. [Funded by NIH-Merck veterinary student fellowship to WCB].

Key Words: Pig genitalia, Phytoestrogens, Thermal imaging

137 Breed of sire, but not feeding program, affects circulating concentrations of leptin in pigs. K. A. Alberti*, M. J. Estienne, and A. F. Harper, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

Leptin, a protein hormone produced primarily by adipocytes, has been implicated in the control of many physiological systems. The objective was to characterize concentrations of leptin in serum of pigs sired by either Hampshire or Berkshire boars, and fed diets with or without antibiotics and animal by-products. Yorkshire x Landrace sows were bred using AI with semen collected from two distinct boar types: 1) a Hampshire boar typical for production of lean, deep-muscled market hogs, and 2) a Berkshire boar, characterized as fat using current swine industry standards. Gilts and barrows from these matings were weaned at 3 to 4 wk of age and reared using one of two feeding programs: 1) feed formulations throughout the starter, grower and finisher phases that utilized FDA-approved antibiotic feed additives and some animal by-products similar to commercial practice and, 2) feed formulations that were free of antibiotic feed additives and animal by-products throughout all production phases. Sixty pigs were assigned to the study (30 per boar line) and were housed 3 pigs per pen. There were 5 pens for each breed of sire and feeding program combination (20 pens total). Feed and water were available on an ad libitum basis. At the end of the grower-finisher phase (BW = 120 kg) blood samples were collected via jugular venipuncture, serum was harvested following centrifugation, and concentrations of leptin determined using RIA. Pigs sired by the Berkshire boar had greater (P < 0.01) 10th rib backfat thickness than the Hampshire-sired pigs (28.6 vs. 20.3 mm; SE = 1.4). Serum concentrations of leptin in Berkshire-sired pigs were greater (P = 0.02) than levels in pigs sired by the Hampshire boar (3.0 vs. 1.8 ng/mL; SE = 0.3). There were no effects of diet or sire x diet (P > 0.1) on backfat thickness or serum concentrations of leptin. In summary, breed of sire but not feeding program affected circulating concentrations of leptin in pigs, and this effect was probably associated with greater subcutaneous body fat in the pigs sired by the Berkshire boar.

Key Words: Leptin, Adipocytes, Pigs

138   Agroforestry utilization of goats and sheep for brush and weed control in forests.   J. F. Guay, E. A. Callahan*, and Y. Sato, *Berry College, Mount Berry, GA*.

The purpose of this study was to investigate the efficacy of using sheep or goats for brush control in pine forests. Utilization of livestock may be more environmentally sustainable than conventional means. An extended block design was used, with two blocks containing two treatments (goats or sheep; 1.98 AU/ha) and three replications (paddocks) in each block. Each pasture was marked with four permanent transects, each transect having three subsamples, to estimate changes in vegetation during each sample period (total of 12 subsamples per paddock). A control plot (ungrazed area) containing four transects was located adjacent to the experimental area. Botanical composition and vegetation numbers were estimated by identifying and recording vegetation immediately under each transect. Target vegetation species were identified and sampled, using a digital camera, every 3.05 meters under each transect. Photographs were later analyzed using a translucent grid to evaluate the change in the relative area of the target vegetation. These measures were used to estimate the amount of vegetation consumed by the animals, or to estimate growth. Samples were taken approximately every 28 d during the study, from June through September. Data were analyzed as repeated measures using JUMP IN software (SAS Inst., Inc., Cary, NC). Both goat and sheep treatments resulted in the reduction (P = 0.0055) of total vegetation area versus the control. When examining the effect of goat and sheep treatments on specific vegetation species, both were effective in the removal of grape and grasses (P = 0.0003 and P = 0.0260, respectively). However, goats and sheep did not reduce hickory or pine species. In terms of change in vegetation area from the first to the last sampling, the goat and sheep treatments both resulted in a greater reduction in total vegetation compared to the control (P = 0.0002), but there was no difference between the goat and sheep treatments. Results indicate that preservation of pine may be possible while eliminating unwanted species by either goats or sheep.

Key Words: Goats, Sheep, Brush control

139   Severe copper deficiency combined with high dietary manganese does not affect bovine prion characteristics.   C. P. McAdams*, S. L. Hansen, J. W. Spears, and H. C. Liu, *North Carolina State University, Raleigh*.

Copper (Cu) may play a role in normal cellular prion protein function. Manganese (Mn) can act antagonistically to Cu and exacerbate Cu deficiency. Bovine spongiform encephalopathy may be associated with changes in brain Cu concentrations which may be lowered by high Mn concentrations. This study analyzed the effects of Cu deficiency and the effect of high dietary Mn on brain prion protein in cattle. Twenty-one Angus calves were born to cows on study for a minimum of 410 days prior to calving and were assigned to the same treatments as their dams. Treatments consisted of: 1) Cu adequate (10 mg supplemental Cu/kg DM, +Cu); 2) Cu deficient (no supplemental Cu and 2 mg supplemental molybdenum/kg DM, -Cu); and 3) Cu deficient plus 500 mg supplemental Mn/kg DM (-Cu+Mn). Calves were fed through a 136-day growing phase (basal diet analyzed 7 mg Cu/ kg DM) and a 139-day finishing phase (3 mg Cu/ kg DM). Jugular blood samples were taken throughout the study and liver and brain obex samples were collected at harvest. Data was analyzed using the Mixed procedure of SAS. Lower liver Cu was seen in -Cu calves (6.9 mg/kg DM) compared to +Cu calves (208.4 mg/kg; *P* < 0.01). Plasma Cu was lower (*P* < 0.01) in -Cu (0.22 mg/mL) versus +Cu (1.1 mg/mL); plasma Cu was also lower (*P* < 0.01) in -Cu+Mn (0.13 mg/mL) versus -Cu. Obex Cu was higher (*P* < 0.01) in the +Cu treatment (14.3 mg/kg) than in the -Cu treatment (3.6 mg/kg). There was also a tendency for lower (*P* = 0.15) obex Cu in -Cu+Mn calves (1.9 mg/ kg) compared to -Cu. Obex Mn concentration did not differ among treatments. ELISA and Western blotting showed no differences in obex prion concentration due to dietary Cu. All samples were completely digested by proteinase K. Copper chaperone protein (CCS) levels in the obex of +Cu calves tended to be lower (*P* < 0.10) than in -Cu calves. Extreme Cu deficiency was observed based on liver, plasma, and obex Cu levels. Differences in CCS indicated that brain Cu metabolism was affected by Cu deficiency. Nevertheless, changes were not seen in brain prion protein concentrations.

Key Words: Cattle, Copper, Prion

140   The effect of Bovine Leukosis Virus infection on the proportion among bovine leukocyte populations in the blood of cows.   S. Touroo*, E. Carson, B. Lewis, B. Galbreath, K. Peterson, P. Prater, and T. Wistuba, *Morehead State University, Morehead, KY*.

The effects of Bovine Leukosis Virus (BLV) infection on the proportion among bovine leukocyte populations in blood (WBC) was investigated using differential staining and a CBC profile. Previous research has indicated that total WBC count and total lymphocyte are impacted by BLV infection. However, few studies have included neutrophils, basophils, and monocytes. Eighty Angus cows (51 positive and 29 negative) were bled by jugular venipuncture into 7 ml EDTA treated vaccutainer tubes on October 2, 2007. Cows had previously tested positive for the presence of BLV and were retested by ELISA on the day blood samples were taken. The analysis of variance was generated using PROC GLM (SAS Inst., Inc. Cary, NC), the model included presence or absence of BLV infection and sex. Least-squares means were calculated and separated using pair-wise t-tests (PDIFF option). There was no impact of sex on any of the parameters used in this study and thus the bulls were eliminated from the data set. Total white blood cell count (9.49 vs. 8.46 K/μL; P < 0.09) and total eosinophils were greater (0.67 vs. 0.35 K/μL; P < 0.005) in the cows that tested positive for BLV. Proportions of lymphocytes were greater (P = 0.11) for uninfected cows (65.2%) compared to infected cows (61.5%). However, there were no differences in total counts or proportions of neutrophils (2.57 K/μL and 29.5%), basophils (0.004 K/μL and 0.05%), or monocytes (0.125 K/μL and 1.46 %) and there was no difference detected for the neutrophil:lymphocyte ratio (2.5:1). This study supported previous research in its findings that BLV infection has an impact on total white blood cell counts and lymphocytes.

Key Words: BLV, Beef, Leukocyte

141   Relationships among lactate dehydrogenase activities, isoenzyme patterns, and hematological values in resting Thoroughbred and Miniature horses.   H. Minard*, C. Bokina, K. Jogan, S. Reiter, and C. Rosenkrans, Jr., *University of Arkansas, Fayetteville*.

Our objective was to determine the relationships among lactate dehydrogenase (LDH) activities, LDH isoenzyme patterns, and hematological values in Thoroughbred and Miniature horses. Samples were collected from Thoroughbred horses (n = 25) and Miniature horses (n = 34) at 0700-0800. Five LDH (1-5) bands were evaluated utilizing digital densitometry to quantify isoenzymes. Total LDH activity was determined using a modified colormetric kinetic assay. The pattern of LDH isoenzyme distribution in plasma was: LDH-1 (22 %), LDH-2 (25 %), LDH-3 (40 %), LDH-4 (13 %), and LDH-5 (1 %). Hematological values were determined using Cell-Dyne 3500 hematological analyzer. Age was negatively correlated (P < 0.01) with lactate and all LDH values (r < -0.34; P < 0.01). All LDH activities and lactate were positively correlated (r > 0.24; P < 0.10) with white blood cells (WBC). Band LDH-3 was positively correlated with platelets (r = 0.23; P = 0.08) and WBC (r = 0.37; P = 0.004), and negatively correlated with red blood cells (RBC; r = -0.33; P = 0.01), hemoglobin (r = -0.51; P = 0.0001), and hematocrit (r = -0.53; P = 0.0001). Age was related (P < 0.05) to monocytes, eosinophils, RBC, and weight, neutrophils, and lymphocytes. Breed was related (P < 0.01) to all LDH activities, lactate, hemoglobin, hematocrit, height, and weight. Interactive effects of breed and gender affected (P < 0.05) RBC, hemoglobin, height, hematocrit, platelets, and weight. These results indicate that plasma LDH activities and lactate concentrations were associated with immune cell profiles. Future studies will focus on the genetic regulation of LDH and associations with equine form and function.

Key Words: Horses, LDH, Immune function

142   Identification of genomic polymorphisms in upstream elements of the bovine CYP3A28 gene.   K. Murphy*[1], S. Reiter[1], M. Brown[2], R. Okimoto[3], H. Brown, Jr.[1], and C. Rosenkrans, Jr.[1], [1]*University of Arkansas, Fayetteville*, [2]*USDA/ARS, El Reno, OK*, [3]*Cobb-Vantress, Siloam Springs, AR*.

The cytochrome P450 (CYP) enzyme family consists of a group of heme-containing monooxygenases that participate in metabolism and phase I detoxification.

Previously, our group reported that the coding sequence for the CYP3A28 gene in cattle was polymorphic and related to cattle performance on toxic tall fescue. Our objective was to evaluate the 5′-upstream region of the CYP3A28 gene for single nucleotide polymorphisms (SNP). Genomic DNA was prepared from purebred Brahman (n = 14) and purebred Angus (n = 8) cows. Specific primers for bovine CYP3A28 upstream region were developed and resulted in a 515 base amplicon. Each amplification product was sequenced in both the forward and reverse orientation. Seven locations were found to be polymorphic. The SNPs were labeled with respect to their relative distance from initiation of exon one. Frequency of SNP distribution, as affected by breed (Angus vs. Brahman), was determined by Chi-square analyses. Frequency of SNPs t-318c, t-113a, a06g, and t21c was affected (P < 0.03) by breed. All cows that were homozygous cytosine, homozygous adenine, homozygous guanine, or homozygous cytosine for t-318c, t-113a, a06g, and t21c, respectively, were Brahman. Cows that were heterozygous for those locations also were Brahman. Frequency of three additional sites (c-189t, t-78g, and g17a) was not affected (P > 0.09) by breed. Our results indicate that the 5′-upstream region of the bovine CYP3A28 gene was polymorphic and frequency was affected by cattle breed. Future work will evaluate the relationship of these polymorphisms and cattle susceptibility to ergot alkaloid poisoning.

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1998	Not Given		1977	Sam Hansard	Tennessee
1997	William G. Luce	Oklahoma	1976	J.C. Hillier	Oklahoma
1996	Raymond W. Harvey	North Carolina	1975	J.K. Riggs	Texas
1995	Gary L. Cromwell	Kentucky	1974	T.J. Cunha	Florida
1994	George E. Mitchell, Jr.	Kentucky	1973	O.D. Butler	Texas
1993	L.E. McDowell	Florida	1972	George W. Litton	Virginia
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2004	Roger L. McCraw	North Carolina	1990	Joe Hughes	Oklahoma
2003	Darrh Bullock	Kentucky	1989	Henry Webster	Clemson
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2006[2]	Scott T. Willard	Mississippi State University	1994[2]	Peter J. Hansen	University of Florida
2005[2]	Clinton Krehbiel	Oklahoma State University	1993[1]	Kevin Pond	NC State University
2004[1]	M. Todd See	NC State University	1993[2]	Rod Geisert	Oklahoma State University
2004[2]	Theo Van Kempen	NC State University	1992[1]	David S. Buchanan	Oklahoma State University
2003[1]	Sam Jackson	Texas Tech University	1992[2]	James L. Sartin	Auburn University
2003[2]	Tom Spencer	Texas A&M University	1991[1]	W.E. Beal VPI & SU	
2002[1]	Joel Yelich University of Florida		1991[2]	Wayne Greene	Texas A&M University
2002[2]	Beth Kegley	University of Arkansas	1990[1]	J.W. Mabry	University of Georgia
2001[1]	Shawn Ramsey	Texas A&M University	1990[2]	T.H. Welsh Texas A&M University	
2001[2]	Jason Apple	University of Arkansas	1989	J.W. Spears	NC State University
2000[1]	Andy D. Herring	Texas Tech University	1988	S.B. Smith Texas A&M University	
1999[2]	Chad C. Chase, Jr.	USDA, ARS	1987	D.L. Thompson, Jr.	Louisiana State Univ.
1998[1]	Markus F. Miller	Texas Tech University	1986	G.J. Hausman	USDA, ARS, Athens, GA
1998[2]	Arthur L. Goetsch	Langston University	1985	J.W. Savell Texas A&M University	
1997[1]	Tim Marshall	University of Florida	1984	D.R. Notter	VPI & SU
1996[1]	William L. Flowers	NC State University	1983	T.S. Stahly University of Kentucky	
1996[2]	Markus F. Miller	Texas Tech University	1982	D.N. Marple	Auburn University

[1]Education

[2]Research

NPB Swine Industry Award

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

Graduate Student PaperAward

Year	Awardee	Place of Meeting	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
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

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

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

ASAS Southern Section
Future Meeting Dates and Locations

2009   Atlanta, GA   Jan. 31–Feb. 3
2010   Orlando, FL   February 6–9