Abstracts

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ASAS Southern Section

FUTURE MEETING DATES AND LOCATIONS

2015	Atlanta, Georgia	Jan. 31-Feb. 3, 2015
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2018	Jacksonville, Florida	February 3-6, 2018

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Bill E. Kunkle Interdisciplinary Beef Symposium from NOVUS International

1 Bill E. Kunkle Interdisciplinary Beef Symposium.
J. D. Arthington[*1] *and M. H. Poore*[2]*, [1]UF/IFAS Range Cattle Research and Education Center, Ona, FL, [2]North Carolina State University, Raleigh*

The membership and administrative board of the of the Southern Section, American Society of Animal Science (ASAS), honors Dr. William (Bill) E. Kunkle by the naming; Bill E. Kunkle Interdisciplinary Beef Symposium. Bill Kunkle's influence on application-oriented beef research, extension education outreach, and allied industry support, is well-recognized throughout the Southeast, and indeed, throughout the US. In addition, his leadership and influence on the beef programs of the ASAS Southern Section have been highly meaningful and impactful on the membership. One aspect of his influence relates to Bill's commitment to mentoring young beef research and extension faculty. His influence on several current faculty programs is still widely viewed today. Bill was born 16 November, 1947 in Hudson Michigan and was raised in Alvordton, OH. Along with his 5 siblings (3 brothers and 2 sisters), Bill's family farmed vegetables and field crops, and raised cattle and pigs. Two of his brothers and their sons continue to farm in northwest OH with land in 3 counties. Bill received his BS, MS, and PhD from The Ohio State University and during that time in Columbus, married Gail Clause (1971) who was pursuing her DVM. In 1974, Bill and Gail moved to Maryland where he last served as an Associate Professor and Beef Cattle Extension Specialist (1974 to 1980). In 1980, Bill joined the faculty of the Department of Animal Sciences, University of Florida, as a Beef Cattle Extension Specialist where he served for 22 years. In this role, Bill developed a remarkable and well-deserved reputation, as a practical, science-based beef cattle expert. His research and application in the use of liquid feeds, citrus pulp, bakery waste, and poultry litter are still practiced today. In addition, his efforts in forage utilization and preservation continue to impact our industry. Publishing in the peer-reviewed literature and industry media, Bill's program served as a model for the successful development of seamless research and extension program activity. Bill died unexpectedly on February 1, 2002 when he was President-Elect of ASAS Southern Section. He is survived by his wife Gail, currently Professor Emeritus, University of Florida, College of Veterinary medicine and two sons, Matthew William Kunkle, residing in Tacoma WA, with wife Kristy and daughter Harper and Benjamin Todd Kunkle, residing in Arlington VA. The membership of the ASAS Southern Section are thankful to Novus International for their financial support of this Symposium in recognition of Dr. Bill Kunkle.

2 Practical developments in managing animal welfare in beef cattle. What does the future hold?
M. S. Calvo-Lorenzo[*]*, Oklahoma State University, Stillwater*

Interest in the welfare of cattle in the beef industry has intensified over time due to ethical concerns and societal perceptions that exist about the treatment and living conditions of farm animals. Several schools of thought exist regarding welfare, and its definition will vary according to an individual's philosophies (how one defines and prioritizes what is 'good'), experiences (societal and cultural influences of animal roles and/or relationships), and involvement in the livestock industry (knowledge on how livestock operations work and why). Many welfare concerns in the beef industry could be mitigated by enhancing traditional husbandry practices that utilize practical improvements to alleviate or eliminate heat stress, pain from standard procedures, stressful cattle handling techniques and the transitional effects of weaning, dry feeding, transportation, and co-mingling calves. Welfare issues regarding the transportation of livestock have received increased attention due their perceived and known effects (stress, fatigue, injury, morbidity, or mortality) on cattle welfare, food safety, and carcass quality. Although cattle facilities tend to be regionally co-located, economic losses from dark cutters and bruising suggest that opportunities for improvement exist in load handling, density, transport duration, and environmental conditions of transport. Recent concerns on the potential welfare effects of feeding beta-adrenergic agonists (BAA; used to increase lean muscle mass in finishing cattle) have emerged based on variable observations of poor cattle mobility, increased pain and injury, and difficulty in handling of BAA-fed cattle. The resultant questions regarding the use and management of BAA in cattle have led to industry-wide effects including the removal of a single BAA product from the market and the development of BAA-specific welfare audits to verify the potential cause of these effects (BAA-caused versus BAA-related). Altogether, the beef industry continues to be challenged by welfare issues that question a large range of practices, from traditional husbandry to newer technological advancements, all which are influenced by consumer perception of how the bovine animal feels or experiences life. As welfare awareness increases and the demand for information intensifies, efforts to improve livestock care and management must refer to scientific investigations that fill and identify gaps of knowledge, focus on practical solutions and develop educational tools that advance knowledge in livestock welfare, and understand consumer perceptions. Furthermore, the future of livestock welfare must align welfare concerns with other aspects of sustainable beef production such as environmental quality, profitability, food safety and nutritional quality.

3 Integrating physiological responses with endocrine biomarkers to effectively evaluate stress and well-being in beef cattle.
J. A. Carroll[*]*, USDA-ARS, Livestock Issues Research Unit, Lubbock, TX*

Acknowledgement that modern livestock production systems impose stress upon animals has been readily accepted by the scientific community and producers. As the economic burden has increased for livestock producers, expectations for animal performance have continued to increase, thus placing more strain upon the entire production system, including the animals and their caretakers. Whether or not periodic exposure to various stressful conditions within the production system jeopardizes the well-being of the animals continues to be an area of debate largely due to the inability to accurately quantify the magnitude and severity of the stress response on other biological systems of the body. Adding to the confusion is the fact that activation of the stress axis can be both beneficial as well as detrimental on the body depending upon the duration of the stress response and the frequency at which an animal is exposed to stressful stimuli. Few would argue against the fact that continuous long-term stress inhibits livestock productivity and overall well-being. However, whether or not occasional exposure to acute or short-term stress jeopardizes the productivity and well-being of livestock is less clear. To fully appreciate the complexity associated with activation of the stress axis and the overall biological impact on the body, one must

delve deep into the scientific literature and examine the science in an unbiased manner. Additionally, it's imperative to appreciate and understand that activation of the stress axis in animals is an essential survival mechanism necessary to maintain homeostasis during biologically challenging times. Acute activation of the stress axis leads to repartitioning of energy to organs and tissues essential for coping with stressful conditions, redirects blood flow from the peripheral to large muscle groups, slows digestive function, and primes the immune system to prepare for subsequent infections. Conversely, chronic activation of the stress axis disrupts digestive function, causes catabolism of muscle tissue, and suppresses overall immune function, thus making an animal more susceptible to infection and disease. But what parameters are needed to distinguish periods of acute stress from chronic stress, and what biological markers are the best indicators of "stress" in an animal? While there are a plethora of physiological responses and endocrine biomarkers that can be quantified, there has yet to be an integrative tool identified that has been readily embraced by scientists and producers as an effective and efficient indicator of the magnitude of stress that an animal is experiencing.

4 Animal welfare concerns for livestock exposed to adverse environmental conditions.

T. L. Mader, University of Nebraska, Lincoln*

Increasing awareness of animal welfare has become a priority in almost all food production systems involving animals. Under normal working conditions and environments, production practices are constantly being evaluated to insure that optimum levels of animal well-being and comfort are maintained. However, during periods of adverse weather, optimum conditions for animal comfort as well as animal performance are often compromised. In the Midwest and Plains states, the heat waves of 1995, 1999, 2006, 2009, and 2010 were particularly difficult on animals reared in confinement, with documented cattle losses approaching 5,000 head each year. Additionally, during the summer of 2011, nearly 15,000 head of cattle across five states were lost as a result of heat stress. During prolonged periods of heat stress lower conceptions rates are observed in livestock. In addition, animals reared in confinement buildings are often compromised, due to limitations in ventilation systems. Under the opposite environmental spectrum, the winters of 1992 to 93, 1996 to 97, 1997 to 98, 2006 to 07, and 2008 to 09 caused hardship for livestock producers, particularly for those rearing animals in an outdoor environment. During the winters of 1996 to 97 and 2008 to 2009 up to 50% of the newborn calves were lost in many areas, with over 75,000 head of cattle lost in the Northern Plains states. Late fall and early winter snowstorms in 1992, 1997, and 2006 resulted in the loss of over 25,000 head of feedlot cattle each year in the Central and Southern Plains of the United States. Economic losses from reduced performance of livestock (cattle) experiencing severe environmental stress likely exceed losses associated from livestock death by 5- to 10-fold. Use of alternative supplementation programs may need to be considered for livestock challenged by adverse environmental conditions. Use of additional water for consumption and cooling, shade, and/or alternative management strategies need to be considered to help livestock cope with heat stress. For animals reared outside, during the winter, strategies that increase animal space and environmental buffers, need to be employed to minimize effects of mud, wet conditions, and wind-chill. The above-mentioned weather events suggest that there are ample opportunities for livestock producers to enhance animal welfare and minimize impact of environmental stress. A greater understanding of animal responses to weather challenges is needed by caretakers to help animals cope with adverse climatic conditions.

5 Temperament and training influences growth and reproduction in Bos taurus and B. indicus cattle.

R. F. Cooke, Oregon State University - EOARC Burns, Burns*

Temperament is defined as the fear-related behavioral responses of cattle when exposed to human handling. Our group evaluates cattle temperament using: 1) chute score; 1-5 scale that increases according to violent behavior during chute restraining, 2) exit velocity; speed of cattle exiting the chute, 3) exit score; dividing cattle according to exit velocity into quintiles and using a 1-5 scale (slowest to fastest quintiles), and 4) temperament score; average of chute and exit scores. To facilitate interpretation and dissemination of results, our group also assigns a final temperament type to cattle; adequate temperament (ADQ; temperament score ≤ 3) or excitable temperament (EXC; temperament score > 3). To understand the implications of temperament on beef production, our group recently evaluated the impacts of this trait on cattle productive, reproductive, and health parameters. As expected, EXC cattle had greater plasma cortisol vs. ADQ cattle during handling, independent of breed type (*Bos indicus x B. taurus*, $P < 0.01$; *B. taurus*, $P < 0.01$) or age (cows, $P < 0.01$; heifers, $P < 0.01$). In regards to reproduction, EXC females had reduced annual pregnancy rates vs. ADQ cohorts, independent of breed type (*B. indicus* x *B. taurus*, $P = 0.03$; *B. indicus*, $P = 0.05$). Moreover, *B. taurus* EXC cows had decreased pregnancy rate ($P = 0.03$), calving rate ($P = 0.04$), weaning rate ($P = 0.09$), and kg of calf weaned/cow exposed ($P = 0.08$) vs. ADQ cohorts. In regards to feeder cattle, EXC calves had reduced weaning BW ($P = 0.04$), heightened acute-phase protein response upon feedlot entry ($P \leq 0.05$), and reduced carcass weight ($P = 0.07$) vs. ADQ cohorts. Our group also reported that exposing *B. indicus* x *B. taurus* or *B. taurus* heifers to frequent human handling improved temperament ($P \leq 0.02$), reduced plasma cortisol ($P < 0.01$), and hastened puberty ($P \leq 0.02$). Similar benefits, however, were not observed in mature cows or feeder cattle. In conclusion, temperament impacts productive, reproductive, and health parameters of beef cattle independent of breed type. Hence, strategies to improve herd temperament are imperative for optimal production efficiency of beef operations worldwide.

Breeding and Genetics

6 Growth and reproductive performances in F1 crossbred heifers from Hereford, Braford, and Bonsmara sires and Angus and Brangus dams.

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Reproductive performance of heifers and young cows has generally been less in *Bos indicus* compared to *Bos taurus* cattle and forms the basis of searching for tropically adapted indicine and taurine cattle for incorporation into commercial cow herds in the Gulf Coast region. The objective of this research was to evaluate source and extent of tropical adaptation affecting F_1 first-calf heifer BW and productivity traits. F_1 heifers with Brangus (**BN**) dams were sired by

Braford (**BFBN**; n = 44), Hereford (**HEBN**; n = 29), and Bonsmara (**BOBN**; n = 58) sires. F_1 heifers with Angus (**AN**) dams were sired by Hereford (**HEAN**; n = 32) and Bonsmara (**BOAN**, n = 40) sires. F_1 heifer breeds did not differ ($P > 0.22$) for pregnancy and weaning rate. Calving rate was similar ($P > 0.26$) among F_1 heifer breed types, but there was a trend ($P < 0.10$) for calving rate to be greater for HEBN compared to BOBN F_1 first-calf heifers. Live BW at weaning of their first calf was similar ($P > 0.17$) for BFBN and HEBN and for HEBN and BOBN F_1 heifers, but was greater ($P < 0.05$) for BFBN compared to BOBN and for BOAN compared to HEAN. F_1 first-calf heifers with BN dams were heavier ($P < 0.01$) and had lower ($P < 0.05$) BCS at weaning than F_1 first-calf heifers with AN dams. Calf adjusted 205-d BW was similar ($P > 0.25$) among BFBN, HEBN, and BOBN F_1 first-calf heifers, but was greater ($P < 0.01$) for BOAN compared to HEAN and for BN compared to AN granddams. In the present study, there were differences in first-calf heifer BW and offspring growth traits among F_1 breed types, but there was not a distinct overall advantage ($P > 0.35$) of any particular breed type based on calf:dam weaning BW ratio.

7 Evaluation of SNP's located on three candidate genes with milk production and fertility traits in dairy cattle.
M. D. Garcia, LSU, Baton Rouge, LA*

The objective of this study was evaluate SNP associations for both fertility and milk production traits in a population of dairy cattle located in the Southeastern U.S. A total of 123 dairy females born between 2004 and 2010 were evaluated in the current study. The milk production traits that were collected included averages for lifetime milk yield, protein yield, and fat yield. The fertility traits that were collected included lifetime averages for services to conception and days open after calving to subsequent conception. The SNP's were selected from three candidate genes that had previously been described to be associated with both milk production and fertility traits in Holstein cattle. The three candidate genes included the diacylglycerol acyltransferase gene (DGAT1) located on BTA 14, the leptin receptor gene (LEPR) located on BTA 3, and the calpastatin gene (CAST) located on BTA 7. A total of 60 SNP were analyzed (20 per gene) and were equidistantly spaced across each candidate gene. Analyses to evaluate potential SNP association were conducted via the mixed model procedure of SAS and the LSMEANS function was utilized to determine significant difference in performance for specific traits between genotypes. Specifically, SNP rs132699547located on DGAT1 was significantly ($P < 0.05$) associated with average lifetime fat yield and SNP rs137111668 located on the LEPR gene was significantly associated with average lifetime milk yield. A total of 10 SNP located on all three candidate genes exhibited trends ($P < 0.1$) when evaluating SNP for averages of lifetime milk, protein yield, and fat yield. Furthermore,three SNP rs109663724, rs133149410 and rs43348652 each located on a unique candidate gene exhibited trends across multiple traits. Although no SNP were significantly associated with fertility traits, multiple SNP were identified as significant ($P < 0.05$) or exhibiting a trend ($P < 0.1$) for milk production traits. Thus, identification of SNP on all candidate genes associated with milk production traits in the current study require validation in association with the use of more SNP in other dairy breeds, production schemes and populations.

8 Penalization of treated records for use in the estimation of genetic parameters in Dorper sheep.
L. Ngere[*1], D. G. Riley[2] and J. VanWyk[3], [1]Texas A & M University, College Station, [2]Texas A&M AgriLife Research, College Station, [3]University of Pretoria, Onderstepoort, South Africa*

Internal parasites are a major concern to the livestock industry leading to animal and economic losses. Treatment of animals unfairly advantages them over the untreated. Penalization of treated records may permit inclusion of such data for prediction of genetic merit. The objective of this study was to evaluate the effect of penalization of treated records on estimates of heritability and permanent environmental effects as a proportion of phenotypic variance. Records from 1008 Dorper sheep in a private South African flock comprised 17,711 FAMACHA© scores (**Fc**), 3,758 fecal egg counts (**FEC;** practically only *Haemonchus contortus*), and 4,209 hematocrit (**Ht**) values that were collected from 1997 – 2000. Animal models were used to conduct single trait analyses. Fixed effects were year, month, sex, age categories and treatment. Random effects were id and permanent environmental effects. Data were analyzed in three sets: 1) untreated records only; 2) all records; no penalties; and 3) all records; those records occurring up to 90 d after treatment were penalized by adding 1 trait SD (unique to records of lambs or adults) to the record. Heritability estimates of Fc ranged from 0.16 ± 0.03 (all records, no penalties and all records including those penalized) to 0.21 ± 0.03 (untreated records only). Heritability estimates of FEC were 0.03 ± 0.02 (all records with no penalties), 0.04 ± 0.02 (all records including those penalized) to 0.06 ± 0.03 (untreated records only). Hematocrit heritability estimates ranged from 0.17 ± 0.05 (untreated records only) to 0.18 ± 0.04 (all records; no penalties and all records including those penalized). When records of treated animal were included, the permanent environmental variance for Fc was increased and the additive genetic variance was decreased resulting in a lower estimate of heritability for Fc. Penalization in other studies augmented the estimate of heritability; reasons for the failure to do so in these data may be a result of the repeated records structure across the different worm seasons each year, the inclusion of mature and young animals with records in the data, or to the relatively greater adaptation of Dorper sheep to such an environment.

Key Words: Heritability, Penalization of records, Parasite resistance

9 Breed and sex influence on calf birth weight in purebred and crossbred Angus and Nellore calves.
L. W. Bauer[*1], J. O. Sanders[1], D. G. Riley[1] and A. D. Herring[2], [1]Texas A&M University, College Station, [2]Texas AgriLife Research, College Station*

Several reports have documented differences in birth weight among reciprocal crosses of *Bos indicus* and *Bos taurus* calves, particularly when Brahman was the source of *Bos indicus* influence. Reports in the literature of reciprocal crosses involving other *Bos indicus* breeds are scarce. The objective of this report was to evaluate differences in birth weight in reciprocal F_1 crosses of Angus and Nellore. Birth weights (BWT) were analyzed in Nellore (Ne) and Angus (An) straightbred and reciprocal F_1 cross calves (n = 518) born at a single location in central Texas. The breed group classifications for analyses included Angus (AnAn), Nellore (NeNe), Angus-sired F_1 (AnNe), and Nellore-sired F_1 (NeAn). BWT was evaluated through general linear model analyses that included calf breed, calf sex, calf breed by calf sex interaction, and the regression on Julian birth day within year of birth. All effects in the model accounted for important

($P < 0.02$) variation. The regression on Julian birth day was 0.026 ± 0.011 kg/d. Least squares means and standard errors for the calf breed by calf sex interaction are shown in Table 1. As reported with other reciprocal *Bos indicus-Bos taurus* F_1 crosses, bull calves were much larger than heifer calves when produced from Nellore sires and Angus dams (NeAn); in this cross, there was a difference of 7.2 kg ($P < 0.001$), but in the reciprocal cross (AnNe), male calves were only 0.7 kg heavier than females, and were not significantly different. There was also a larger difference between male and female NeNe calves (5.0 kg) than observed in other reports of purebred *Bos indicus* breeds. These data illustrate the concept that in producing F_1 *Bos indicus-Bos taurus* calves, the mating type plays a very influential role in birth weight when Nellore is involved; the magnitude of the average reciprocal cross difference and the reciprocal difference between sexes is similar to that expressed in other *Bos indicus-Bos taurus* crosses.

Table 1. Least squares means of birth weight in Angus, Nellore and F1 crosses across calf sex

Calf breed	Calf sex	n	Birth weight (kg)
AnAn	F	91	35.0 ± 0.54
AnAn	M	81	37.2 ± 0.57
AnNe	F	72	32.2 ± 0.60
AnNe	M	87	32.9 ± 0.54
NeAn	F	49	38.7 ± 0.72
NeAn	M	57	45.9 ± 0.67
NeNe	F	45	29.6 ± 0.77
NeNe	M	36	34.6 ± 0.85

10 Influence of inclusion of genomic or pedigree relatedness and designed family structure on association analyses of calf birth weight.

D. G. Riley[*1], *A. D. Herring*[1], *P. K. Riggs*[1], *C. A. Gill*[1], *J. E. Sawyer*[2] *and J. O. Sanders*[1], [1]*Texas A&M University, College Station,* [2]*Texas AgriLife Research, College Station*

The incorporation of genomic relatedness, estimated by markers shared, may improve accuracies of genetic parameters; however, effects of different parameterizations on detection of trait-marker associations have not been detailed. Incorporation of designed family structure in association analyses may influence detections. The objective was to characterize differences in SNP-birth weight associations detected in analyses that employed 1) pedigree-based relatedness, 2) genomic relatedness based on markers, and 3) no relatedness modeled with inclusion or omission of structured family fixed effects. Birth weight was measured on 737 F_2 Nellore-Angus calves from 13 full-sibling ET families and 4 half-sibling crossbred families from 2003 to 2007. There were 34,957 SNP genotypes available on animals. Three model random structures were considered: two included relatedness modeled with a genomic relationship matrix (constructed by adjusting the probability of identity by descent with the probability of identity by state) or a pedigree-based matrix (kinship coefficients); the third was a fixed effects model. For each, two analyses were conducted with or without family as a fixed effect. Fixed effects in all analyses were age of dam, sex of calf, and birth year-season combinations. Association was evaluated as regressions of birth weight on marker genotypic values (0 and 2 for alternate homozygotes, 1 for heterozygotes). The FDR was minimized at 0.05. Detections were lower from models including genomic relatedness (165 and 138 with and without family modeled, respectively) than those with pedigree-based relatedness (727 and 685 with and without family modeled, respectively) or a fixed effects model (720 and 1125 with and without family). The fixed effect model resulted in 611 detections not identified by any other. Detections were augmented by inclusion of family in addition to random, but resulted in fewer associations in a fixed effects model. Family appeared to therefore substitute for random relatedness in the fixed model, but duplicated relatedness in the mixed models. There likely are non-zero covariances between the levels of family as a fixed effect and the random relatedness. Associated markers included (genomic relatedness; no family) on BTA14 (129 of 138), 3 on BTA5, and one each on BTA6, 17, 18, 19, 21, and 27. The genomic relationship matrix appeared to best model the relatedness stratification present in these data for association analyses.

11 Estimation of genetic parameters for performance traits in Brahman stocker cattle.

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Genetic parameters for performance traits, such as average daily gain (ADG) and body condition score (BCS; 1 = very thin to 9 = very fat), have yet to be estimated and reported on Brahman stocker cattle. The objective of this trial was to estimate heritability of ADG (n = 659), BCS (n = 843), and body weight (BW; n = 969) of Brahman steers and heifers in stocker grazing trials. Cattle were part of a research Brahman herd in East Texas. Calves were born from 1986 to 2011 (n = 1058). At weaning, steers and heifers were placed on forage-based stocker trials conducted in the spring, summer, or winter post-weaning. Winter trials consisted primarily of ryegrass, while spring and summer trials were bermudagrass-based. Data were analyzed using animal models, with sex, trial year and trial trial season(trial year) as fixed effects, and additive genetic random effects. For ADG, trial year and trial season(trial year)were sources of variation ($P < 0.001$) but sex was not ($P = 0.99$). Trial year, trial season(trial year), and sex all were influential on BCS and BW ($P < 0.001$). Males had greater BW than females (340.6 ± 3.7 kg steers, 302.4 ± 5.1 kg heifers). Means for BCS were 5.27 ± 0.07 (males) and 5.03 ± 0.09 (females). Means for ADG were 0.71 ± 0.14kg/day and 0.71 ± 0.04 kg/d for males and females, respectively. Spring trial means ranged from 297.3 to 407.6 kg (BW), 5.31 to 5.64 (BCS), and 0.28 to 0.94 kg/day (ADG). Means for summer trials ranged from 249.8 to 480.7 kg (BW), 5.01 to 6.46 (BCS), and 0.51 to 0.88 kg/d (ADG). Winter trait means ranged from 232.7 to 373.3 kg (BW), 4.30 to 7.15 (BCS), and 0.44 to 1.11 kg/d (ADG). Heritabilities for each trait were also estimated. Heritability for body weight was estimated at 0.40 ± 0.05, BCS at 0.50 ± 0.06, but that for ADG did not differ from 0. Heritability for BW and BCS corresponded with similar estimates of comparable traits in other trials, while heritability for ADG did not.

12 Relationships between temperament and hematological responses of crossbred steers following bovine viral diarrhea virus challenge.

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The objective of this study was to investigate relationships of temperament with hematological responses in Angus-Nellore crossbred steers challenged with bovine viral diarrhea virus (BVDV). Temperament scores were evaluated 4 to 6 weeks after weaning (approximately 8 mo age) on a 1-to-9 scale by 4 evaluators. The higher temperament values indicate more aggressive and agitated behavior. Mean temperament scores (averaged across evaluator) were 4.2, 5.9, 4.5, and 4.8, in 2009 to 2012-born steers, respectively. Yearling (n = 382) F2 and F3 steers born from 2009 to 2012 were vaccinated with commercial bovine respiratory disease vaccine treatments killed (KV, n = 28, 32, 33 and 31), modified live (MLV, n = 25, 36, 36 and 33) or no vaccine (NON, n = 25, 36, 36 and 31) products, with steers stratified by breed composition and sire across these 3 treatments. Following vaccination with KV booster or single MLV (25 to 35 d), steers were challenged intranasally with a Type 1b BVDV strain (d 0). Whole-blood samples for hematological counts were collected on d 0, 7, 14, 28, and 42 with white blood cell (WBC), lymphocyte (LYM), neutrophil (NEU), platelet (PLT), and NEU:LYM ratio evaluated. Pearson correlations of temperament score and hematological measures were evaluated. No hematology measure at d 0 was correlated to weaning temperament score, several correlations ($P < 0.05$) were found following BVDV exposure. WBC counts were correlated with temperament at d 7, 14 and 28 (r of -0.10, -0.22, and -0.24, respectively). LYM counts were related to temperament at d 14 and 28 (r of -0.16 and -0.18, respectively), but not d 7 or 42. NEU counts were related to temperament at all days following challenge (r of -0.12, -0.11, -0.14 and -0.13, respectively for d 7, 14, 28 and 42). PLT counts were correlated with temperament at d 14 and 28 (r of 0.15 and 0.10, respectively), but not d 7 or 42. NEU:LYM ratio was not correlated to temperament on any day. There were large amounts of variability among individual animals for all traits evaluated. Although the degree of correlation with weaning temperament was not large for these hematological measures, it is interesting that significant relationships appeared following BVDV exposure, and illustrate that relationships involving cattle temperament and health responses to pathogens need further investigation.

Key Words: BVDV, temperament, immune response

13 Carcass weight and behavior of Angus- and Angus-Hereford crossbred steers are associated with heat shock protein 70 genetic polymorphisms.

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Breed-type effects on cattle performance and temperament are recognized, however the impact of SNPs in the promoter region of the bovine heat shock protein 70 (Hsp70) gene on carcass characteristics and behavior are not well documented. Angus- and Hereford-sires were utilized on the Angus-based cow herd at the University of Arkansas for fall 2011 calving. At weaning, behavior scores for balking and chute, and exit velocity (velocity = distance (m)/time (s)) were determined, in addition to blood samples for genotyping. Balking scores were on a scale of 1-5 with 1 signifying no balking and 5 a persistent balk, and chute scores ranged from 1-5 with 1 being docile and 5 violently struggling. Animals were backgrounded and finished at West Texas A&M University and slaughtered in Friona, TX. Two SNPs previously described in the Hsp70 promoter region expressed associations with carcass weight and behavior scores. The A1125C SNP affected ($P = 0.0037$) HCW. Steers that were AA at the A1125C SNP had heavier ($P = 0.0037$) HCW than the AC genotype (384 ± 5.9 kg, 361 ± 4.9 kg, respectively). Genotype at the A1125C SNP was also associated with breed-type differences ($P < .0001$) in that 85.7% of the AA genotype (n = 18) were black (Angus-sired) compared to 14.2% of the AA genotype (n = 3) with Hereford influence. The T1204C SNP also affected HCW and differed ($P = 0.0008$) by genotype. Steers that were TT at the T1204C SNP had heavier ($P = 0.0008$) HCW than the CT and CC genotypes, which were similar (390 ± 5.9 kg, 366 ± 5.3 kg, and 359 ± 5.9 kg, respectively). Genotype at the T1204C SNP was also associated with breed-type differences ($P < .0001$). The majority of the black steers were TT compared to CT and CC genotypes (69.2%, 23.0%, and 7.7%, respectively). Hereford-influenced steers were CC and CT genotypes (50%, 50%, respectively) with no TT genotypes represented. Balking score at the scale entrance was also affected by the T1204C SNP. Steers that were CC (n = 18) balked more ($P = 0.0037$) than TT (n = 22), while CT genotypes (n = 18) balked intermediately (1.76 ± 0.10, 1.23 ± 0.11, 1.50 ± 0.09, respectively). Chute score and exit velocity were also affected by the T1204C SNP. The Hsp70 promoter region may offer partial insight to differences in cattle breed performance and temperament.

Key Words: SNP, behavior, HCW

14 Effect of hair shedding on performance in Angus, Hereford, and Charolais dams and the relationship to surface temperatures.

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The objectives of this study were to evaluate the effect of hair shedding on birthweight (bw) and adjusted d205wt in purebred progeny from Angus (n=430), Hereford (n=98), and Charolais (n=167) dams and to determine the relationship with body surface temperatures. Data were collected every 30 d from March to July from 2008 to 2012. Dams were observed by two technicians for hair shedding and given a visual score (VS) of 1 to 5 with a score of 1 indicating completely shed, 2 = 25% shed, 3 = 50% shed, 4 = 75% shed and 5 = no shedding. The month of first shedding (MFS) was determined when a female reached an average shedding score of ≤3.25 for a given month. Performance data included calf bw and d205wt records collected from the perspective breed associations. Hair samples and thermal images were collected on Angus females in 2008 and 2009 in March, May, and July. A 5.08 cm by 10.16 cm hair sample was clipped directly behind the left shoulder below the top line. A thermal image was taken of the sampled area and analyzed for average surface temperature for the shaved (AvgShav) and unshaved (AvgHair) areas. Shedding data were analyzed using the MIXED procedure of SAS with bw and d205wt as response variables with fixed effects of gender, year, and MFS with sire as a random effect. Dam age was included as a fixed effect for bw. Birth weight and d205wt were considered traits of the dam. In Hereford cattle, dams

with a MFS in March weaned calves 18.37 ± 8.85 kg heavier than dams with a MFS of June (P<.01). In Angus cattle, dams with a MFS in March had calves with bw 7.75 ± 1.64 kg greater than dams with a MFS in June (P<0.001). Visual score was significant for AveShav in June (P<0.02). For AveHair VS was significant in March (P<0.04) and June (P<0.01) indicating differences in surface temperature due to hair shedding. Timing of hair shedding may have an influence on birth and weaning performance of the calf for certain breeds when considered as a trait of the dam.

Extension I

15 Hands-On workshop for women cattle producers: advanced BQA training and truck/trailer safety.

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Women beef cattle producers in North Carolina enjoy a variety of educational opportunities, and they especially value hands-on workshops with only the female gender present. The NC Leadership and Cattle Handling for Women Producers: Advanced BQA Training and Truck/Trailer Safety program was designed to promote and improve self-confidence for women in the cattle industry by giving them hands-on educational opportunities and cattle handling skills implementing Beef Quality Assurance methods (BQA). During 2013, three 2-day workshops were held across the state. This program was a partnership between the National Beef Cattlemen's Association, NC Cattlemen's Association, NC Department of Agriculture and Consumer Services and the NC Cooperative Extension. The workshops were limited to 16 female participants at each location in order to provide a non-intimidating atmosphere and to allow the participants to practice the techniques taught by instructors. A total of 55 women applied for the workshop and of those applicants, 25 became members and 6 were current member of the NCCA. A total of 37 women attended one of the three workshops with 31 of the participants becoming BQA certified. Participants who attended the 2-day workshop were given the opportunity to learn by both classroom lecture and hands-on demonstration. The topics included 1) How to be a Leader in the Cattle Industry, 2) BQA Certification Training with Chute-side Demonstration, 3) Truck & Trailer Safety and 4) Tractor Safety. After the training, producers responded to a questionnaire (n=36). Selected questions (scale of 1= Not Satisfied to 4= Very Satisfied) and mean evaluation score ± SD were; relevance of information to your needs (3.97±0.17), Subjects matter knowledge of the instructors (3.97±0.17), Overall quality of the training workshop (3.97±0.17). The questionnaire included a comparison of participants' knowledge before and after the training (scale of 1=Very Low to 5= Very High). Comparison of selected questions using paired t-test showed an increase ($P < 0.01$) from pre-test to post-test knowledge; tractor safety (2.4±1.2 ; 4.3±0.8), BQA record keeping (2.0±1.0 ; 4.1±0.8), truck & trailer safety when hauling cattle (2.3±0.9 ; 4.1±0.8), BQA chute-side techniques (2.5±1.0 ; 4.6±0.6). Selected results from impact evaluation showed 100% of participants will include BQA chute side techniques on their farm and 100% of the participants would recommend this training to other women.

Key Words: Beef Cattle, Hands-on workshop, Women

16 Evaluation of internet traffic on a statewide beef cattle extension website.

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The Mississippi State University Extension Service and Mississippi Agricultural and Forestry Experiment Station joint website MSUcares, msucares.com, includes a beef cattle website, msucares.com/livestock/beef. This commodity-specific website addresses the educational needs of the Mississippi beef cattle industry and consists of 30 web pages. The objective of this evaluation was to gain insight into user interest in the various content and programming areas contained with the MSUcares beef cattle website for use in improving future content and program offerings. Website traffic tracking results were obtained using Google Analytics. The average viewing time spent per page was 83 s in 2007. It was 128 and 127 s, respectively, in 2011 and 2012. The addition of the online directories, Master Cattle Producer modules, webinars, and streaming cattle marketing events to the website may have contributed to the general trend of increased time spent on web pages on the beef cattle website over this period. The Mississippi Commodity Feed Sources Directory, Mississippi Hay Directory, and Master Cattle Producer web pages all ranked within the top five web pages within the beef cattle website for average time spent on a webpage in 2010 through 2012. The beef cattle publications webpage was ranked first within the beef cattle website for average time spent on a web page in 2012, with an average of 269 s spent on this page that year compared with 75 s spent on the page in 2007. The number of unique page views increased from 31,713 and 31,326 views in 2009 and 2010, respectively, to 34,984 and 34,216 views in 2011 and 2012, respectively. From 2007 through 2012, the beef cattle website homepage ranked first for both page view and unique page views. This was expected as it is the portal for the beef cattle website and the uniform resource locator (website address) advertised in beef cattle extension program marketing materials. As of 2012, the top five most viewed web pages within the MSUcares beef cattle website were: 1) beef cattle home, 2) Mississippi Commodity Feed Source Directory, 3) Mississippi Hay Directory, 4) Mississippi Beef Cattle Improvement Association, 5) and beef cattle extension publication web pages. Website usage data show that this website is gaining internet traffic over time, particularly on the online directory educational module web pages. This information provides guidance for further development and enhancement of online beef cattle extension programming.

17 Hands-on workshop presents alternative forages for North Carolina beef cattle producers.

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North Carolina beef cattle producers have increasing interest in growing their cattle after weaning on pasture; however, the common base forages, Bermudagrass (Cynodon dactylon) and Tall Fescue (Festuca arundinacea), are not conducive to this system without substantial supplementation. An alternative summer forage grazing demonstration program was conducted at five locations across the state to bring attention to the need to diversify forage systems. Demonstrations and associated workshops were hosted by NC State University's pasture-based livestock education program, Amazing Grazing, along with the NC Forage and Grasslands Council, the NC Cattlemen's Association, and local Extension agents. The program began with dinner featuring local meat and was followed by a pasture walk to highlight the topics of discussion: 1) limitations of the base forages, 2) alterna-

tive species of perennial grasses, 3) summer annuals, 4) pasture ecology, and 5) temporary fencing. In addition, a site-specific topic was featured in the discussion including silvopasture, haylage, and weed control. The workshop structure was arranged to encourage questions and open discussion between the group and hosts. After the walk, participants completed an evaluation. Total registration was 195 (35±8; workshop mean±SD) and 144 (29±3) evaluations were completed. Participants were 83% male and 17% female with an average age of 47. Total pasture was 5224 ha (1045±511) with 1807 ha (361±103) as hay. The total number of cows owned by the attendants was 4232 (846±396), yearlings were 2889 (578±386), and bulls were 244 (49±34). The demonstrations performed during the workshop made a clear impact on the participants with 99% indicating they had a better understanding of pasture ecology as well as the limitations associated with the base forages. Additionally, 100% indicated they feel more comfortable with the topic of alternative forage types and 96% with temporary fencing. The hands-on demonstrations and relaxed atmosphere allowed for questions from the group to address issues that may have otherwise been missed, and is a great contributor to the overall success for this series of hands-on workshops. The enthusiasm expressed from the participants for developing a management system around alternative forages is very promising.

Key Words: Hands-on workshop, Beef cattle, Forage

18 Impact of a beef cattle youth leadership camp.

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The Wax Junior Leadership Camp, better known as Making Tracks, is a joint effort among the Mississippi State University (MSU) Animal and Dairy Sciences Department, the Mississippi Cattlemen's Foundation, and the Mississippi Junior Cattlemen's Association (MJCA). Making Tracks is a unique leadership camp that focuses on the beef cattle industry. Youth must be entering at least the 9th grade and no older than 21 to participate in Making Tracks. The 3-day event is held annually during the summer on the MSU campus. It includes workshops dealing with all aspects of the cattle industry. Both hands-on activities with live cattle and beef end product, as well as, interactive classroom sessions are used to educate youth during the camp. Topics covered vary each year and have included subject areas such as aging cattle by dentition, cattle reproduction, cattle handling, beef end product, and Beef Quality Assurance. Campers team up to compete in different activities each year, such as a cattle handling contest, iron chef competition, meats or live cattle evaluation. Making Tracks has utilized many MSU facilities over the years for various activities. Attendees stay in campus dorms during the camp. Host sites around campus include the Animal and Dairy Sciences Department classrooms and laboratories, Leveck Animal Research Center Beef Unit, Bearden Dairy Research Unit, Ballew Hall meats laboratory, and College of Veterinary Medicine facilities. Making Tracks is often the first introduction to the MSU Animal and Dairy Sciences Department for many youth attending the camp. Attendees are actively recruited by department faculty and clubs. Many former Making Tracks attendees have gone on to enroll at MSU as Animal and Dairy Sciences majors or in related majors, and many have gone on to attend veterinary school or graduate school. The camp is sponsored by The Wax Company, the Mississippi Cattlemen's Foundation, and the MJCA. There is an $80 cost for campers to attend, which is paid by families or local county cattlemen's associations. In its 21 years of existence, approximately 900 youth representing 6 states have attended the camp. Approximately, 50 youth attend each year. In addition to Mississippi youth, campers have attended from Alabama, Louisiana, Georgia, Kentucky, and Tennessee. Making Tracks is a key educational and social opportunity for youth in the region interested in the beef production and marketing. The continued demand for this long-running program indicates its value to youth development.

19 Stakeholder feedback regarding the Department of Animal Science teaching programs at the University of Arkansas.

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The objective of this study was to determine stakeholder and extension faculty impressions and feedback regarding the value received from the Department of Animal Science teaching programs and services. An electronic survey was prepared using SurveyMonkey® and was emailed to 3,781 stakeholders. The first and second email announcing the survey was sent June 28 and July 8, 2013, respectively. The survey was closed July 12. Stakeholders categorized themselves as livestock producers (47.3%), current or former students in the department (35.4%), hay or forage producers (27.6%), extension personnel (16.3%), allied industry personnel (6.9%), and other government agency personnel (5.0%). A stakeholder could select more than one category. The overall response rate was 8.5% (n = 323). When asked if they were currently, or had ever been, enrolled as a student at the University of Arkansas-Fayetteville, 156 (48.3%) said "yes" and 167 (51.7%) said "no." Of those answering "yes," 10.9% indicated that they were current students and 80.8% indicated that they were alumni of the University of Arkansas. A majority (66.7%) of the respondents who indicated they were a current or former student at the University of Arkansas reported their major was through the Department of Animal Science. In determining the value of each teaching experience, resource or activity, the following scale was used: 1 = not valuable at all, 2 = slightly valuable, 3 = valuable, 4 = extremely valuable, and N/A = no knowledge about or experience with a listed resource or activity. The percentages of respondents rating the following departmental teaching experiences, resources and activities either extremely valuable or valuable were: access to and availability of professors (96.3%), atmosphere of Department (94.5%), hands-on experiences (94.3%), scholarships (93.7%), coursework (92.6%), classroom instruction (92.6%), advising (90.3%), classrooms and facilities (85.3%), student clubs (78.7%), and internships (78.6%). Stakeholders responding to the survey had minimal levels of experience with/knowledge about international experiences, social media (Facebook, Twitter), and undergraduate research. Results identified teaching programs/services that have value as well as programs/services that have minimal exposure to stakeholders. These data will be used as background information for a departmental review.

Key Words: Stakeholders, Survey, Teaching, Undergraduate

20 Stakeholder feedback regarding the Department of Animal Science extension programs at the University of Arkansas.

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The objective of this study was to determine stakeholder and extension faculty impressions and feedback regarding the value received from the Department of Animal Science extension programs and ser-

vices. An electronic survey was prepared using SurveyMonkey® and was emailed to 3,591 stakeholders and 190 extension agricultural and 4-H county agents (total = 3,781). The first and second email announcing the survey was sent June 28 and July 8, 2013, respectively. The survey was closed July 12. Stakeholders categorized themselves as livestock producers (47.3%), current or former students in the department (35.4%), hay or forage producers (27.6%), extension personnel (16.3%), allied industry personnel (6.9%) and other government agency personnel (5.0%). A stakeholder could select more than one category. Overall response rate was 8.5% (n = 323) with 27.4% (n = 52) and 7.5% (n = 271) of extension personnel and stakeholders responding, respectively. In determining the value of each extension experience, resource or activity the following scale was used: 1 = not valuable at all, 2 = slightly valuable, 3 = valuable, 4 = extremely valuable, and N/A = no knowledge about or experience with a listed resource or activity. The programs or services rated either extremely valuable or valuable by stakeholders were factsheets (88.5%), forage management programs (87.3%), livestock market news (86.7%), beef/forage demonstrations (86.7%), electronic newsletters (84.1%), beef cattle management programs (83.0%), county programs and field days (82.4%), 4-H livestock programs (82.3%) and experiment station field days (81.5%). The programs or services rated either extremely valuable or valuable by extension personnel were livestock market news (100%), regional beef cattle conferences (90.6%), sheep and goat programs (90.3%), grassland evaluation program (85.2%), electronic newsletters (83.7%), the 300 day grazing program (82.8%), and videos/podcasts (81.8%). Extension personnel also were asked to rate additional activities and services that involved faculty in the animal science department. The extension personnel rated availability of Department of Animal Science extension faculty for county programs (100%), Animal Science in-service trainings (95.5%), ease of access to and response from Department of Animal Science extension faculty (95.9%), county agent/Animal Science advisory committee (89.5%) and Animal Science webinar meetings (78.9%) either extremely valuable or valuable. These results will be used as background information for a departmental review.

Key Words: Extension, Stakeholders, Survey, County Agents

21 Stakeholder feedback regarding the Department of Animal Science research programs at the University of Arkansas.

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Departments continuously strive to enhance the relevance of the land-grant mission. Objectives were to determine stakeholder and extension faculty impressions and feedback regarding the value received from the Department of Animal Science research programs. An electronic survey was prepared using SurveyMonkey® and was emailed to 3,591 stakeholders and 190 extension agricultural and 4-H county agents (total = 3,781). First and second email announcing the survey was sent June 28 and July 8, 2013, respectively; survey was closed July 12. A total of 323 responses were received. Overall response rate was 8.5% (n = 323) with 27.4% (n = 52) and 7.5% (n = 271) of extension personnel and stakeholders responding, respectively. Stakeholders categorized themselves as livestock producers (47.3%), current or former students in the department (35.4%), hay or forage producers (27.6%), extension personnel (16.3%), allied industry personnel (6.9%), and other government agency personnel (5.0%). A stakeholder could select more than one category. In determining the value of each research program or resource, the following scale was used: 1 = not valuable at all, 2 = slightly valuable, 3 = valuable, 4 = extremely valuable, and N/A = no knowledge about or experience with a listed resource or activity. Research programs or resources rated either extremely valuable or valuable by stakeholders were beef cattle health (93.4%), beef cattle nutrition (92.1%), parasitology (91.8%), forages (91.2%), and beef cattle reproduction (84.7%). Similarly, extension personnel surveyed rated beef cattle nutrition (100%), health (100%), reproduction (100%), forages (97.5%), parasitology (97.2%), and forage (97.5%) research programs/resources as extremely valuable and valuable. Meats and swine management/nutrition were rated valuable and extremely valuable by 72.4 and 45.3% of stakeholders, and 78.2 and 69.2% of extension personnel, respectively. Stakeholders responding to the survey reported minimal levels of experience with/knowledge about swine management/nutrition, beef cattle genetics/genomics, and meats research programs offered by the Department. Extension personnel surveyed had similar responses with minimal experience with/knowledge about swine management/nutrition and meats research programs and the Department's *Arkansas Research Highlights* publication. Results identified research programs and resources that have value, as well as programs that have minimal exposure to stakeholders. These data will be used as background information for a departmental review.

Key Words: Research, Stakeholders, Survey

22 Impact of a 4-H Replacement Beef Heifer Development Contest.

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The 4-H Replacement Beef Heifer Development Contest was designed to provide a real-world experience for youth interested in raising beef cattle. Over 1,500 Mississippi youth annually participate in junior livestock shows, but much more work is involved in developing beef heifers that will generate income over their productive lifetimes. Youth chose three heifers that fit their cattle program and submitted information on each animal's age, weight and breed-type along with an estimated starting monetary value of each heifer and goals for the contest. The 10-mo contest began in November 2012 and ended in August 2013. Youth were challenged to make critical decisions regarding the daily well-being of their heifers; kept accurate records regarding nutrition, health-related expenses and breeding decisions; and managed their proposed budget versus actual expenses. The heifer development project consisted of 3 heifers (purebred or commercial) that were either autumn born from the previous year or spring born of the year in which the contest begins. Because the contest was designed to evaluate the youth producer's ability to manage the heifers rather than the genetic composition of the heifers, participants using purebred and commercial heifers were judged together without preference given for breed or breed type. Contestants were judged on all managerial aspects of their heifer development project. Participants were encouraged to take advantage of Extension agents, advisors, and experienced producers in selecting quality heifers and discussing production costs. A panel of judges consisting of Extension specialists, cattle producers and industry representatives scored each youth's record book, appraised each heifer, and discussed the presentation of each contestant while youth defended their management decisions. Awards for the contest, solicited from county cattlemen's associations, industry groups and individuals, included a livestock trailer, laptop, and numerous schol-

arships. The value of these awards approached $10,000 in 2013, with similar award values given in previous years. In addition, youth received free admission to a cattle artificial insemination school sponsored by the Mississippi State University Extension Service, a $300 value. Each year's winner presented their talk to beef producers at the Mississippi Cattlemen's Association Annual Convention. Thirty-four youth competed in the initial 5 yr of this contest. They learned about the cattle industry, established contacts with industry leaders that will benefit them in future endeavors, and shared their experiences with fellow cattle producers.

23 Assessment of an environmental stewardship clinic series and a partnership among agencies to deliver watershed management education.

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In the last 10 to 15 years, public awareness of watershed management and interest toward environmental stewardship has increased. The Alabama Cooperative Extension System (ACES) partnered with the Alabama Department of Environmental Management (ADEM), Cherokee County Soil & Water Conservation District, and the Weiss Lake Improvement Association through a 319d Impaired Waterway Grant to host a pilot series of clinics designed to address watershed and land management needs and best management practices (BMPs) throughout Cherokee County, Alabama. The objective of this series was to provide livestock producer and land owner education and Extension agent in-service training on watershed management. The clinics consisted of six 2-h hands on sessions from January to June 2013. Monthly meetings were hosted by livestock producers and land owners throughout Cherokee County, Alabama. This free Environmental Stewardship Clinic Series was open to any individual interested in learning more about watershed management issues and building or adding to their environmental stewardship toolbox. Clinic topics included: Introduction to Water Resources; Soil Management; Managing Streamside Forests for Wildlife, Livestock, and Water Health; Grass Management; Farm Pond Management; and Smart Yards for Healthy Water. Instructors were ACES state specialists and regional agents with subject matter expertise. The clinics were advertised through county Extension newsletters, Facebook accounts, animal science webpages, newspaper, and radio interviews. Each workshop included a classroom presentation and outdoor/hands-on demonstrations. Participant backgrounds varied from livestock producers, gardeners, loggers, foresters, poultry producers, ACES agents, and home, pond, and lake property owners. Participation in the series was incentivized through signage and t-shirts bearing a clinic logo, certificates, and logging and forestry continuing education credits. Participation in the clinics varied from 8 to 23 attendees. Clinic evaluations from participants proved favorable with an average satisfaction rating of 96%. Participants indicated a 92% likelihood of adopting the information and techniques provided throughout the series and a 96% probability of attending future clinics/ ACES related events. Evaluation showed an average increase in knowledge of 21% and an economic impact average of $1382.48 associated with the 6 clinics. This program and partnership is one of few examples of the successful coordination of a sub-contract with ADEM to complete the educational component of a 319d Impaired Waterway Grant. Interest has been shown to replicate and deliver similar programming in additional counties and at the state level.

Extension II

24 Beef programming across state lines: SERA 41 webinars.

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Technology today provides the opportunity to access information from nearly anywhere. The use of online meeting software packages and high speed internet is a tool that has had limited utilization for delivering educational programs for livestock producers. It has, however, been accepted at higher rates as a means to provide updates for county-based faculty and staff. Recent years of high grain prices led to increased incorporation of coproduct feedstuffs. For some states, this meant that novel feedstuffs were being incorporated into beef feeds. Acknowledging the necessity to provide timely updates to county-based staff led to a series of three web-based educational programs. These programs capitalized on the ability to access expertise from several states across the southeast. Three sessions were offered during October and November of 2012. Members of SERA-41 were asked to help publicize the programs as well as posting an announcement on eXtension. Two different webinar software packages were evaluated. Sessions were recorded and links were shared for viewing at later dates. The peak number of attendees for the first and second webinar sessions was 51 and 73, respectively. The third was viewed by 26 attendees. On January 24, 2013, the post-program video views were 69, 31 and 10 for each of the sessions. As of October 2, 2013, the post-program video views were 96, 47 and 22. Thus, the total numbers of attendees and post-program viewers impacted with these three multi-state sessions were in excess of 300. The expense associated with these programs was minimal with time being the cost. Issues that were learned from these sessions include: corporate firewalls can limit access to programs; a difference exists in software and can impact ease of acceptability; effective low-cost mechanism to provide professional training to county-based staff. The opportunity to work collectively with peers from out-of-state with minimal expense to provide educational programs is feasible with today's technology.

25 All Things Equine: a unique opportunity to teach youth about equine management topics.

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All Things Equine is a one-hour interactive educational seminar where 4-Hers are given the opportunity to interact with live animals, learn practical application of management techniques, and to assess the health status of live horses. 4-Hers from across the state are encouraged to participate in 4-H University, which is a week –long conference that allows 4-Hers to practice life skills acquired throughout their 4-H career, provides statewide networking opportunities, and a chance to experience college life. 4-H University is composed of competitive and non-competitive components. Participants from across the state compete in more than 40 events reflecting projects they were active in during their 4-H career and attend non-competitive learning seminars for a total of 7 hours of interactive instruction held at The Louisiana State University. During the non-competitive educational component of 4-H University, LSU AgCenter exten-

sion specialists and agents collaborate with professionals from the Louisiana State University Veterinary School to provide a program called All Things Equine. Instructors demonstrate equine evaluation techniques, health standards, and management practices to approximately 65 youth. Following each demonstration youth participants practice the hands on techniques. Youth are allowed to evaluate equine vital signs on live horses, calculate and perform appropriate feeding techniques, evaluate fecal samples for parasite infestation, judge a class of performance horses, and age a live horse. Evaluations regarding the effectiveness for All Things Equine range from 4.2 -4.7 for the last two years on a scale of 5.0 with an average 4.35 (SD=0.2). Increases in the post-test scores compared to the pre-test scores indicate that participants increased knowledge in all topics presented after participating in All Things Equine.

Key Words: youth education, equine management, equine

26 Response of beef cows, not exposed to mineral supplements, to an injectable trace mineral supplement.

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The objective of this study was to examine beef cow response to an injectable form of trace mineral supplementation in a production environment where forage and grazing was well managed but free-choice mineral supplementation was historically not practiced. The study site was a 55 ha cow-calf operation with rotational stocked pastures of mixed warm-season grasses, overseeded clovers, non-toxic fescue, and overseeded winter annuals for fall and spring grazing. Soil test pH, P, and K were 6, 20 ppm, and 132 ppm, respectively. On April 15, 2011, 35 beef cows and 7 yearling heifers (average weight 1035 ± 179 lb) were assigned to either an injectable mineral or no injectable mineral treatment. The injectable mineral contained 60 mg/mL Zn, 10 mg/mL Mn, 5 mg/mL Se, and 15 mg/mL Cu (Multimin 90, Multimin USA, Fort Collins, CO). The injectable mineral dose was 0.5mL/45.45 kg BW. Female BW, body condition score, pregnancy rate, postpartum interval, and calculated number of days from bull exposure to breeding were determined over a 1-year cycle (pre-breeding 2011 to re-breeding 2012). Body weight did not differ ($P \geq 0.19$) between treatments at any point when compared among all females. Body condition score tended to be greater ($P = 0.10$) for injectable mineral at 90-d calf processing; however body condition score did not differ at weaning, calving or re-breeding. Pregnancy rate did not differ ($P = 0.36$) and was 90.4% for no injectable mineral and 76.2% for injectable mineral. Retained injectable mineral cows that calved in the spring of 2011 had a similar ($P = 0.43$) postpartum interval compared to no injectable mineral cows that calved in spring 2011. Calculated days from bull exposure to breeding did not differ among all retained females ($P = 0.89$). These results indicate injectable mineral may not increase pregnancy rate in beef cows not exposed to free choice mineral supplementation in a well managed forage production and grazing systems environment.

119 Response of beef calves, not exposed to free-choice mineral supplements, to an injectable trace mineral supplement

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The objective of this study was to examine growth and immune response of beef calves, not exposed to a free-choice mineral supplement, to an injectable mineral formulation. The study site was a 55 ha cow-calf operation with a rotational stocking forage system of mixed warm-season grasses, interseeded clover, non-toxic fescue, and overseeded winter annuals for fall and spring grazing. The location was stocked with 35 beef cows, 7 yearling heifers, and calves were retained on the farm from fall weaning until spring marketing. Calves whose dams either did not receive or received trace mineral injection pre-breeding were randomly assigned within dam treatment to either a no injectable mineral treatment or injectable mineral treatment. The injectable mineral contained 60 mg/mL Zn, 10 mg/mL Mn, 5 mg/mL Se, and 15 mg/mL Cu. Calves assigned to the injectable mineral treatment were administered injectable mineral at 90 d of age processing and again at weaning at a dose of 1mL/45.45 kg BW (Multimin 90, Multimin USA, Fort Collins CO). All calves received 0.3% BW corn gluten feed pellets from weaning through pre-conditioning. Neither dam treatment pre-breeding nor calf treatment affected weight gain from 90 d processing through a 46-d pre-conditioning period ($P \geq 0.27$). Type 1 bovine viral diarrhea virus neutralizing titer at weaning, 21 d post-weaning, or 46 d posting-weaning was not affected by pre-breeding dam treatment ($P \geq 0.59$) or calf treatment ($P \geq 0.44$). These results indicate injectable mineral did not improve growth or bovine viral diarrhea virus neutralizing titer for calves managed within an improved forage and grazing system but not provided free choice access to a mineral supplement.

27 Evaluation of warm season annuals for forage finishing in the piedmont region on animal performance and meat quality.

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Four warm season annual forages were evaluated over an 84-d grass-finishing system for beef cattle. Sixteen 0.73 ha pastures were blocked by previous management and assigned to one of four treatments: 'Tifleaf 3' pearl millet (PM; *Pennisetum glaucum)*, 'Tifleaf 3' pearl millet and 'Red River' crabgrass (PMCG; *Digitaria sanguinalis)*, 'Honey Graze BMR' brown midrib sorghum sudangrass (BMR SxS; *Sorghum bicolor x S. bicolor ssp. drummondii*) and 'Sugar Grazer' sorghum sudangrass (SxS; *Sorghum bicolor x S. bicolor ssp. drummondii*). Thirty-two cross-bred beef steers (avg BW 386 ± 9.5 kg) were stratified by weight and randomly assigned to a pasture. BW was recorded on d 0 and 84. Additionally, ultrasound measurements of ribeye area, 12th rib fat thickness, intramuscular fat, and rump fat thickness were recorded on d 0 and 84. All pastures were managed for rotational stocking. Forage samples for mass and nutritive value were collected on d 0 and every 14 d thereafter. On d 86, all animals were harvested, and carcass data was collected for yield and quality determination as well as objective carcass fat and lean scores (CIE L*, a*, b*) and subjective fat and lean scores. Forage mass was not influenced by treatment during the summer season ($P = 0.90$). There were no treatment differences in steer ADG ($P = 0.42$) or ultrasound data of predicted carcass traits ($P \geq 0.34$). Carcasses from PMCG had a greater overall maturity (A^{80}) than SxS ($P < 0.01$; A^{60}) and PM ($P = 0.03$; A^{70}) due to PMCG carcasses having a greater lean maturity ($P < 0.01$) than carcasses from other treatments. There were no differences between treatments for carcass marbling scores ($P > 0.12$). Subjective fat color readings of SxS carcasses were more yellow in color than all other treatments ($P \leq 0.03$). Carcasses from steers grazing all treatments had similar HCW, %KPH, REA, 12th rib fat thickness, and yield grade ($P > 0.17$). No treatment differences were observed for objective color scores of lean ($P > 0.50$) and fat ($P > 0.26$), or subjective lean color scores ($P > 0.34$). These data

indicate the four forage systems can be used in warm season annual forage finishing programs without affecting animal performance and having minimal effects on carcass characteristics.

Key Words: Beef cattle; forage finished; carcass characteristics

28 Implants for short-term heifer grazing in Northeast Oklahoma.

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Implant utilization in Oklahoma is below national averages and particularly low in smaller herds more common in eastern Oklahoma. A project was conducted to demonstrate the benefits of even short term opportunities to implant heifers grazing summer native pastures. Crossbred heifers (n = 123) with an average initial BW of 280.0 kg had been previously purchased, vaccinated, and dewormed. On June 6, 2013 heifers were weighed and received an anthelmintic and a fly tag. Any heifers with horns were dehorned and if they had excessive warts, were given a wart vaccine (Colorado Serum, Denver, CO). Heifers were assigned to 1 of 3 treatments: non-implanted (Control), implanted with Ralgro® (Merck Animal Health, Summit, NJ), or implanted with Component® TE-G with Tylan® (Elanco Animal Health, Greenfield, IN). All heifers grazed a common native pasture of approximately 137 ha. Data was analyzed as a completely randomized design with heifer as the experimental unit and using initial weight as a covariate for weight measures. Contrasts were evaluated for Control vs. individual or combined implant treatments and the two implant treatments. Heifers were weighed off of the study on August 13, 2013 after a 68 d grazing period. Heifers on the Control, implanted with Component, and implanted with Ralgro treatments had ADG of 0.66, 0.74, and 0.70 kg/d, respectively. Weight gains of heifers on the Control, implanted with Component, and implanted with Ralgro treatments were 45.1, 50.3, and 47.3 kg/d, respectively. Average daily gains of heifers implanted with Component were greater ($P = 0.07$) than for control heifers. This resulted in Component implanted heifers gaining 5 kg more ($P = 0.07$) than Control heifers. Average daily gains and weight gains between the two implant treatments were not different ($P > 0.28$). Ralgro implanted heifers ADG and weight gain did not differ from the Control ($P > 0.42$). These results suggest that with limited days on feed, implanting heifers with Component has the potential to increase average daily gains and result in more marketable weight.

Graduate Student Competition I

29 Relationship between the rumen microbiome and residual feed intake-efficiency of Brahman Bulls stocked on Bermudagrass pastures

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Residual feed intake (RFI) testing has increased selection pressure on biological efficiency in cattle. The objective of this study was to assess the association of the rumen microbiome with inefficient, positive RFI (p-RFI) and efficient, negative RFI (n-RFI) Brahman bulls grazing 'Coastal' bermudagrass [*Cynodon dactylon* (L.) Pers.] under two levels of forage allowance (high and low stocking intensity). Sixteen Brahman bulls were previously fed in confinement for 70 d to determine the RFI phenotype. Bulls were then allotted 60 d stocking on bermudagrass pastures to estimate RFI using the n-alkane technique. At the conclusion of the grazing period, rumen liquid samples were collected from each bull by stomach tube to evaluate the rumen microbiome. Extraction of DNA, amplification of the V4-V6 region of the 16S rRNA gene, and 454 pyrosequencing were performed on each sample. After denoising the sequences, chimera checking, and quality trimming, 4,573 ± 1,287 sequences were generated per sample. Sequences were then assigned taxonomy from the Greengenes database using the RDP classifier. Overall, 67.5 and 22.9% of sequences were classified as *Bacteroidetes* and *Firmicutes*, respectively. Within the phylum *Bacteroidetes*, *Prevotella* was the most predominant genus and was observed in greater relative abundance in p-RFI bulls compared to n-RFI bulls ($P = 0.01$). In contrast, an unidentified *Bacteroidales* family was greater in relative abundance for n-RFI bulls than p-RFI (26.7 vs. 19.1%; $P = 0.03$). *Ruminococcaceae* was the third most abundant family in our samples, but it was not affected by RFI phenotype. No effect of stocking intensity was observed for bacterial taxa, but there was a tendency for alpha diversity and operational taxonomic unit richness to increase with lower stocking intensity. Results suggested the rumen microbiome of p-RFI Brahman bulls has higher levels of *Prevotella*, but the bacterial community composition was unaffected by stocking intensity.

30 Evaluation of lactic acid and sodium metasilicate on microbial parameters of fresh beef

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Lactic acid has been widely used on harvest floors as an antimicrobial spray for carcass intervention. Sodium metasilicate has been approved for use on carcasses, trimmings, and ready to eat products. Each of these antimicrobials has been used at a variety of concentrations. Utilizing these antimicrobials in different stages during meat processing may assist in the reduction of the risk of pathogenic microorganisms. The purpose of this study was to determine optimum concentrations of usage of lactic acid and sodium metasilicate for pathogen reduction on beef bottom round muscles. Lactic acid was applied at 1, 2, 3, and 4% (LA1, LA2, LA3, and LA4) and sodium metasilicate was applied at 2, 3, 4, and 5% (SM2, SM3, SM4, and SM5). Concentrations were determined based on current industry use and FSIS Directive 7120.1 revision 15. Beef bottom round was cut into 100 cm^2 pieces. Pieces were inoculated with *Escherichia coli* O157:H7 (5 strains), Non-O157 Shiga-toxin producing *Escherichia coli* (STEC, 1 strain each of the "Big 6"), *Salmonella* spp. (5 strains), or *Listeria monocytogenes* (5 strains). After 30 min of contact time samples were treated with LA1, LA2, LA3, LA4, SM2, SM3, SM4, or SM5 and then allowed 30 min of contact time. Samples were serially diluted and plated on MacConkey Agar with Sorbitol (*E. coli*), XLT4 (*Salmonella* spp.), or Modified Oxford Medium (*L. monocytogenes*). Data were analyzed using the PROC MIXED procedure of SAS and Tukey pairwise comparisons. For all microorganisms, increasing the concentration of lactic acid or sodium metasilicate increased the effectiveness of the treatment. SM4 and LA4 were determined to be the lowest concentrations most effective against all

30 **Table 1.** Culture results in colony forming units per cm^2 in $\log_{10}$ ($\log_{10}$ CFU/cm^2).

Culture	LA1	LA2	LA3	LA4	SM2	SM3	SM4	SM5	SEM
E. coli O157:H7	6.74^{a}	6.20^{b}	5.90^{bc}	5.76^{c}	6.32^{x}	6.12^{xy}	5.87^{yz}	5.70^{z}	0.09
E. coli Non-O157 STEC	6.71^{a}	6.33^{ab}	6.04^{b}	5.43^{c}	6.20^{x}	6.20^{x}	5.88^{xy}	5.52^{y}	0.12
Salmonella spp.	6.41^{a}	5.20^{b}	5.26^{b}	4.76^{b}	5.92^{x}	6.16^{x}	4.93^{y}	4.70^{y}	0.16
Listeria monocytogenes	6.45^{a}	6.37^{a}	6.36^{a}	5.93^{b}	7.18^{x}	7.03^{x}	6.64^{y}	6.65^{y}	0.08

^{abc}Means with common superscripts in the same row are not different (P>0.05).
^{xyz}Means with common superscripts in the same row are not different (P>0.05).

microorganisms (Table 1). By utilizing the lowest concentration of antimicrobial solution necessary to achieve effective pathogen reduction, meat processors can lower the overall cost of intervention methods while still providing a safe and wholesome meat supply.

31 Learning and memory recall of horses tranquilized with acepromazine maleate.

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Acepromazine maleate (Ace) is a common tranquilizer employed by horse handlers as a "training aid" because it allows handlers more control of fractious horses in training situations. Tranquilizing horses with Ace is effective at increasing tractability in horses, but little research exists on its effect on learning ability and the ability to recall learning at later dates. Thirty-five mature horses (average age = 11 years old) were randomly assigned to tranquilized (n = 18) and non-tranquilized control (n = 17) groups and used to determine if learning and recall abilities differed between tranquilized and non-tranquilized horses. Horses were trained to lever press in a training stall containing a single lever for three consecutive days using a food reward and a secondary reinforcer (buzzer). Horses were trained to a criterion of 30 independent lever presses for each training day (90 total presses). On the fourth day, each horse was administered either 0.088 mg/kg IM of Ace or a saline control, according to treatment, and allowed to stand for 15 min while the tranquilizer took effect. Then the horse was moved into a second stall containing a white lever and a black lever. Each horse was randomly assigned a correct lever color and was trained to criterion of 30 independent lever presses on the assigned lever on that day. Fourteen days after the training date for the lever color discrimination, horses were returned to the two-lever stall and allowed to lever press. Each lever press was recorded as either correct (pressing the originally assigned lever color), which was rewarded with food and the secondary reinforcer, or incorrect, which received no food reward or secondary reinforcer. Number of correct lever presses and time (s) for the horse to complete 30 correct lever presses were recorded, and data were analyzed using a t-test. No significant difference (P< 0.0001) was detected in number of correct lever presses between control (29.5 ± 0.3) and tranquilized (28.5 ± 0.3) groups. Similarly, no significant differences (P< 0.0001) in time to complete 30 correct responses (control = 643.9 ± 54.8 s; tranquilized = 583.7 ± 53.2 s) was detected. These results indicate horses can learn while under the influence of Ace and can retain that learned information to be recalled at a later date. These results support the use of acepromazine maleate during training or handling of fractious horses.

32 Prenatal stress influences the insulin response to a glucose challenge in yearling Brahman Heifers.

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The effect of prenatal stress on postnatal glucose metabolism was studied in progeny of cows that did or did not experience a trans-

32 **Table 1.** Glucose and insulin response variables to a glucose challenge in prenatally stressed and control yearling heifers

	Treatment group		
Variable	Prenatal Stress	Control	P-value
Basal glucose, mg/dL	84.16±4.21	82.89±4.21	0.81
Basal insulin, µIU/mL	11.04±1.16	11.94±1.16	0.58
Peak insulin, µIU/mL	47.88±5.62	56.80±5.62	0.13
Insulinogenic index*	0.33±0.05	0.44 ±0.05	0.08
Time to peak insulin, min	22.01±2.26	17.36±2.29	< 0.01
Time to basal glucose, min	125.00±2.80	142.00±2.51	< 0.01
Time to basal insulin, min	111.67±10.93	126.67±10.93	< 0.01

*ΔI/ΔG calculated at 30 min post-challenge

portation event during gestation. Specifically, 12 prenatally stressed (dams transported for 2 h on d 40, 60, 80, 120, and 140 of gestation) and 12 Control yearling heifers of similar BW (211±4.4 kg) were balanced for temperament and subjected to an iv glucose tolerance test to compare insulin responsiveness and glucose clearance. The tests were conducted over 2 d using a complete block design. The heifers were fitted with jugular vein cannulas and placed in individual stanchions. Following a 2-h acclimation period, a 50% dextrose solution was administered to each heifer (0.5 mL/kg BW). Blood samples were collected during the acclimation period, immediately prior to, and following the glucose challenge at intervals of 10 and 20 min. Serum concentrations of glucose and insulin were determined by enzymatic assay and ELISA, respectively. Repeated measures mixed models analyses were used to compare glucose and insulin concentrations and the ratio of insulin to glucose (IGR) over time. Prenatal treatment significantly affected concentrations of insulin (P=0.03), but not glucose concentrations (P=0.61), over time. Prenatal treatment also affected the IGR over time (P=0.01). Table 1 lists basal glucose and insulin concentrations, peak insulin concentration, the insulinogenic index ($\Delta I/\Delta G$) at 30 min post-challenge, the time to peak insulin concentration, and the time to reach basal insulin and glucose concentrations. Prenatally stressed heifers were less insulin resistant than Control heifers. Prenatally stressed heifers had decreased insulin concentrations ($P \leq 0.03$) and returned to basal glucose and insulin concentrations earlier following the glucose challenge ($P<0.01$). These data suggest that prenatal stress enhances insulin sensitivity in Brahman calves.

33 The effects of a tannin-rich pine bark pellet diet on parasitic nematode infections and carcass characteristics of grazing meat goats.

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The objective of this study was to assess fecal egg counts (FEC), blood metabolites, animal performance, and carcass characteristics of meat goats fed condensed tannin (CT)- containing ground pine bark (PB; Pinus spp.) diet. Pine bark is one of the abundant forest byproducts in the southern US and contains 11–13% CT on a dry matter (DM) basis. Twenty-four Kiko cross male goats (Capra hircus; initial BW = 39.7 ± 2.55 kg) were randomly assigned to two experimental diets (0% PB vs. 1.2% PB pellet supplementation/BW) in total dry matter intake DMI) with two different sexes (buck vs. wether) in a winter rye grass-dominant pasture. Animals were fed once a day at 0900 h and had free access to water and trace mineral salt blocks. Control animals were drenched orally with Cydectin (1 ml/10 kg BW) when FEC was over 1000 egg per gram of feces, but the PB treatment group was not dewormed. Blood samples were collected for both plasma and serum on d 50. Carcass characteristics were assessed after slaughter at the end of the experiment (d 55). Feeding PB diet was not significant different in average FEC (1333.3 vs. 820 FEC/g; P=0.14) compared to Moxidectin dewormed-control, respectively, but castrated animals having lower (P<0.04) FEC compared to intact animals. There was no difference in initial and final BW, ADG, carcass characteristics, meat pH, and meat colors between treatments; however, treatment x sex interactions for rack (P<0.05), LM area (P=0.07), breast (P=0.11), leg, (P<0.06), hot carcass weight (HCW), and CCW (P=0.11) were suggested that castrated animals provided more carcass weights compared to intact animals. Blood plasma protein (P<0.05), glucose (P<0.01), urea (P<0.05), and gamma-glutamyl transferase (P<0.03) were higher for the PB diet than for control, but blood phosphorus level was lower for PB diet compared to the control diet. Results from the current study indicated that animals consuming PB pellet might have the ability to reduce FEC by inhibiting the fecundity of the worm parasite compared to Moxidectin dewormed-control; however, additional studies are needed to further validate these findings.

34 Effects of stacking technologies on hay consumption, waste and performance in a cow/calf enterprise.

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Two experiments evaluated the effects of (Rumensin 90®; Elanco Animal Health; Greenfield, IN) supplementation, limit feeding and ammoniation on hay consumption, hay waste, and cow and calf performance during the winter feeding period. The objective was to determine if hay utilization in beef cattle could be improved by stacking technologies. In experiment 1, 72 gestating Angus and Angus x Hereford cows (532 ± 59 kg) were used in a completely randomized design. Hay feeding system treatments were control (CONT1) and two technologies applied together (TECH1). Cows provided the CONT1 treatment had ad libitum access to prairie hay (6.2% CP, 54% TDN) in a standard ring feeder equipped with a metal apron and were fed 0.45 kg/d of a 38% CP cottonseed meal-based supplement with no feed additive. Cows exposed to the TECH1 treatment were provided 7 h daily access to the same lot of hay in a modified cone feeder and 0.45 kg/d of a 38% CP cottonseed meal-based supplement containing 200 mg of monensin. In Experiment 2, 36 comparable lactating cows (528 ± 63 kg) and their fall-born calves were used in a completely randomized design. The control (CONT2) treatment was the same as CONT1 with the exception of an increase in daily supplement amount by 1.13 kg. The technology treatment (TECH2) was similar to TECH1 with the following exceptions: hay was ammoniated 3 months in advance of the experiment at the rate of 3% anhydrous ammonia relative to hay DM and the supplement amount was increased to 0.79 kg/d and delivered 200 mg monensin. Cows exposed to TECH2 were allowed 6 h daily access to hay in the modified cone feeder. Data were analyzed using the MIXED procedure of SAS. Pen was the experimental unit and the model included treatment as fixed effect. In both experiments, hay feeding systems resulted in similar cow BW change ($P > 0.14$) between d 0 and experiment termination. Hay waste was significantly ($P = 0.01$; experiment 1, 157 vs. 75 kg and experiment 2, 134 vs. 48 kg) reduced by the TECH treatments. Net disappearance of hay/d per cow was significantly ($P < 0.03$) reduced by the TECH treatments. In experiment 2, calves from cows receiving the TECH2 treatment gained less weight ($P = 0.01$) than those receiving the CONT2 treatment. Hay utilization can be improved as much as 30% compared to a more traditional approach when available technologies are applied simultaneously.

35 Effect of surgical castration with or without oral meloxicam on the acute inflammatory response in yearling beef bulls.

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Pain management and welfare are increasingly prevalent concerns within animal agriculture and oral analgesics may alleviate the pain associated with castration. This study was conducted to elucidate the effects of surgical castration on the acute inflammatory response and immunomodulation and whether concurrent oral administration of meloxicam (1 mg/kg BW) ameliorates these responses. On d -1, crossbred bull calves (n=31; initial BW = 227.4 ± 10.3 kg) were fitted with indwelling jugular cannulas and rectal temperature probes, placed into individual stanchions, and assigned randomly to 1 of 3 treatments. Treatment application occurred at h 0 and consisted of: 1) intact bulls with sham castration (CON), 2) surgical castration (CAS), and 3) surgical castration with oral meloxicam (MEL). Blood samples were collected at 0.5-h intervals from h -2 to 4 h, 1.0 h intervals from h 4 to 8 h, and 12-h intervals from h 12 to 72 h. Serum was analyzed for cortisol and haptoglobin (Hp) concentrations using ELISA. Whole blood was analyzed for complete blood cell counts at -2, 0, 2, 4, 6, 8, 12, 24, 36, 48, 60, and 72 h. Post-castration rectal temperature was greatest for MEL, intermediate for CAS, and least for CON (P=0.01). Serum cortisol was increased (P<0.001) for CAS and MEL compared to CON during the post-castration period. At 0.5 and 1.5 h, cortisol was greater in CAS and MEL than CON; whereas, at 2 and 2.5 h CAS was greatest, MEL was intermediate and CON was least (trt x time; P<0.001). Total white blood cell (P≤0.04), lymphocyte (P≤0.02) and monocyte (P≤0.002) counts were greatest for CAS, intermediate for MEL and least for CON. Administration of MEL reduced (P≤0.002) eosinophil counts during the 72-h post-castration period when compared to CON and CAS. The change in serum Hp, relative to baseline values, was reduced for MEL at 36 (P<0.01) and 60 h (P≤0.03) and the overall Hp concentration was least for MEL (P<0.001). Oral administration of meloxicam altered the acute inflammatory response in castrates, as evidenced by a reduction in Hp and certain leukocyte concentrations.

Key Words: castration, cortisol, inflammation, meloxicam

36 Using performance data and reproductive measurements to predict fertility in replacement beef heifers.

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This study investigated the effect of reproductive tract and growth characteristics measured 30-70 d prior to the breeding season on 1) pregnancy outcome and 2) time to conception in replacement beef heifers. A total of 1,992 heifers (BW 329±42 kg; age 347±27 d) were delivered for enrollment in the Georgia Heifer Evaluation and Reproductive Development (HERD) program between 2006 and 2011 at two locations. Variables were chosen to estimate management of heifers prior to entering the program in addition to developmental traits traditionally measured in the HERD program and included: reproductive tract score (RTS), weight 70-d prior to breeding as a percentage of target weight, hip height (HH) 40-50 d prior to breeding, and ADG 40-50 d prior to breeding. Cattle entered in the program were of similar age and subjected to comparable nutritional and management protocols. Chi-square test of homogeneity (pregnancy status) and the Kaplan-Meier product limit method (number of days from initial breeding to conception) were used to analyze univariate associations with predictor variables. Multivariate analyses of pregnancy status and time to conception were performed using logistic regression and Cox regression respectively. The odds of pregnancy increased by 15% for every 2.5 cm increase in HH ($P = 0.001$), and by 20% for every 30-d increase in heifer age at the start of the breeding period ($P = 0.019$). Although reproductive tract score was associated ($P = 0.015$) with pregnancy status in the univariate analysis, after adjusting for the other variables included in the final multivariate model there was no significant association ($P = 0.24$). Reproductive tract score ($P = 0.26$) and heifer age ($P = 0.06$) were not significantly associated with time to conception in the multivariate Cox regression analysis and were not included in the final model. However, HH was associated with the time to conception after adjusting for location and year of enrollment. After 35 d the hazard rate for conception increased 15% for every 2.5 cm increase in HH [hazard ratio (95% CI) = 1.15 (1.04, 1.26); $P = 0.005$]. Variables intended to indicate prior management (ADG and weight 70-d prior to breeding as a percentage of target weight) were not found to be associated with pregnancy or time to conception. The results suggest that factors relating to maturity can be used to select heifers that are more likely to achieve pregnancy and have reduced times to conception.

Key Words: beef, heifer development, fertility

37 Production, digestion and ruminal fermentation by beef cattle limit-fed co-product feedstuffs.

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In terms of energy density, economics of shipping hay is often not justified in years where adverse conditions limit available forage. Co-product feedstuffs could represent an alternative to feeding hay. Our objective was to determine if co-product feedstuffs could be used to meet the energy demands for cows in late pregnancy. Eighty-six crossbred cows (527 ± 0.8 kg BW) in late gestation were stratified by BW, BCS, and age and allocated randomly to 1 of 6 groups that were held on 2-ha dormant bermudagrass pastures for 68 d. Three groups were offered bermudagrass hay (8.8% CP, 72% NDF) ad libitum (BH). The 3 remaining groups were offered 6.4 kg of soybean hulls daily and allowed access to mixed-grass hay (3.0% CP, 82% NDF) for 1 h daily (SH). Changes in BW, BCS, and serum non-esterified fatty acids were minimal between treatments ($P \geq 0.31$). Birth weights tended ($P = 0.05$) to be greater from SH, but no difference was observed in dystocia scores ($P = 0.23$). In a companion study, 8 ruminally-fistulated cows (671 ± 32.0 kg BW) were stratified by BW and allocated randomly to 1 of 4 treatments in a 2-period study: limit-fed soybean hulls (LSH), limit-fed distillers' dried grains with solubles (LDG), a limit-fed mixture of soybean hulls and distillers' dried grains with solubles (MIX), or ad libitum mixed-grass hay (HAY; 10.6% CP, 71% NDF). Limit-fed diets were formulated to meet the ME requirements of an 11-mo post-partum mature beef cow. Diet amounts were increased over a 14-d period. Cows were then moved to indoor 3 × 4.3 m concrete pens fitted with

rubber mats for a 14-d adaptation and 5 d of total fecal collection period. On the final day of collections, rumen fluid was sampled immediately prior to feeding and 2, 4, 6, 8, 10 and 12 hr post-feeding for measurement of rumen pH, VFA and NH_3-N concentrations. Dry matter disappearance was greatest for LSH and MIX, intermediate for LDG, and lowest for HAY ($P < 0.05$). A treatment × time interaction ($P < 0.05$) was observed for ruminal pH, acetate, propionate, and butyrate concentrations, acetate: propionate ratio, and NH_3-N concentrations. Based on this information, co-product feedstuffs may be used in lieu of hay to meet the energy requirements of cows during late pregnancy without adverse effects.

Key Words: limit feeding, co-product feedstuffs

38 Survival comparison of shiga toxin producing Escherichia coli (STEC) O26 and farm isolated O26 in ground beef and the environment.

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In June, 2012, six non-O157 STEC serogroups were added to the zero-tolerance adulterant list. One of these serogroups was *Escherichia coli* O26. In August 2010, Cargill meat solutions corp. recalled approximately 8,500 pounds of ground beef products due to *Escherichia coli*contamination. From a previous study conducted in the author's lab, O26 was found to be the dominant serogroup isolated from calves during the pre-harvest stage. Also, O26 strains isolated from a farm were found to contain different genes related to pathogenicity as compared to clinical strains. To discover if the presence of the different genes affects survival, both clinical and farm strains were put through a ground beef and environmental survival test. Three farm isolated strains and one clinical isolate were used in this study. Before inoculating the samples, a multiplex PCR assay targeting *stx*1, *stx*2, and *eae*A genes was used to determine the presence of three major STEC genes. The selected strains were transformed with a GFP plasmid. Environmental samples include feces, bedding, and water. These were taken from a local farm while ground beef was purchased from a local store and proved to be O26 and O157 free via PCR. Samples were inoculated with overnight O26 cultures diluted to the final concentrations of approximately 8 Log CFU/g, 6 Log CFU/g, and 2 Log CFU/g for the ground beef tests. Environmental samples were inoculated with approximately 6 Log CFU/g and 4 Log CFU/g. Ground beef samples were stored at 4°C for 10 days; environmental samples were stored at room temperature for 30 days. To enumerate survived O26 cells, 100 ml of 0.1% peptone water was added to the 25g samples. Bags were stomached, and 100µl was spread in duplicate on LB agar plates supplemented with 0.1 mg/ml ampicillin and 50mg/ml arabinose. Plates were incubated for 24hrs at 37˚C and enumerated. Multiplex PCR showed that the three farm isolates all contained the *eae*A gene while the clinical strain had both the *eae*A and the *stx*1 genes. The ground beef and environmental survival tests comparing the clinical and farm strains were done in duplicate and both showed a similar survival rate.

39 Stocker cattle performance on cereal rye and rye-based cool season annual mixtures.

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A 3-yr grazing trial was conducted to measure the potential of rye (*Secale cereale*) and rye combined with wheat (*Triticum aestivum* L.), annual ryegrass (*Lolium multiflorum* Lam.), or arrowleaf (*Trifolium vesiculosum* L.) and crimson clover (*Trifolium incarnatum* L.) for stocker cattle production. Forage combinations included 1) Cereal rye (RYE) 2) Cereal rye and wheat (RWH), 3) Cereal rye and ryegrass (RRG) and 3) Cereal rye and clover (RCL). Sixteen pastures were assigned to one of four blocks based on soil type and treatments were randomly assigned to the four experimental units (0.8 ha paddocks) in a randomized complete block design. Paddocks were planted on or about 15 October each year. All pastures were provided 56 kg N ha^{-1} at planting. RYE, RWH, and RRG were provided an additional 56 kg N ha^{-1} in early January, while RCL paddocks were provided only 28 kg N ha^{-1} and RRG paddocks were provided an additional 56 kg N ha^{-1} in early March. Sixty-four beef steers were stratified by weight (275 ± 18 kg initial BW) and two testers were randomly assigned to a pasture. Grazing began in late January or early February of each year when forage availability supported grazing. Body weights were recorded for all cattle on d 0, and every 28 d thereafter following a 16-hr fast. Forage mass was estimated using a rising plate meter (weekly) and hand clipping 0.1 m^2 quadrats (bi-weekly). Stocking rates were adjusted with put-and-take steers based on forage availability. Data are presented for yr-1. Gains of steers were similar ($P = 0.23$) for RYE, RWH, RRG, and RCL (1.24, 1.16, 0.87, and 1.04 kg/d, respectively). The average stocking rate for that grazing season was greater ($P < 0.05$) for RWH and RYE compared to RRG and RCL (4.84, 4.80, 3.95, and 3.73 hd/ha, respectively), however total days of grazing was longer ($P < 0.01$) for RRG and RCL compared to RWH and RYE (134, 129, 84, and 84 d, respectively). The resulting animal gain per hectare was similar across treatments ($P = 0.83$), however, the cost of gain tended ($P = 0.10$) to be lower for RCL, RYE, and RWH compared to RRG ($93.45, $93.53, $101.37, $116.54 per 100 kg BW). These data indicate the addition of clover to cereal rye can extend the grazing season and decrease the cost of gain compared to other cool season annuals.

Key Words: cool season annual forages, beef, clover

40 Utilization of by-product feeds to decrease feed cost while maintaining performance of yearling beef bulls.

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In a two-year study, 58 yearling bulls (initial BW = 280 ± 31 kg) were individually fed for 90 d (YR 1) and 99 d (YR 2) to evaluate two by-product based diets and a commercial diet. The diets were: 1) A commercial ration (COM); 2) A ration composed of 49% soybean hulls, 24.5% corn, 24.5% corn gluten feed and 2% minerals (CGF); or 3) A ration composed of 49% soybean hulls, 24.5% corn, 24.5% dried distillers grains plus solubles and 2% minerals (DDGS). Bulls were individually fed ad libitum using Calan gates. On d 0, 49, and 90 (YR 1) or 99 (YR 2), BW were recorded, and, ribeye area, 12th rib fat thickness, intramuscular fat, and rump fat thickness were assessed via ultrasound. Additionally, the diets were subjected to in vitro digestion to evaluate production of CH_4, H_2S, gas production kinetics, IVTDMD, pH, NH_3-N, and VFA concentrations. Animal performance data showed that ADG was greater ($P < 0.05$) for bulls fed COM compared with CGF and DDGS (2.04, 1.83, and 1.82 kg/d, respectively). Final BW was greater for COM and CGF ($P < 0.05$) than DDGS. Feed conversion and DMI as a percentage of BW were similar for all treatments ($P > 0.06$). Predicted intramuscular fat was higher for COM and DDGS ($P < 0.05$) compared to CGF, whereas ribeye area was similar across all treatments ($P = 0.57$). Data from the in vitro tests revealed greater IVTDMD and H_2S production for CGF ($P < 0.001$). Total CH_4 production, CH_4 production per g of

incubated DM and per g of fermented DM were all greater for the CGF and DDGS treatments ($P < 0.01$). Molar proportions of acetate, acetate to propionate ratio, and total VFA concentrations were higher for CGF and DDGS ($P < 0.001$). Molar proportion of propionate was significantly higher for COM ($P < 0.01$). These data indicate that diets utilizing these by-products can be used to reduce feed cost, with minimal or no effect on animal performance. However, caution should be used incorporating corn gluten feed at high rates into rations to avoid potential negative effects of CH_4 and H_2S production in the rumen. Nevertheless, depending on the conjuncture of cattle and feed prices, utilization of CGF and DDGS diets may be preferable over COM.

Key Words: bull, by-product, in vitro.

41 Effects of dam cow size on subsequent female offspring dry matter and residual feed intake.

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Thirty-eight Angus cross nulliparous beef heifers (BW = 280 ± 26.3 kg) were used to determine if differences in DMI and residual feed intake (RFI) exist based on dam cow size. Heifers were housed in individual pens (2.2 x 9.1 m) equipped with 2.2 m of bunk space and fed a diet consisting of 87.2% bermudagrass hay and 12.8% liquid protein supplement (nutrient analysis of diet: DM = 90.4%, CP = 13.7%, NDF = 67.2%, TDN = 56.2%) for a 14 d adaption and 70 d feeding period. Individual feed intake was collected daily and used to calculate RFI for each heifer as the difference between actual and expected feed intake. Heifer is the experimental unit. Two-day initial and final BW and hip height were recorded; hip height was used to calculate frame score (FS). Dams of heifers were assigned to a light (550 ± 21.3 kg) or heavy (625 ± 34.8 kg) BW group at weaning based on BW adjusted to a BCS 5 to determine differences in offspring DMI and RFI. Based on RFI ranking, heifers were classified as positive (POS; 0.32) or negative (NEG; -0.32) RFI and low (LOW; -0.43), medium (MED; 0.01), or high (HI; 0.43) RFI for analysis of BW, FS, BW gain, and DMI. Dry matter intake and RFI were similar ($P > 0.42$) among heifers out of dams from both BW groups; however, a positive relationship existed ($r = 0.39$, $P = 0.02$) between dam adjusted BW and heifer DMI. Heifers with greater FS had greater ($P < 0.01$) DMI. Initial BW were similar ($P > 0.05$) among all RFI classification groups; whereas FS and BW gain were similar ($P > 0.05$) among heifers in the POS compared with NEG RFI group, respectively. Body weight gains were greater ($P = 0.03$) in LOW (57.9 ± 8.1 kg) compared with MED (47.4 ± 9.03 kg) RFI heifers, but similar to the HI RFI heifers. DMI was greater ($P = 0.04$) for POS (7.6 ± 0.91 kg) compared with NEG (7.1 ± 0.66 kg) RFI heifers, and greater ($P = 0.03$) for HI (7.8 ± 0.93 kg) compared with MED (7.0 ± 0.68 kg) RFI heifers, respectively. Heifer DMI and RFI was not impacted by dam BW group; however, a positive relationship did exist between female offspring DMI and their dams BW.

Key Words: beef heifers, residual feed intake, dry matter intake

42 National Pork Board Swine Industry Award for Innovation: The economic impact of removing ractopamine from pork production.

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Ractopamine is commonly used to increase feed efficiency in cattle and hogs; its use results in greater deposition of muscle mass and reduced fat deposition, resulting in increased meat production. Ractopamine is approved for use by the international standards body, Codex Alimentarius. However, Russia and China have banned imports of beef and pork that cannot be certified as having been produced without ractopamine. Currently, Russia accounts for approximately 7% of U.S. beef exports and 4% of U.S. pork exports. China accounts for nearly 16% of all U.S. pork exports. Our objective was to determine the effect of ractopamine removal from pork production on the price and quantity of livestock and meat markets. Pork price and quantity effects were calculated for retail, wholesale, and slaughter markets. An equilibrium displacement model (EDM) was used to estimate the market effects of beta agonist removal. USDA price and quantity data compiled by the Livestock Marketing Information Center was used in the model. The EDM was composed of three sectors in the pork industry: 1) retail (consumer), 2) wholesale (processor/packer), and 3) slaughter (hogs fed for slaughter). Beef and poultry markets were included to capture interactions (substitution) between retail markets. Ractopamine removal from feeding caused two main shifts to occur. First, predicted red meat production declined, causing a supply reduction. Second, production costs increased for hog feeders. Decreased feeding profitability and meat production were used as exogenous shocks in the model. Quantities at all market levels, retail, wholesale and slaughter decreased for pork. Pork prices increased at the retail and wholesale level and decreased at the slaughter level. Ractopamine removal is most detrimental at the slaughter level because derived demand is decreased due to the increased costs occurring at the feeding and packing levels. The largest price and quantity impacts for pork are at the slaughter level. Price and quantity are each estimated to decrease by 5.68% and 3.88%, respectively. The reduced derived demand for feeder animals due to the removal of the ractopamine is not fully offset by higher finished animal prices. Retail level consumers are worse off due to the decrease in product availability and higher prices.

Graduate Student Competition II

43 Sampling post-scalding does not impair RNA integrity or real-time PCR in market weight Yorkshire pigs.

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Tissue samples are collected as quickly as possible following exsanguination of pigs to minimize the risk of RNA degradation and facilitate gene expression assays. However, collecting subcutaneous adipose tissue and longissimus muscle requires cutting through the hide which leaves the underlying tissue exposed during scalding-dehairing which is counter to best practice for collecting meat quality data and poses possible food safety issues. In order to test the effect of sampling pre- or post-scalding on RNA-based assays and indices of meat quality, subcutaneous adipose and *longissimus dorsi* tissues were harvested from the right tenth rib of market weight Yorkshire hogs (n=16) immediately following exsanguination and again immediately following scalding. Total RNA was extracted from all samples and RNA quality was assessed both visually by gel electrophoresis and by determining an RNA Integrity Number (RIN). The expression of adipose and muscle marker genes were then measured using real-time PCR. Ultimate pH, visual color score, and objective Hunter color scores were compared between carcasses that were sampled prior to scalding and those that were not. All RNA samples

exhibited sharp ribosomal bands with a 28S to 18S ratio greater than one when visualized on a denaturing gel. All RIN values were greater than 8.8 while no differences in OD 260/280 ratio ($P < 0.71$) or RIN values ($P < 0.21$) existed between sampling times indicating that scalding did not negatively affect RNA integrity in either adipose tissue or longissimus muscle. There were no differences in the mRNA expression levels of the *ADIPOQ, LEP, GLUT4* or *PPARg* genes in adipose tissue or *CKM, MYOG, GLUT4* or *TNNT1* in longissimus muscle sampled pre- or post-scalding as determined by real-time PCR. However, sampling tissue prior to scalding resulted in greater visual color score ($P < 0.001$) and lesser L* ($P < 0.001$) and b* ($P < 0.001$) values while neither a* values ($P < 0.53$) nor 24h pH ($P < 0.41$) were affected. These data indicate that sampling post-scalding did not impair RNA quality or the ability to measure gene expression via RNA-based assays such as real-time PCR. However, sampling tissue prior to scalding did result in darker color of the underlying muscle 24 h postmortem. Thus, if both RNA-based assays and meat quality endpoints are to be performed using the same animal, tissue sampling should occur at a time point immediately following scalding.

44 Effects of sugar substitutes on feed intake and growth performance of broiler chicks.

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Sugar substitutes were historically regarded as inert substances capable of replacing natural sugar in diets with no effects. However, research indicates they can induce physiological responses by triggering taste receptors in the small intestine and thus enhancing glucose absorption. Day-old male Cornish Cross broiler chicks (n=48) were used in a 21-d experiment to evaluate the effects of sugar substitutes (SS) on feed intake and growth. Chicks were blocked by initial BW and randomly assigned to 1 of 3 treatments: Control (CON), Aspartame (ASP), or Stevia (STV). Treatments were randomly assigned to pens in a commercial battery brooder with raised wire floors (99 x 69 x 24 cm). Chicks were fed a commercial, non-medicated starter poultry diet *ad libitum* in which ASP and STV were fed at 150 mg/kg of BW (on a pen basis) using previous day feed intake (FI). Orts were measured and discarded daily and 24-h FI was calculated. Chick BW was recorded on d 0 and 21 and 8 times in between. Data were analyzed using PROC Mixed of SAS with BW and ADG analyzed on a chick basis as repeated measures whereas daily FI was evaluated on a pen basis. The model for both included the interaction between treatment and time. On d 7-14, chick BW averaged 21.8 g more for STV compared to CON ($P<0.05$). On d 12, chick BW was 17.5 g heavier for ASP vs. CON (248.3 vs. 230.8 g; $P=0.04$). However, the increase in BW attributed to SS intake was not maintained as final BW was 16.5 g greater for CON compared to ASP (343.5 vs. 327 g; $P=0.05$) and did not differ from STV (337 g). Daily FI averaged 72.4 g less for ASP vs. CON on d 15, 18, and 19 ($P<0.05$) and tended to be 37 g less for ASP vs. CON and STV ($0.05<P<0.10$) on d 16 and 17. However, total FI did not differ between treatments ($P>0.4$). These results indicate that while SS may improve BW during the first 14 d, this increase does not translate to heavier final weights. Further investigation is needed to determine how length of the SS feeding period affects feed intake and growth.

Key Words: Sugar substitutes, broilers, growth, feed

45 Effects of increasing levels of distillers dried grains on in vitro ruminal gas production.

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The objective of this study was to determine if increased levels of DDGS affected gas production when measured at 3 times throughout the feeding period. Three ruminally cannulated steers (avg BW =629.23±36.0 kg) were housed in individual 4 x 4-m pens with access to *ad-libitum* long-stem fescue hay (10.5% CP, 41.5% ADF, 64.6% NDF; DM basis), water, and trace mineral blocks. Treatments consisted of DDGS (33.5% CP, 29.7% NDF; DM basis) fed at 1 of 3 treatment levels: 0 (CON), 0.4 (MOD), or 0.8% (HI) of BW (DM basis), respectively. Steers were randomly assigned to each treatment in a replicated 3x3 Latin Square. Each experimental pd consisted of 18 d feeding period at the prescribed level of DDGS followed by a 10-d washout. Rumen fluid was collected at 3 sub-periods (d 1, 10, and 18) at 0700 h and was processed following standard procedures. Rumen inoculum (25 ml) and 0.5 g DDGS were added to 100 ml of buffer for incubation in duplicate for each treatment. Four blank replicates were also used. Cumulative gas production was measured (psi) using radio-frequency gas production modules (Ankom Technology, Macedon, NY). Module number and location within water bath was completely randomized for each collection. Cumulative gas production was measured every 5 min for 24 h and was analyzed by hour following transformation to ml of gas produced using the ideal gas law and Avogadro's Law. Data were analyzed within and between sub-periods as repeated measures using the Mixed model of SAS where the model included the fixed effect of period and the interaction between treatment, sub-period, and time. Time was the repeated measure and the subject was steer within sub-period. There were no differences between treatments on d 1 or 18; however, on d 10, cumulative gas pressure was significantly less for HI vs. CON and MOD after 14 of incubation. After 24 h, total gas produced was 24.2% less for HI vs. MOD and CON. There were no differences between sub-periods for CON or MOD steers; yet, for HI steers, 24-h gas production was 21.7% less on d 10 compared to d 1 or 18. These results indicate that increasing DDGS intake to 0.8% of BW will initially reduce gas production from ruminal fermentation, although 24-h gas production did not differ between treatments after 18 d adaptation to the new level of feeding.

Key Words: DDGS, *in vitro*, gas production, long-stem hay

46 Age influences the expression of estrogen receptor isoforms alpha and beta in the choroid plexus of developing gilts.

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Puberty in females is a stage of development that results in the ability to produce viable offspring. The mechanistic event(s) permitting/triggering puberty involves the gonadal and adipogenic hormones estrogen and leptin. Leptin is transported across the blood-brain barrier by binding to the short form (Ob-Ra) of the leptin receptor in the choroid plexus and estrogen regulates choroid plexus activity through its receptor isoforms alpha (ERα) and beta (ERβ). Previous studies reported an increase in the expression of Ob-Ra in the

choroid plexus as puberty approaches, which may be associated with estrogen through one or both of its receptors. Therefore, it is hypothesized that developmental differences in the expression of ERα and ERβ in the choroid plexus will exist as puberty approaches. Twenty –four crossbred (Yorkshire x Hampshire) gilts were utilized to characterize ERα and ERβ in the choroid plexus at different ages until puberty. At 30 days of age, gilts were randomly allocated to predetermined age groups, 8, 12, 16, 18, 20 weeks and puberty (n=4/age group) for euthanasia and choroid plexus tissue collection. Upon attainment of each age or day of pubertal detection, gilts were euthanized and brain tissue harvested. The choroid plexus was collected from the lateral, third, and fourth ventricles. Tissue was snap frozen in liquid nitrogen and stored at -80°C until analysis for ERα and ERβ gene expression using relative real-time RT-PCR. The effect of age on ERα and ERβ were analyzed using the PROC MIXED procedure of SAS. Gilt was utilized as the RANDOM component to account for correlated variation within animal. Between 16 and 20 weeks of age ERα and β expression decreased (P≤.03) 29.0%±0.44% and 70.0%±0.21%, respectively. Furthermore, the reduction in ERβ was greater (P≤.03) than ERα within age group. However, at puberty each receptor isoform increased to quantities detected in the 8 and 12 week old gilts. As expected, developmental differences in the expression of ER isoforms in the choroid plexus occurs as puberty approaches. Future studies will determine the relationship between the differences in ER isoforms and Ob-Ra in the choroid plexus.

47 Changes in trace minerals in lambs fed sericea lespedeza and administered sodium molybdate.

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Prolonged feeding of sericea lespedeza (SL) led to reduced serum concentrations of molybdenum (Mo), a co-factor in an enzyme complex that may contribute to weight gain. The objective was to determine the effect of Mo supplementation on changes in BW and serum, fecal, urine, and liver concentrations of trace minerals (TM) in lambs fed SL. Lambs weaned in May (90 ±1.5 d of age) were blocked by BW and parasite resistance, and randomly assigned to 1 of 3 diets (n = 10/diet): 900 g of **1)** 75% alfalfa pellets (CO), **2)** 75% SL pellets (SL), and **3)** 75% SL pellets and oral drench of sodium molybdate (SLMO; 70 mg/lamb daily) for 104 d. Supplements were isonitrogenous, isocaloric, and similar in TM. Serum was collected on d 28, 56, and 103, urine and feces on d 56, and a liver biopsy on d 104 to determine concentrations of TM (inductively coupled plasma-atomic emission spectroscopy). A mixed model was used for data analysis. Mo drench increased serum ($P < 0.001$), liver ($P < 0.001$), and urine ($P < 0.001$) Mo to that of CO lambs, while that of SL lambs was markedly reduced. Fecal Mo was greatest in SLMO followed by SL then CO lambs ($P < 0.02$). Serum concentrations of Co ($P < 0.006$) and Zn ($P < 0.001$) were reduced in SL compared with CO lambs, and Cu was greatest in CO followed by SL then SLMO lambs ($P < 0.001$). Liver concentrations of Cu ($P < 0.001$), Mo ($P < 0.001$), Se ($P < 0.004$), and Zn ($P < 0.03$) were reduced in SL compared with CO lambs. Fecal Cu, Fe, Zn, and Co were reduced ($P < 0.01$) in SL compared with CO lambs, and Mn was reduced in SLMO compared with CO lambs ($P < 0.03$). Urinary Co was reduced in SL compared with CO lambs ($P < 0.03$). BW were similar among diets ($P = 0.11$). Changes in TM status of lambs, especially Cu, Mo, Se, and Zn, could explain poor production reported in previous experiments.

Key Words: sericea lespedeza, molybdenum, trace minerals

48 Microbial diversity of deli roast beef and survival of Listeria monocytogenes.

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Ready to eat (RTE) is a term applied to those products which require no cooking or heating before consumption. The lack of required heating associated with RTE products provides a unique level of food borne risk. To ensure the safety of these RTE products, antimicrobials such as diacetate and lactate are often added to limit bacterial growth. Despite strict regulations and monitoring of food borne pathogens during fabrication and packaging, contamination of RTE products can simply occur after the product has been opened. *Listeria monocytogenes (LM)* is responsible for 250 deaths each year in the United States and is frequently isolated from these products. Although *LM* can come from a variety of complex sources, contamination often occurs from contact with unclean surfaces. The consumption of our foods rarely affords sterile conditions.

To evaluate the survival of *Listeria monocytogenes* on RTE products, 4 brands of deli-sliced roast beef samples were inoculated with *LM10403s,* or a 5-strain *LM* cocktail containing *LM49594*, *LM101M*, *LM108M*, *LM19115*, and *LM7644*. Products were selected to represent variable ingredient compositions and antimicrobial use. Briefly, duplicate 25g roast beef samples were monitored at days 0, 1, 3, 6, 8, 12, 16 during 4°C refrigeration storage. For *LM* enumeration, samples were homogenized and diluted with 100mls .1% peptone and plated onto Oxford agar. Colonies were enumerated after 48 hours at 37°C. DNA was isolated from the samples using the chloroform/phenol extraction method. *LM* survived in all treatments and the presence of antimicrobials had no terminating effect on the pathogen. Surprisingly, of those products containing antimicrobials, only product B displayed a significant increase in growth over a 16-day storage period. This increase in *LM* number occurred during a decrease in pH in the uninoculated control samples, likely due to a growing population of lactic acid producing bacteria (LAB). Denaturing gradient gel electrophoresis and subsequent sequencing revealed unique bacterial compositions between brands, including multiple LAB species. These data suggest that the propensity of *LM* growth on RTE products is associated with changing populations of background microflora. In products without antimicrobials, samples inoculated with the 5-strain *LM* cocktail displayed a 3log increase in growth over a 16 day period at both high (4.25log CFU/g) and low (1.70log CFU/g) levels of initial contamination. No significant differences in metabolic activity were seen by these strains in vitro. More research needs to be done to ensure the safety of these products during home use and storage.

49 Effect of dietary starch level on muscle glycogen replenishment in performance horses.

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Four Quarter Horses (2 to 3 yr; 401 to 432 kg BW) were used in a simple crossover design for a 49-d study to determine the effect of dietary starch levels on post-exercise glycogen replenishment. Horses were fed either high starch (HS) or low starch (LS) concentrates

at 0.75% BW/d plus l.0% BW/d coastal bermudagrass hay for 14 d, then worked to fatigue in a standardized exercise test (SET). After a 14-d washout period, horses were switched to the opposite diet for 14 d then again performed the SET. Both the LS and HS concentrates were commercially available feeds. Total diets provided an average of 997.6 g of starch and 553.7 g of starch/d in the HS and LS diets, respectively. Throughout the trial, horses were lightly exercised for 30 min, 3 d/wk. The SET consisted of a 30-min warm-up period at a brisk trot in a panel exerciser followed by 27 min of gradually ascending high-intensity work on a treadmill.

Skeletal muscle biopsies were taken from the biceps femoris at rest, immediately after the SET, and 6, 24 and 48 hr post-exercise. Samples were flash frozen in liquid nitrogen and stored at -80°C until analysis for later muscle glycogen concentration using a commercial kit. Venous blood samples were taken at rest, immediately post exercise and every 15 min for 3 hr post exercise. Blood samples were analyzed for lactate, glucose, total protein and Ca concentration. Data were analyzed using Proc Mixed (SAS) procedure with main effects of sample time, horse, period, trt and time x trt interaction.

HS horses had a more rapid rate of glycogen repletion at 6 hr post exercise, as observed by the higher glycogen concentration ($P<0.05$) compared to the immediate post-exercise samples (15.4 vs. 7.9 ug/mg wet wt), while the LS horses did not return to normal levels until 24 hr post SET. Horses on the HS diet had a higher muscle glycogen concentration ($P <0.05$) at 48 hr than the LS horses (18.1 vs. 10.6 ug/mg wet wt). Results indicate that horses on the LS diet (which is representative of low-starch feeding programs commonly observed in the industry), replenish their skeletal muscle glycogen slower than horses on the HS diet. Based on this study, performance horses undergoing multiple bouts of intense exercise may benefit physiologically from receiving diets that contain more than 553.7 g of starch/day.

50 Impact of receiving bovine respiratory disease and ancillary therapy utilization on steer finishing performance, efficiency, carcass characteristics, and lung scores.

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This experiment evaluated the impact of bovine respiratory disease (BRD) incidence and ancillary therapy administration on subsequent finishing performance, efficiency, carcass characteristics, and lung scores of steers. Crossbred steers (n = 516; BW = 217 ± 20 kg) were purchased from local livestock auctions in September 2012. Calves that met BRD treatment criteria during the receiving period were randomly assigned to 1 of 4 experimental ancillary groups: flunixin meglumine injection (NSAID), viral vaccination (VACC), vitamin C injection (VITC), or no ancillary therapy (NOAC). Overall morbidity and mortality attributed to BRD were 66.5% and 13.2% respectively. After the receiving period, calves were grouped by previous ancillary therapy treatment and the number of times treated for BRD (BRDX) for allocation to finishing pens. The BRDX experimental groups included: never treated for BRD (0X), treated 1 time (1X), 2 times (2X), or 3 or 4 times (3/4X). Arrival BW did not differ among ancillary groups or BRDX, ($P = 0.70$) and ($P = 0.17$) respectively. However, BRDX during receiving decreased calf performance, resulting in BW of 324, 316, 285, and 260 kg for 0X, 1X, 2X, and 3/4X, respectively at the start of the finishing phase ($P < 0.01$). Ultrasound estimates on d 91 and 138, BW, and visual appraisal were used to target a common physiological end point (average DOF = 182) for each pen of cattle. Data were analyzed using the MIXED procedure of SAS with pen (n = 32; 6 per ancillary group; 8 per BRDX group) serving as the experimental unit. An ancillary therapy by BRDX interaction was observed for only 2 of the variables measured (d 91 LM area and marbling number). Therefore, data were analyzed by ancillary therapy and BRDX. There were no differences ($P \geq 0.59$) in 12th rib fat thickness or US yield grade among experimental treatments. No ancillary group differences existed for any of variables analyzed ($P \geq 0.26$). With increasing BRDX, days on feed and lung consolidation scores increased linearly ($P \leq 0.01$), while HCW, dressing percentage, LM area, and the percentage of US Prime and Choice carcasses decreased linearly ($P \leq 0.03$).These results suggest that with additional days on feed, calves treated multiple times for BRD may be able to reach similar physiological end points as their untreated cohorts. However it may not be possible for calves treated multiple times for BRD to reach the same quality and yield potential.

51 Performance and behavioral measurements by fall-born heifer calves traditionally weaned with or without companion goats 1-year summary.

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Traditionally, weaning is an abrupt process consisting of calves being separated from their dams and placed in a drylot. This practice can cause exposure to many types of stressors, both social and environmental, that may negatively affect animal performance. Anecdotal claims have reported that placing companion animals in pens with calves during the weaning process may reduce the negative effects associated with the weaning process and may ultimately improve calf performance. Our objective of this study was to evaluate performance and behavior measurements by fall-born heifer calves traditionally weaned with or without companion goats. At 0730 on May 14, 2013, 69 fall-born heifer calves (189 ± 6.9 kg initial BW; 233 ± 2.4 d of age) were separated from their dams, weighed, stratified by BW, age of dam, and d of age, and were allocated randomly to 1 of 6 groups representing 2 weaning treatments: 1) with companion goats (n = 5 does/replication; 3 replications); or 2) without companion goats (3 replications), for a 14-d weaning period. Calves were offered 0.91 kg/hd/d of corn gluten feed and had ad libitum access to water, salt, and medium quality hay. Calf BW, balking and chute scores, and exit velocity were determined on d 0 and 14. Behavioral measurements were taken at 12, 24, 51, and 72 h post-weaning and included the percentage of calves bawling, walking rapidly, running, standing, or lying down during a 10 min observational period. Data were analyzed using PROC MIXED of SAS, with group of animals considered the experimental unit. Start and end BW, ADG, total gain, balking and chute scores, exit velocity, change in balking and chute scores, and change in exit velocity did not differ ($P \geq 0.20$) across treatments. Percentage of calves bawling, walking rapidly, running, standing, or lying down did not differ ($P \geq 0.26$) across treatments; however, a time effect was detected ($P \leq 0.01$) for the percentage of calves bawling and lying down. Calves bawled more at 12 and 24 h compared with 51 and 72 h and lied down more at 51 h compared with all other observation times. Therefore, traditionally weaning fall-born heifer calves with companion goats may not increase animal performance or positively affect behavior.

Key Words: companion goats, heifer calves, weaning

52 Site of prostaglandin injection does not alter effectiveness of estrous synchronization protocols.

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Beef Quality Assurance (BQA) protocols have contributed to significant improvements in the quality of beef available for consumption. Changing management practices to align to BQA standards can also improve farm profitability. One of the main points of BQA is to administer intramuscular injections in the neck to avoid injection blemishes in the more valuable cuts of beef from the rump. The objective of this study was to compare the effectiveness of injection site of prostaglandin (PG) F_{2a}, in either a standard or a modified estrous synchronization (ES) protocol, on steroid hormone concentrations and pregnancy rates. This research was conducted at two different locations over a two-year period. A Co-synch+7dcontrolled internal drug release (CIDR) ES protocol was conducted with the site of PGF_{2a} injection alternated between neck and rump in AngusX cattle at location 1(n=308). Multiparous cows of various ages with BCS around 5.5 were bred via artificial insemination (AI) following either ES using a 7 day CIDR-PGF_{2a} protocol (n=244) or subsequent observed estrus 21 d later (n=64) after ES through a 7 day CIDR-PGF_{2a} protocol. Blood samples from 75 animals were collected at CIDR insertion and at breeding to determine if progesterone (P4) and estrogen (E2) concentrations varied due to PGF_{2a} injection site. All cattle were confirmed pregnant by ultrasonography at 30, 60, or 70 days post insemination. Data were analyzed as a randomized complete block design in Proc Mixed with animal as the experimental unit. Differences were declared significant at $P<0.05$. Site of PGF_{2a} injection, either in the neck or rump, did not affect ($P>0.05$) overall conception rates in response to AI (62.7 %, 61.1 % respectively). Progesterone concentrations confirmed cattle were cyclic prior to ES. Altering PGF_{2a} injection site did not impact P4, E2 concentrations or the P4:E2 ratio at breeding ($P>0.05$). Conception rates did not vary between animals bred immediately following ES (57.6%) compared to animals bred 21d later (50.3 %;$P>0.05$). However, cattle bred during standing estrus had higher ($P<0.05$) pregnancy rates than timed AI in subsequent estrus (61vs.44 %, respectively). First service conception rates and pregnancy rates were consistent with previous reports and once cattle are synchronized they will remain in synchrony for an additional cycle. Overall, altering the location of the PGF_{2a}injection during ES did not change circulating hormone concentrations at breeding or pregnancy rates; therefore cattle producers should follow BQA guidelines when administering ES protocols.

Key Words: Beef production, Estrous synchronization, Quality assurance

53 Effects of meal timing on ghrelin, growth hormone, and insulin sensitivity in male holstein calves.

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Eighteen neonatal Holstein bull calves (38.85 ± 4.71 kg) were assigned to one of two treatments at birth to determine the effect of feeding time on growth, nutrient intake, metabolic hormone secretion, and energy metabolism. Treatments consisted of regularly fed calves (n = 9) offered milk replacer (MR) daily at 0630 h, and irregularly fed calves (n = 9) offered MR at 1030, 0800, 0630, 0830, 0530, 0930, and 0730 Monday through Sunday, respectively. Body weights were measured weekly from birth to 9 weeks. Water intake, fecal scores, and starter intake were measured daily. Serial blood collections were conducted at 2, 4, 6, and 8 weeks for ghrelin and growth hormone (GH) concentrations. Blood samples were collected at time points 0, 15, 30, 45, 50, 55, 60, 65, 70, 75, 90, 105, and 120 minutes, with collection beginning one hour prior to regular feeding time (0530 h) and ending one hour post regular feeding time (0730 h). An intravenous glucose tolerance test (IVGTT) was performed at weeks 3, 6, and 9 to assess glucose metabolism. Water intake increased ($P < 0.05$) in irregularly fed calves at weeks 1 and 3. A treatment by week interaction and a main effect of week were observed for ghrelin concentrations ($P < 0.05$), and regularly fed calves exhibited increased ghrelin concentrations at week 4 ($P < 0.10$). Plasma ghrelin concentrations increased with age until weaning at week 6 then decreased at week 8. An increase in GH concentrations were observed at time points t= 75 ($P < 0.05$), 90 ($P < 0.10$), and 120 ($P < 0.10$) min. A treatment by week interaction and a main effect of week were observed for GH concentrations ($P < 0.0001$). Regularly fed calves had higher GH concentrations at weeks 2 and 4 ($P < 0.05$). No differences were observed ($P > 0.10$) for glucose concentrations. Peak insulin concentrations ($P < 0.05$) and AUC for insulin ($P < 0.10$) increased as calves aged, indicating that calves become less sensitive to insulin as they develop. Results indicated that feeding time does not have an overall effect on growth, feed intake, and glucose metabolism, but does affect growth hormone concentrations.

54 Vaccinated Angus-Nellore yearling steers have reduced platelet and lymphocyte decline following bovine viral diarrhea virus type 1b challenge.

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Bovine respiratory disease has large economic impacts on the U.S. cattle industry, and various vaccination products and protocols have been used for prophylaxis. We investigated potential differences in protection from modified live (MLV) verses killed vaccination in yearling steers subjected to bovine viral diarrhea virus (BVDV) type 1b challenge. Angus-Nellore F_2 and F_3 steers (n = 287) across 3 years (2010, 2011, and 2012) were assigned to one of three vaccine treatments: no vaccine (n = 97), two-dose killed vaccine (n = 94), or single-dose MLV (n = 96). Vaccines were multi-valent products including BVDV 1a and 2, IBR, BRSV, and PI_3 antigens. All animals were challenged intranasally 28 to 35 d post booster/MLV vaccination with BVDV 1b strain CA0401186A (320.5 ± 2.60 kg BW). Whole blood samples were collected 0, 7, 14, 28, and 42 d post infection (dpi); serum samples were collected 0, 14, 28, and 42 dpi. Platelet and lymphocyte counts (whole blood) and serum neutralizing antibodies to BVDV 1b were evaluated. The greatest percent decline in lymphocyte and platelet counts were calculated by dividing the lowest observed platelet/lymphocyte count (d 7 to d 42) by the baseline (d 0) and multiplying by 100 for each steer. GLM analyses were utilized to compare vaccine treatments with least squares means evaluated. While 75% of the steers had reduced platelet and lymphocyte counts, 52% and 63% of these, respectively, had pronounced (> 40%) reductions. Percentage depression in platelet count was affected ($P < 0.05$) by vaccine treatment; non-vaccinated animals had a greater platelet decline (-45.5%) than animals vaccinated

with MLV (-37.9%) or killed (-39.0%) products, however, vaccinated calves did not differ. Non-vaccinated (-48.3%), and killed-vaccinated (-48.2%) steers had a more pronounced lymphocyte decline ($P < 0.05$) than MLV-vaccinated steers (-39.5%). Total BVDV 1b neutralizing antibody production (measured as area under the curve) was not influenced ($P > 0.05$) by the percentage reduction in platelet or lymphocyte count. A greater proportion of steers exhibited lymphocyte depression than platelet reduction in response to this BVDV strain. Use of MLV reduced lymphocyte depression, but vaccine type did not affect platelet decline. If platelet and lymphocyte reduction are precursors for BRD, then MLV may provide more protection against a BVDV type 1b strain in Angus-Nellore crossbred cattle.

Key Words: Cattle, Viral challenge, Immune response

55 Effect of Hydration Hay™ on blood metabolites, packed cell volume, and vital signs of horses transported long distances during summer conditions.

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Dehydration of horses during long-distance transportation is a concern for many equine professionals and enthusiasts. Hydration Hay™ (HH, Purina Animal Nutrition LLC) is a compressed block of hay expands to yield a high-moisture feed when soaked in water. The objective of this experiment was to determine the effects of offering HH compared to traditional hay on hydration status of horses hauled long-distances. Ten mature horses were adapted to a diet of bermudagrass hay 2 weeks prior to the experiment. Horses were stratified by gender, age, and breed, and randomly assigned to treatments: traditional grass hay (CON, no dietary change), or HH (half of daily diet replaced with HH). Horses were loaded onto a commercial trailer and transported 721 km (Haul 1). Blood was collected and vital signs were measured prior to, at midpoint of, and at completion of the haul, and bodyweights were measured prior to and at completion of the haul. Blood measurements included serum glucose, total serum protein, and packed cell volume (PCV). Vital signs included heart rate (HR), respiration rate (RR), and rectal temperature (RT). One week later, horses were reassigned to opposite treatments, and the experiment was repeated. Horses were transported 695 km during Haul 2. Mean environmental temperature was 6.1°C greater for Haul 1 compared to Haul 2. Data were analyzed using the MIXED procedure of SAS. Main effects included treatment, haul, and time of sampling. Treatment did not affect ($P \geq 0.51$) serum glucose or total serum protein concentrations, but there was a tendency ($P = 0.07$) for HH to decrease PCV. Horses offered HH had lower ($P < 0.01$) RR compared to CON. There was an interaction ($P < 0.01$) of treatment × time of sampling for RR. Prior to haul and at midpoint, treatment did not affect ($P \geq 0.83$) RR. But, at completion ($P < 0.01$), HH horses exhibited decreased RR compared to CON horses. Treatment did not affect ($P \geq 0.66$) HR or percent bodyweight change. There was a treatment × haul interaction ($P = 0.03$) for RT, where RT was 0.25°C greater ($P < 0.01$) for CON horses during Haul 1, but RT was not different ($P = 0.16$) between treatments during Haul 2. In conclusion, hauling horses with HH was associated with significant decreases in RR, lower rectal temperatures during higher temperature transport and a trend for lower PCV suggesting better hydration status during transport.

Key Words: horse, hydration, transport

56 Relationship between single nucleotide polymorphisms of the bovine IL-8, NOS2, and NOS3 genes with disease resistance and performance in newly received beef calves.

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Objective of this study was to characterize single nucleotide polymorphisms (SNP) in the promoter region of interleukin-8 (IL-8), inducible nitric oxide synthase (NOS2) and endothelial nitric oxide synthase (NOS3) genes; determine relationship between SNP and disease resistance; and to determine performance differences between genotypes for SNP identified. Steers were randomly selected from ongoing trials conducted at the University of Arkansas Stocker and Receiving Cattle Research Unit. Health and performance records were used to identify sick (n = 22) and healthy (n = 26) animals. Animals were defined as sick if pulled from their pen for treatment of respiratory disease or suspected respiratory disease. Healthy animals were defined as animals randomly selected from the same pen as sick animals that did not display health or performance related problems during the feeding period. Body weight was recorded and blood samples were collected upon arrival at facility (d 0) then again on d 14, 28, 42, and 56. Genomic DNA (n = 48) was extracted from the buffy coat of EDTA whole blood and SNP identified by sequencing the 5' upstream regulatory region of each gene. Seven SNP were identified in the IL-8 promoter region (A234C, G248A, A378C, C433T, C447T, G451A, and G538A) and five in the NOS2 promoter region (C4752T, T4980C, A4999T, G5035A, and A5108T). Eleven SNP (G96C, G145A, G190A, T202G, G313A, G354A, T361G, C413G, G492C, T506C, and A524G) and three insertions/deletions (G412-418G, G423-428C, and C479-480A) were observed in the promoter region of NOS3 gene. Chi-square was used to determine association between SNP and health status and number of times animals were pulled from their pen for treatment. A positive association was observed for NOS3 G492C and number of times an animal was clinically diagnosed with bovine respiratory disease (BRD, $P < 0.05$). Health status of animals was similar for all SNP identified ($P > 0.11$). Mixed models indicated effects of SNP upon ADG for IL-8 C433T ($P < 0.05$), NOS2 C4752T ($P < 0.05$), and a tendency for IL-8 G538A ($P = 0.06$). Additional research is needed to determine the relationship of SNP in the promoter region of the IL-8, NOS2, and NOS3 genes with disease resistance and animal performance.

Key Words: bovine respiratory disease, interleukin 8, nitric oxide, single nucleotide polymorphism

Meats

57 Beef cattle carcass characteristics from continuously stocked pastures of wheat, triticale and ryegrass mixtures.

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An experiment was conducted to evaluate carcass characteristics of growing-finishing beef cattle from continuously stocked mixed pastures of triticale (Triticale secale), wheat (Triticum aestivum) and ryegrass (Lolium multiflorum). Eighteen yearling Angus cross steers

(mean intial BW, 391 ± 98 kg) were randomly assigned to continuously graze six 1.42-ha pastures (3 steers/pasture) planted with mixtures of wheat, triticale & ryegrass (WTR), wheat & ryegrass (WR) or triticale & ryegrass (TR). There were 2 pasture replicates per treatment. Pastures were grazed beginning January 29, 2013 when forage DM availability reached approximately 1,000 kg/ha, and additional put-and-take steers were used as necessary to maintain forage allowance at 1 kg DM/kg steer BW. Forages were sampled biweekly throughout the experiment and steer weights were recorded every 28 d. Grazing was discontinued after 116 d on May 24, 2013 when forage quality and availability were no longer adequate to support satisfactory steer ADG. Data were analyzed as a completely randomized design by the PROC GLM procedure of SAS with the animal as the experimental unit. No differences ($P > 0.05$) were observed for steer ADG among the different treatments (1.34, 1.37 and 1.39 kg/d for WTR, WR and TR respectively). Steers were humanely harvested at a commercial processing facility. Carcasses were measured for skeletal maturity, lean maturity, average maturity, marbling, quality grade, lean color (L*, a* and b*-values), fat color (L*, a* and b*-values), hot carcass weight, back-fat thickness, Longissimus muscle area, kidney pelvic and heart fat, yield grade, and dressing percent . Differences were only observed ($P < 0.05$) in fat color b* values when analyzed across treatments. Fat color b* values were 28.9, 30.1, and 33.0 for WTR, WR and TR, respectively. Therefore, fat color in steers on continuously stocked pastures of triticale and ryegrass mixtures will be more yellow than steers on continuously stocked pastures of wheat, triticale and ryegrass mixtures. With no observed differences in other measured variables the decision for which forage combination to utilize for winter forage feeding is largely dependent on which forages have better growth performances in a particular region and consumer perception of differences in fat color.

58 Withdrawn by Author.

59 Fatty acid analysis of specific adipose locations when steers were fed corn by-products.

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The objective of this study was to evaluate the effects of dried distillers grains with solubles (DDGS), corn gluten feed (CGF), or soybean meal and ground ear corn (SBM) on various beef adipose locations. Thirty-six Angus crossbred steers were assigned to one of three feedlot diets differing in protein source included at 25% of the diet DM; 1) DDGS, 2) CGF, and 3) SBM and individually fed for 100 d. Steers were slaughtered when backfat was estimated at 1.27-cm via ultrasound. At 24-hr postmortem, tissue samples were collected from the *Longissimus lumborum* intramuscular fat (LL), subcutaneous fat from the *Longissimus lumborum* (SQ) and subcutaneous fat from the brisket region (BR) for fatty acid (FA) analysis. Total lipids were quantitatively extracted and FA content was determined by gas chromatography (Agilent Technologies, Santa Clara, CA). The MIXED procedure (SAS Inst. Inc., Cary NC) was used to test the main effects of adipose location, protein source and the subsequent interactions at $\alpha = 0.05$. There was a protein source by adipose location interaction for percent of total saturated fatty acid (SFA; $P = 0.03$) and monounsaturated fatty acid (MUFA; $P < 0.01$), regardless of diet, BR had a decreased percentage of total SFA ($P \leq 0.01$; 35.92%) and an increase percentage of total MUFA ($P \leq 0.01$; 60.38%) compared to LL (46.67%, 46.80%, respectively) and SQ (45.60%, 50.44%, respectively). Within protein source, the LL had a greater proportion of total polyunsaturated fatty acid (PUFA; $P \leq 0.01$) than did BR and SQ, however, DDGS SQ was similar to CGF LL and SBM LL ($P < 0.10$). Regardless of protein source, BR had the lowest n-6:n-3 ratio ($P = 0.01$; 3.32) compared to LL (9.39) and SQ (8.93). Dried distillers grains with solubles LL and SQ were similar to each other ($P = 0.59$) and greater than ($P < 0.01$) all other protein source by adipose location interactions. For conjugated linoleic acid (CLA), BR was greater than LL and SQ, independent of protein source ($P \leq 0.01$). Furthermore, DDGS BR had a smaller proportion of total CLA compared to CGF BR and SBM BR ($P \leq 0.01$). These results show that feeding corn by-products can differentially alter FA composition depending on adipose location.

Key Words: fatty acid, beef, corn gluten feed, dried distillers grains with solubles

60 Characterizing growth performance and meat quality in Mangalica pigs.

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Blonde (B), Red (R), and Swallow-bellied (SB) Mangalica pigs were recently imported to Auburn University due to their extreme propensity to fatten and reputation for producing superior quality pork. Our objectives were 1) to characterize differences in growth performance and carcass merit of purebred Yorkshire (Y), B, R, and SB Mangalica pigs, and 2) to compare indices of meat quality in purebred R, Y and crossbred (RxY) pigs. To achieve this, pigs were allowed ad libitum access to water and diets formulated to meet National Research Council recommendations. Feed intake was recorded daily and weight gain was measured every 7 d. Carcass and quality characteristics were recorded 24 hr postmortem according to National Pork Producers Council Guidelines (2000). Data were analyzed using GLM procedure and mixed model analysis (SAS, 2002). Comparison of growth and carcass parameters between Y, B and SB barrows demonstrated divergent phenotypes. Backfat thickness was 2.9-fold greater in B than Y and 1.2 fold greater in B than R and SB pigs ($P < .0001$). Marbling score was greatest in R pigs being 1.65-fold greater than in B or SB and 3.5-fold greater than in Y pigs ($P < 0.01$). In contrast, LEA was 2.4-fold greater in Y versus B, R or SB pigs ($P < 0.0001$). Daily feed intake, ADG, and feed efficiency was highest in Y and lowest in SB pigs ($P < .0002$). Indices of meat quality were compared in R, RxY, and Y pigs. Consistent with growth performance across breeds, backfat thickness was 1.8-fold and 3.4-fold greater in R than RxY and Y pigs ($P < 0.0001$), marbling score was 1.5 and 2.8-fold greater in R than RxY and Y pigs ($P < 0.005$) and LEA was 1.5-fold and 2.3-fold greater in Y than RxY and R pigs ($P < 0.0001$). Loin and ham ultimate pH was significantly greater in R than RxY or Y pigs ($P < 0.01$) mirroring color ($P < .005$) and firmness scores ($P < .003$). Cook loss was significantly lesser in R than Y pigs ($P < 0.007$) while WBS was not different in chops between groups ($P < 0.11$). Mangalica breeds contained a greater percentage of monounsaturated and polyunsaturated fatty acids in adipose and muscle compared to Y. These data indicate that while Mangalica exhibit poorer growth performance, Mangalica pork exhibits superior meat quality attributes suggesting higher price points for Mangalica pork in niche markets are justified.

Pastures and Forages

61 Beef cattle performance from grazed mixtures of triticale and wheat with ryegrass.

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Previous research indicates that beef production from winter-grazing in the lower Gulf Coast region is typically greater from monocultures of ryegrass (*Lolium multiflorum*) and wheat (*Triticum aestivum*) than triticale (*Triticum secale*); however, little information is available on beef production from mixtures of these species. For this reason, we conducted an experiment to evaluate triticale (T; var. Trical 2700), wheat (W; var. SS 8641) and ryegrass (RG; var. Marshall) in mixtures as winter forage for grazing beef cattle. Replicate 1.42-ha paddocks of T + RG, W + RG and T + W + RG (2 paddocks/treatment) were planted on November 30, 2012, and were initially stocked with 4 yearling crossbred steers (388 ± 98 kg initial BW) per paddock on January 29, 2013 when forage availability had achieved 1,000 kg DM/ha. Forage allowance was maintained at a target value of 1 kg DM/kg steer BW utilizing an adjustable stocking density by the put-and-take method. Forage availability and quality were determined by clipping eight 0.25-m^2 quadrats per paddock prior to grazing and at subsequent 2-wk intervals throughout the duration of the experiment. Grazing was discontinued after 116 d on May 24 when forage availability and quality were no longer able to support satisfactory ADG. Data were analyzed as a completely randomized design by the PROC MIXED procedure of SAS 9.2, and forage metrics and chemical composition determined at each sampling period were treated as repeated measures. Mean forage availability (1,354 kg DM/ha), forage allowance (1.06 kg DM/kg steer BW) and grazing-d/ha (378) did not differ ($P > 0.10$) among treatments, and there were no differences ($P > 0.10$) among treatments in steer ADG (1.34, 1.37 and 1.39 kg/d for T + W + RG, W + RG, T + RG respectively). Mean forage IVDMD (88.2%) and concentrations of CP (18.2%) and ADL (1.5%) were not different ($P > 0.10$) among treatments, but concentrations of NDF and ADF tended to be greater ($P = 0.20$) for mixtures containing T than W + RG (47.6 and 26.4% vs. 44.6 and 24.5%, respectively). Results indicate that binary mixtures of W and T with RG were comparable, and the ternary mixture offered no advantage over binary mixtures, for beef production from winter-grazing of these forage species.

62 Stockpiled 'Tifton 85' bermudagrass for cow-calf production as influenced by nitrogen fertilization. I: Productivity and nutritive value.

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Stockpiling bermudagrass (*Cynodon dactylon*) forage can potentially reduce cost of winter feeding compared with feeding hay and supplement, but forage productivity and quality response to N fertilization is highly variable. For this reason, we conducted a late fall/early winter grazing study to determine effects of rate of N fertilization on productivity, nutritive value and economic feasibility of stockpiled 'Tifton 85' bermudagrass for fall-calving, lactating cows. Beginning on October 31, 2012, 16 cows (mean initial BW, 619 ± 2 kg) and their calves (mean age, 16 ± 1 d) were assigned randomly to replicate (n = 2) 0.76-ha paddocks (2 cow-calf pairs/paddock) of stockpiled 'Tifton 85' bermudagrass pasture (SB) that had been cut on August 1 and fertilized with either 56 (56N), 112 (112N), or 168 (168N) kg N/ha; or to replicate (n = 2) 0.41-ha paddocks (2 cow-calf pairs/paddock) of dormant summer pasture with free-choice access to August-cut bermudagrass hay (73% NDF, 34% ADF and 6% ADL) plus 2.7 kg whole cottonseed daily (HAY). Cows were given access to strips of ungrazed forage by moving polytape every 3 to 4 d in order to maintain a forage DM harvest efficiency of approximately 75% as determined by biweekly sampling of pre-and post-graze forage. Forage productivity and nutritive value data were analyzed as a completely randomized design using PROC MIXED of SAS in which biweekly forage harvests were treated as repeated measures. Mean forage mass (6,858 kg DM/ha), forage CP concentration (12.6%), forage IVDMD (60.9%) and grazing d/ha (340) were not different ($P > 0.05$) among SB treatments over the 116-d grazing period that ended on February 16, 2013. Mean forage concentrations of NDF, ADF and ADL were greater ($P < 0.05$) for 56N (69.3, 32.8 and 5.0%, respectively) than 168N (66.3, 31.2 and 4.7%, respectively), but were not different from 112N (67.4, 32.0 and 4.7%, respectively). Mean concentrations of cell wall constituents were greater ($P < 0.05$), and IVDMD and concentration of CP were less ($P < 0.05$) for hay than SB forages. Economic analysis revealed that input costs/cow were 48, 43 and 38% greater ($P < 0.05$) for HAY than 56N, 112N and 168N, respectively. Concentrations of CP and TDN (predicted from concentrations of cell-wall constituents) in SB forages declined only modestly over the course of the experiment, were sufficient for supporting lactating beef cows without supplementation, and were consistently greater than those of hay throughout the grazing season.

63 Stockpiled 'Tifton 85' bermudagrass for cow-calf production as influenced by nitrogen fertilization. II: Cow and calf performance.

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Stockpiling bermudagrass may be an effective way for cow/calf operations to save on mechanical-harvesting and supplementation costs. However, previous research has demonstrated that the nutritive value of stockpiled bermudagrass alone may be inadequate for sustaining lactating beef cows. The objective of this study was to determine lactating-cow production, subsequent reproductive performance, and calf performance from stockpiled 'Tifton 85' bermudagrass. On October 31, 2012, 16 cows (mean initial BW, 619 ± 2 kg) and their calves (mean age, 16 ± 1 d) were assigned randomly to replicate (n = 2) 0.76-ha paddocks (2 cow-calf pairs/paddock) of stockpiled 'Tifton 85' bermudagrass pasture (SB) that had been cut on August 1 and fertilized with either 56 (56N), 112 (112N), or 168 (168N) kg N/ha; or to (n = 2) replicate 0.41-ha paddocks (2 cow-calf pairs/paddock) of dormant summer pasture with free-choice access to bermudagrass hay (73% NDF, 34% ADF, 6% ADL) plus 2.7 kg whole cottonseed daily (HAY). Cow BW and BCS were recorded every 21 d along with calf BW and hip height (HH). Milk production was determined by 3 weigh-suckle-weigh measurements corresponding to early, peak and mid-lactation. Blood samples were taken from cows 3 times corresponding to cow production cycle to evaluate energy status from blood urea nitrogen (BUN). In early January, all cows received a CIDR 8 d prior to timed artificial insemination (TAI), which was removed after 5 d followed by 2 injections of $PGF_{2\alpha}$ 8 h

apart, and pregnancy status was determined in mid-April. Data were analyzed as a completely randomized design using PROC MIXED of SAS in which animal performance data were treated as repeated measures using paddock as the experimental unit. Mean cow BW (600 kg), BCS (5.61) and milk production (11.2 kg/d) were not different ($P > 0.05$) among treatments. There were no differences ($P > 0.05$) in BUN among treatments except at the final blood sampling for which 112N (13.2 mg/dL) and 168N (16.2 mg/dL) were greater ($P < 0.05$) than HAY (12.1 mg/dL) and 56N (10.1 mg/dL). Projected calving interval for cows on HAY (410 d) was greater ($P < 0.05$) than cows on SB (370 ± 1 d). Weight per d of age and calf 205-d adjusted weaning weight were not different ($P > 0.05$) among treatments. These results indicate that all treatments of stockpiled forage without supplementation were sufficient for supporting lactating beef cows without negatively impacting fertility or animal performance.

64 Evaluation of wheat and triticale forage for stocker production in the Gulf Coast region.

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Annual ryegrass (*Lolium multiflorum*) is utilized extensively for stocker production from winter grazing in the Gulf Coast region, but little information is available on lesser utilized annual forages such as wheat (*Triticum aestivum*) and triticale (× *Triticosecale*) for this purpose. For this reason, we conducted a 3-yr grazing experiment to quantify productivity, quality characteristics and beef performance from wheat and triticale forage compared with ryegrass. Six 1.42-ha pastures were seeded with each forage (2 paddocks/treatment) in early fall of each yr and stocked continuously beginning in late fall/early winter with 3 yearling Angus × Simmental steers (322 ± 10 kg initial BW). Additional put-and-take steers were utilized as necessary to maintain available forage mass at 1,500 to 2,000 kg DM/ha, and grazing was discontinued in mid-spring of each yr; mean forage allowance (FA) across all yr was 1.36 kg DM/kg steer BW, and was not different among treatments. Forage samples were taken every 14 d, and cattle were weighed every 28 d throughout each grazing season. Mean concentrations of forage NDF, ADF and ADL were greater ($P < 0.05$) for triticale and wheat than ryegrass, and concentrations of total nonstructural carbohydrates (TNC) were greater ($P < 0.05$) for ryegrass and wheat than triticale. Steer ADG was greater ($P < 0.10$) from ryegrass (1.54 kg/d) than triticale (1.23 kg/d), and ADG from wheat (1.36 kg/d) was not different ($P > 0.10$) from ryegrass or triticale. Wheat required a greater ($P < 0.10$) mean stocking rate (4.0 steers/ha) than ryegrass (3.2 steers/ha) and triticale (3.4 steers/ha) in order to maintain available forage DM at the same target mass, which resulted in a greater ($P < 0.10$) mean number of steer-grazing-days/ha for wheat (497) than ryegrass (406) and triticale (415). Steer ADG was positively correlated ($P < 0.05$) with forage concentrations of CP and TNC, and negatively correlated ($P < 0.0001$) with concentrations of cell-wall constituents. Stepwise linear regression analysis revealed that forage concentration of ADF accounted for ($P < 0.001$) 22%, and FA and concentrations of CP and ADL each accounted for ($P < 0.10$) ≤ 3% of the variability in steer ADG. Results are interpreted to mean that wheat was comparable to ryegrass and superior to triticale for supporting steer ADG, and that greater number of grazing-days/ha from wheat indicate that it may be superior to ryegrass for supporting total BW gain/ha.

65 Incorporating crimson clover *(Trifolium incarnatum)* into ryegrass *(Lolium multiflorum Lam.)* pastures: Impact on yield, forage quality, and pasture N status.

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Annual ryegrass is commonly used as the cool-season component of forage systems in the southeastern Coastal Plain, where cool-season perennial grasses may not thrive. This annual requires N input for optimum productivity. With increasing fertilizer costs, alternative N sources are being sought. This study evaluated the ability of crimson clover to contribute N to the system via fixation and cycling through grazing cattle. Three replications of ryegrass (**RG,** 28.0 kg PLS/ha) or ryegrass with clover (**RC**, 20.2 kg PLS/ha ryegrass + 16.8 kg PLS/ha clover) were seeded into a prepared field in each of 2 years (6 plots/yr, 1.42ha ± 0.32) following summer annual forage crops. All plots received 56.0 kg/ha N at planting. Forage strips with adequate DM for 24 h were allocated daily to 32 yearling heifers (352 ± 79 kg) or 80 cows (536 ± 75 kg) based on total BW and estimated forage DM yield. Plots of RC received no further N applications while RG plots received 44.8 kg/ha additional N after initial grazing rotation each year to encourage regrowth for a second grazing rotation which followed as rapidly as regrowth allowed. Samples to determine forage quantity and quality were collected from all plots prior to each grazing. Grazing days were calculated based on 545-kg standard cows. Total DM yield for RG and RC was 8,765 and 7,712 kg/ha, respectively ($P = 0.06$). Forage from RG contained 12.5% CP compared with 14.5% from RC ($P = 0.03$), and TDN was 71.3 and 71.6% for RG and RC, respectively ($P = 0.68$). Clover contributed 21.2% of DM in RC plots at first grazing and 15.5% at second grazing ($P = 0.40$). Crude protein declined in the second grazing as compared with the first (15.5 to 11.6%) as did TDN (74.7 to 68.2%, $P < 0.01$ for both). Neither total N available for harvest in forage (166.0 and 174.3 kg/ha for RG and RC, respectively; $P = 0.54$) nor total harvestable P (28.9 and 26.1 kg/ha for RG and RC, respectively; $P = 0.08$) was affected by treatment. The RG plots supported 298.0 grazing days/ ha as compared to 271.5 for RC ($P = 0.26$). Results suggest crimson clover could potentially contribute a portion of the N required by the pasture system, reducing the need for commercial fertilizer.

66 Setting stocking rate of wheat pasture based on forage allowance.

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This research was designed to quantify the relationship between stocking rate (**SR**) and performance of growing steers of varying BW on wheat pasture (n = 10, 1.6 ha pastures). In the fall of 2012, 16 heavy BW steers (BW = 282 ± 15.8 kg)were stocked at 2.5 steers/ha on 4 wheat fields (**HVY)**, 12 light BW steers (BW = 189 ± 14.8 kg) were stocked at 2.5 steers/ha on 3 wheat fields (**LT)**, or 20 light BW steers (BW = 191 ± 13.8 kg) were stocked to wheat fields based on equal forage allowance (**FA**; kg forage DM/kg steer BW) to HVY steers (**LTfa**) 3 wheat fields. Forage allowance at turnout on wheat pasture was 3.3 ± 0.6, 5.3 ± 0.3, and 3.2 ± 0.3 kg forage DM/kg steer BW for HVY, LT, and LTfa, respectively. On February 15, HVY steers were removed from pasture and were replaced with 36 steers

(BW = 282 ± 18.4 kg) at a stocking rate of 5.6 steers/ha on March 1 for spring grazeout. Steers in LT and LTfa treatments remained on pasture through the spring grazeout, and stocking rates were increased to 5.6 steers/ha by adding steers (BW = 290 ± 22.7) on March 1. Animal performance data were analyzed using the mixed-model procedure of SAS (SAS Inst. Inc., Cary, NC) for which pasture within treatment was the random effect. In the fall, ADG of LTfa (1.08 kg/d) were numerically (P = 0.28) less than HVY (1.23 kg/d) and LT (1.22 kg/d). While in the spring, ADG of LTfa (0.89 kg/d) were less than (P = 0.04) HVY (1.11 kg/d), and LT (1.00 kg/d) was intermediate and did not differ (P = 0.27) from either. Net return per steer for fall-purchased steers was greater (P < 0.01) for LT ($187 ± 12.7/steer) and LTfa ($177 ± 12.1/steer) than HVY ($94 ± 11.1/steer), yet net return per steer for spring-purchased steers ($79 ± 9.9/steer) did not differ (P = 0.29). Steer grazing days per ha and BW gain per ha tended to be greater ($P \leq 0.07$) for LTfa than LT or HVY, yet net return per ha did not differ ($P \geq 0.39$) among treatments. This data indicates that setting SR of LT calves based on FA resulted in increased actual SR, resulting in reduced individual animal performance, increased gain per hectare, and similar net return per hectare.

67 Addition of clovers to tall fescue pastures improves nitrogen status of animals, forages and soils.

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Grazing studies were conducted in spring and fall 2012 to evaluate meat goat performance, forage characteristics and soil nitrogen (N) cycling in fescue and fescue-clover pastures. The experiment was a split block design with 4 main N treatments: tall fescue mixed with ladino white clover (WC), tall fescue mixed with red clover (RC), tall fescue fertilized with N (POS) and tall fescue with no additional N (NEG). Within each main treatment plot, there were grazed (G) and mowed (M) subplots. Boer-cross and Kiko-cross goats were assigned to one of 12 (0.2 ha) plots over 3 field replications. Nursing does (n = 3 per plot) and their kids (n = 6 per plot) were grazed for 56 d in spring. Eight-mo old wethers (n = 5 per plot) were grazed for 47 d in fall. Additional put and take animals were used to equalize stocking density to approximately 500 kg/ha per doe in spring and 450 kg/ha per wether in fall. Goats were weighed and bled every 28 d. Forage samples were taken in G and M subplots before grazing/mowing each cycle to determine forage quality and botanical composition. ^{15}N Natural Abundance technique was used to calculate %N derived from the atmosphere (%Ndfa) of clovers. Soil samples were taken before and after grazing/mowing and weekly thereafter. Average daily gain did not differ (P =0.39; 0.23) in spring or fall, but kg gain/ha was greater (P<0.01) in the clover treatments compared to POS and NEG during spring. Serum urea N was greater (P<0.01) in does grazing clover treatments in spring on d 28 and 56. Forage yield was affected by N treatment with NEG being less (P<0.01) in spring and WC being less (P<0.01) in fall than all other treatments. Total sward crude protein was greater (P<0.01) in clover treatments in spring. WC fixed more N than RC (P<0.01) in spring (111 vs 70 kg N fixed/ha, respectively). The %Ndfa for WC was less (P<0.05) in fall than in spring corresponding to a greater (P<0.05) soil nitrate level. Soil N values tended to be greater (P<0.10) for WC in both seasons compared to other treatments and also for G compared to M subplots. Inclusion of clovers resulted in similar yields and gains as POS which could reduce the need for N fertilization.

Key Words: goats, legumes, nitrogen fixation

68 The effects of mixed or sequential grazing on performance and reproductive measurements of Katahdin ewes and fall-calving Angus cows grazing stockpiled toxic tall fescue – 1 year summary.

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Mixed-species grazing has several potential advantages and ultimately may improve performance for one or both species. However, there has been little research evaluating hair sheep and cattle grazing stockpiled endophyte-infected tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh; **E**+] either together or sequentially. Therefore, our objectives were to determine the effects of mixed or sequential grazing on performance and reproductive measurements by Katahdin ewes and fall-calving Angus cows grazing stockpiled E+. Katahdin ewes (n = 41; 31 ± 1.9 kg initial BW; 3 ± 0.08 initial BCS) and fall-calving Angus cows (n = 20; 442 ± 10.26 kg initial BW; 5 ± 0.18 initial BCS) were stratified within species by BW and age, and allocated randomly to one of four groups representing two treatments: 1) Mixed grazing (2 replications) and 2) Sequential (lead/follow) grazing (2 replications). In the sequential grazing treatment, cows always followed ewes. Each group had access to a 0.68-ha paddock and were rotated based on available forage. A total of 8.16-ha were grazed over 40 d for all groups. Start weight and BCS for ewes and cows did not differ (P > 0.31) across treatments. Average daily gain, total gain, end weight, and end BCS did not differ (P > 0.18) between treatments. Pregnancy rate, birth date, and lamb counts for ewes did not differ (P > 0.11) across treatments. A treatment x sex interaction tendency was detected for birth weight (P = 0.06). Mixed grazing ram lambs tended to be heavier at birth than mixed grazing ewe lambs. Therefore, utilizing sequential grazing with Katahdin ewes and fall-calving Angus cows may not increase performance or reproductive measurements; thus, managing a multi-species, lead-follow grazing regime relative to mixed grazing may not be warranted.

Key Words: Fescue, Mixed grazing, Sequential grazing

Physiology

69 Growth and reproduction of replacement beef heifers is influenced by growth-promoting implants.

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Charolais x Balancer heifers (n = 65; 179 ± 30 kg; 255 ± 12 d of age) were used to determine the influence of growth-promoting implants on growth, estrous behavior, and pregnancy rate. Heifers were blocked by BW and assigned to 1 of 4 implant treatment groups: 1) control, no implant (CON; n = 16); 2) trenbolone acetate (TBA; 200 mg of TBA; n = 15); 3) trenbolone acetate plus estradiol (TBA+E2; 40 mg TBA and 8 mg E2; n = 17); or 4) zeranol (ZER; 36 mg ZER; n = 17). Heifers were implanted on d 0, and BW was recorded on d

0, 106, 195, and 220. Reproductive tract scores (RTS; scale of 1 to 5 where 1, 2, and 3 were noncyclic, and scores 4 and 5 were cyclic) were determined via ultrasonography on d 106 and 195. Estrous synchronization was initiated on d 195 when heifers received an intravaginal, controlled internal drug-releasing (CIDR) device for 16 d, followed by GnRH 2 d later (d 213 of experiment); PGF2α was administered 1 wk after GnRH (d 220 of experiment). Estrous behavior was monitored by radiotelemetry for 96 h post-PGF2α. Heifers were AI 10 to 19 h after onset of estrus. Heifers were exposed to bulls (1 bull/22 heifers) after AI for 28 d and pregnancy was diagnosed via ultrasonography on d 278 and 299. Average daily gain of heifers was greater ($P < 0.03$) for TBA+E2 heifers (0.80 ± 0.02 kg/d) compared with other treatment groups (0.72, 0.72, and 0.74 ± 0.02 kg/d for CON, TBA, and ZER heifers, respectively). A lower percentage ($P < 0.03$; 18%) of heifers treated with ZER were classified with a cyclic RTS on d 106 than CON heifers (53%) and heifers treated with TBA (67%); heifers treated with TBA+E2 (35%) were similar ($P > 0.10$) to all treatments. There were no differences ($P > 0.10$) for RTS at d 195. Heifers treated with TBA had increased mounts ($P < 0.05$; 60.1 ± 10.4 mounts) during estrus compared with all other treatments (mean = 27.0 ± 8.2 mounts). Duration of estrus (mean = 10.9 ± 1.7 h) was similar among treatments ($P > 0.10$). Pregnancy rate did not differ ($P > 0.10$) among treatments (mean = 72%). Implanting with TBA+E2 post-weaning resulted in heavier heifers at breeding. Reproductive development was delayed in ZER heifers; however, implant strategy did not decrease pregnancy rates.

70 Endophyte-infected fescue alters components of the acute phase response to lipopolysaccharide in beef heifers.

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Sixteen Angus and 8 Hereford X Angus (334.7 ± 10.7 kg BW) heifers were stratified by sire breed, temperament (using weaning exit velocity), and BW and randomly assigned within strata to either an endophyte-infected (E+) or endophyte-free (E-) diet for 10 d to determine the influence of feeding endophyte-infected fescue on physiological and acute phase responses of beef heifers to a lipopolysaccharide (LPS) challenge. Heifers were individually penned in 3.0 x 3.7 m stalls and fed at 1.8 X NEm. Diets contained 20% fescue seed, 30% cottonseed hulls, 36% cracked corn, 10% supplement, 4% molasses, and MGA at 0.5 mg/hd/d and were balanced to meet protein and mineral requirements. Heifers were fitted with vaginal temperature probes on day -16 (prior to treatment implementation), and indwelling jugular cannulas on day -1. Caudal vein areas were measured on days -16 and -2. On the day of LPS challenge (d0), sickness behavior scores (SBS) were recorded and blood samples were collected from heifers at 0.5 h intervals from -2 to 8 h, and again at 24 h relative to LPS administration (0.5 μg/kg BW at time 0h). Data were analyzed separately within pre- and post-challenge periods with the Mixed Procedure of SAS, using repeated measures in a completely randomized design. Decrease in caudal vein area from d -16 to d -2 was greater with E+ ($P < 0.01$) and was the only variable to show significant sire breed effects ($P = 0.06$). Cortisol, IFN-γ, TNF-α, and IL-6 concentrations increased for both groups from pre-LPS to post-LPS. Pre-LPS cortisol ($P = 0.10$) and IFN- γ ($P = 0.08$) concentrations were higher in E+ than E- heifers but no treatment differences were observed post-LPS ($P \geq 0.30$). No difference was observed in TNF-α concentration or SBS between E+ and E- heifers in pre- or post-LPS periods ($P \geq 0.33$). IL-6 was not affected by endophyte pre-LPS ($P \geq 0.34$), but was greater in E+ heifers post-LPS ($P = 0.01$). Vaginal temperature response post-LPS was bimodal and described using cosinor analysis for mean temperature and wave amplitude and duration. The first wave was unaffected by treatment ($P > 0.30$). The second wave showed a greater duration for E+ ($P = 0.09$), but no effect for mean or amplitude ($P > 0.57$). These data indicate that endophyte status affects IL-6 concentrations and vaginal temperature response when heifers are challenged with LPS.

Key Words: Endophyte, cytokine, LPS

71 Form of selenium (Se) in free-choice mineral mix fed to maturing beef heifers differentially affects hepatic expression of genes responsible for Se metabolism.

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Previously we found diet supplementation of maturing Angus-cross beef heifers randomly-assigned to consume a free-choice mineral mix that contained no exogenous source of Se (control, Ctrl) or 3 mg Se/d as inorganic (ISe, sodium selenite); organic (OSe, Sel-Plex®); or MIX (1.5 mg ISe:1.5 mg OSe) resulted in stabilized hepatic Se concentrations (0.551 = 0.520 > 0.418 > 0.264 ± 0.127g: MIX = OSe > ISe > Ctrl, respectively) after 168d of Se supplementation. Using the same liver tissue samples, the objective of the present study was to determine (a) the effect of Se treatment on hepatic expression of specific genes involved with Se metabolism and (b) whether any Se treatment-induced changes in gene expression mirrored existing Se treatment-induced differences in hepatic Se content. Content of 12 miRNA and 152 mRNA was simultaneously determined in liver tissue using miRGE Expression Assay (NanoString Technologies) with customized human/bovine miRNA and bovine-specific mRNA codesets. For each gene, the number of transcripts detected was normalized to the geometric mean expression of three constitutively expressed mRNA transcripts. Potential effect of Se treatment on hepatic expression of each target gene was assessed by ANOVA using the GLM function of SAS. When different, least square means were separated ($P < 0.05$) using pdiff. All codeset targets were detected and expression of 26 gene transcripts was ($n = 14$, $P < 0.05$) or tended to be ($n = 12$, $0.10 \leq P \geq 0.05$) affected by Se treatment. Among these genes, relative to Ctrl, MIX increased expression of 17 transcripts; MIX and ISe increased expression of MAT2B, TRPC5, and Sel W; MIX, ISe, and OSe increased CXCL2 expression, whereas OSe decreased expression of PRODH, SLC1A4, and PDX1. Relative to OSe, MIX increased Sel S expression, whereas OSe increased BOLA-DQA2 expression relative to ISe. From a metabolic perspective, MIX increased gene expression of 2 enzymes (MARS, MAT2B) involved in the selenomethionine pathway, one enzyme (PAPSS1) involved in the selenite pathway, and 5 (Sel 15, Sel T, Sel W, Sel S, GPx4) selenoproteins involved in pathways that regulate oxidative stress. In contrast, the same genes were decreased in OSe versus MIX livers. We conclude that (a) Se treatment affected hepatic gene expression and (b) MIX and OSe treatments differentially affected hepatic expression of important Se metabolism genes, despite having induced similar Se assimilation concentrations. Thus, the hepatic metabolic capacity of MIX and OSe heifers likely differs, despite having similar Se contents.

72 Effects of maternal nutrient restriction during mid-to late gestation on uterine blood flow in beef cows.

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The objective was to examine the effects of maternal nutrient restriction during mid- to late gestation on uterine blood flow in multiparous Angus beef cows. Cows (n = 20) were randomly assigned to one of 10 pens and grouped by BW. Each pen was then randomly assigned a treatment diet with the experimental unit being pen (n = 10; 5 pens/treatment). Cows were allowed ad libitum access to their treatment diet for a 12 h period during the day and released into a dry lot at night. Nutritional treatments started on d 140 of gestation and included a maintenance diet (CON) that consisted of 70% hay and 30% rice hulls that met daily maintenance requirements (100% NRC) and a restricted diet (RES) that consisted of 45% hay and 55% rice hulls that was 80% of daily maintenance requirements (80% NRC). Following the 100 d of nutrient restriction BW averaged 564 ± 30 kg vs. 517 ± 29 kg for CON and RES, respectively. Uterine artery measurements contralateral and ipsilateral to the conceptus were obtained on d 140 and 240 of gestation via Doppler ultrasonography and included resistance index (RI), pulsatility index (PI), and blood flow (BF). Dependent variables were analyzed using the mixed procedure of SAS and means separated by nutritional treatments. At d 140 of gestation (baseline measurement) RI, PI, and BF in the contralateral or ipsilateral uterine arteries were similar (P > 0.08) across nutritional treatments. At d 240 of gestation contralateral RI (P < 0.01) and PI (P < 0.01) were increased in RES vs. CON, while contralateral BF was decreased (P < 0.01) in RES vs. CON. At d 240 of gestation ipsilateral RI, PI, and BF were similar (P > 0.85) across nutritional treatments. Total uterine artery BF (the sum of contralateral and ipsilateral BF) was similar (P > 0.35) across nutritional treatments. Maternal nutrient restriction during mid- to late gestation decreased contralateral uterine artery BF, while similar BF was maintained in the ipsilateral uterine artery. In conclusion, uterine blood flow was not compromised during mid-to late gestation nutrient restriction. Therefore, fetal growth and development may be similar across treatment groups; however, further investigations are needed.

Key Words: nutrient restriction, uterine blood flow, pregnancy

73 The grazing of toxic tall fescue negatively impacts bull fertility.

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The objective of this study was to evaluate BW gain, BCS, semen quality and male fertility for bulls grazing the ergot alkaloid (EA) containing cultivar Kentucky 31 (KY31) compared to the novel endopyhte cultivar lacking EA, (NE). Angus bulls (n = 10) > 2 yr of age were stratified by BW and BCS and allotted to graze either KY31 or NE for 56 d. Bull BW, BCS and breeding soundness exams (BSE) were taken on d 0, 28 and 56. On d 56, bulls with similar and acceptable semen quality from each treatment (n = 2) were chosen for extension with a commercial extender (10^6 motile sperm per mL) and kept at 4° C until used for artificial insemination within 30 h of collection. Angus crossbred females were stratified by age, BCS and BW and allotted to be timed inseminated with KY31 (n = 41) or NE (n = 40) semen with each bull being mated to a minimum of 20 cows. Eight d prior to timed insemination, all cows received CIDRs and maintained for 5 d. The CIDRs were removed, followed by 2 injections of $PGF_{2\alpha}$ 8 h apart, and AI was performed 72 ± 2 h post-CIDR removal. Ten d following insemination, all females were exposed to natural service for the remainder of the breeding season. Pregnancy was evaluated 30 d post-timed insemination via transrectal ultrasound and 55 days post-removal of the bull via rectal palpation to determine AI and total pregnancy rates, respectively. Bull BW, BCS and all semen quality parameters were subjected to analysis using the JMP statistical package (SAS Institute Inc. Cary, NC) with MANOVA and repeated measures procedures to test for effects of treatment, d and their interaction. Pregnancy data was evaluated using Chi square analysis. Bull BW (P = 0.001) and BCS (P = 0.01) were affected by d only. Scrotal circumference (SC) and semen quality parameters were not affected by treatment (P > 0.05) or interactions (P > 0.05); however, SC, motility, progressive motility and morphology tended to increase numerically due to d (P < 0.06). Timed AI pregnancy rates were lower (P = 0.02) when using semen from KY31 bulls compared to NE (22% versus 47.5%, respectively). No difference was observed in total pregnancy rates between groups and averaged 98.6% (P = 0.3). These data indicate that fertility issues may exist with bulls grazing KY31 independent of standard semen evaluation procedures.

74 Yeast cell wall supplementation alters immune parameters in response to a Salmonella challenge in weaned pigs.

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The objective of this experiment was to evaluate the performance and immune responses of weaned pigs supplemented with yeast cell wall (**YCW**) when challenged orally with *Salmonella*. Weaned pigs (n=39; 7.1±0.1 kg BW) were housed in an environmentally-controlled facility equipped with individual pig pens (1.2x0.6m). Pigs were weighed upon arrival, blocked by BW, and assigned to one of three treatments (n = 12/treatment): Control diet, which was a non-medicated starter diet (Control); control diet supplemented with YCW at 250 mg/kg (**YCW250**); and control diet supplemented with YCW at 500 mg/kg (**YCW500**). Pigs were fed for 18 d, and pigs and feeders were weighed weekly. Pigs were anesthetized on d 7 to insert intraperitoneal temperature recording devices (**TEMP**) and on d 14 to insert jugular cannulas. On d 15 blood samples were collected at 6 h intervals from -6 to 72 h relative to oral *Salmonella typhimurium* (10^6 cfu/pig) challenge. Serum was analyzed for cortisol, and whole blood was utilized to measure complete blood cell counts. Data were analyzed using the Mixed procedure of SAS specific for repeated measures. Control pigs had greater (P<0.01) ADG prior to the challenge than YCW500 pigs. Baseline TEMP, measured at 1-hr intervals, was greater (P<0.001) in YCW250 pigs than Control and YCW500 pigs. There was a treatment x time interaction for the change in TEMP (P<0.01) and post-challenge cortisol (P=0.03), white blood cells (**WBC**; P=0.03), and neutrophils (P=0.02). Control pigs had greater (P<0.05) cortisol at 0 h than both YCW-supplemented groups but had less (P<0.05) cortisol compared to YCW500 pigs at 24 and 30 h post-challenge. Control pigs had greater (P<0.05) WBC counts than both YCW-supplemented groups 6 and 12 h post-challenge, and YCW250 pigs had lower (P<0.01) WBC counts than Control and YCW500 pigs 18 h post-challenge. Neu-

trophil counts were greater (P<0.05) in Control pigs than both YCW-supplemented groups at 6 and 12 h post-challenge and greater (P=0.02) than YCW250 pigs at 18 h post-challenge. Lymphocytes were greater (P<0.001) in Control and YCW500 pre- and post-challenge compared to YCW250 pigs. Control pigs had the greatest (P<0.001) monocyte counts compared to YCW-supplemented pigs. This study suggests that YCW supplementation decreases TEMP and specific WBC subtypes to an oral *Salmonella* challenge, which is similar to pervious results observed in cattle, and indicates YCW may be a viable supplement for weaned pigs in order to reduce the negative effects of illness.

75 Variations in the preferential binding of yeast probiotics to gram positive or gram negative bacteria.

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Probiotics are widely utilized in human nutrition to boost immunity and improve health and are also used in the livestock industry to improve health and overall productivity. Despite the extensive amount of research that has been performed on examining the mechanisms by which probiotics confer a positive effect upon the host, their use is still quite highly debated and they are undoubtedly under characterized. The hypothesis for this study was that variations exist in the binding potential of probiotics to Gram-negative and Gram-positive bacteria. To test this hypothesis, the binding capability of five different types of live yeasts or yeast cell wall products to two Gram-negative bacteria (*Salmonella typhimurium* and *Escherichia coli* O157:H7) and three Gram-positive bacteria (*Listeria monocytogenes, Clostridium perfringens*, and *Bifidobacterium bifidum*) was determined using an adhesion assay and subsequent analysis by scanning electron microscope. The probiotics were incubated on coverslips then challenged with the array of different pathogens. Direct interactions were determined between the pathogen and probiotic following extensive washes. Though *S. typhimurium* bound well to all products tested (>90%), *E. coli* O157:H7 had a preference to bind to the yeast cell wall products (up to 60% adherence, as opposed to 24 to 30% adherence to live yeast). The opposite was observed for the Gram-positive bacteria tested, which bound significantly better to yeast cell wall product A ($p<0.05$) and yeast cell wall product C ($p<0.05$). Together, these data suggest that mechanisms by which yeast-based probiotics adhere to pathogens are dictated by variations of surface proteins present on the pathogens. Further research is warranted to determine how these variations in binding potential influence the activity of these yeast-based probiotics *in vivo*.

76 Influence of a prenatal stressor on ACTH-induced cortisol secretion in yearling Brahman heifers.

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The objective of this study was to test whether prenatal stress affects postnatal adrenocortical responsiveness to exogenous ACTH in calves of Brahman cows transported for 2-h periods at 60, 80, 100, 120, and 140 d of gestation. Prenatally stressed yearling heifers (n=12) from this group and 12 Control heifers of similar BW (208.4 ± 4.4 kg) were balanced for temperament and subjected to an intravenous ACTH challenge to compare induced adrenal cortisol secretion. The subjects were fitted with jugular vein cannulas and immediately placed in stanchions for blood collection. Following a 6-h acclimation period, porcine ACTH (0.1 IU/kg BW) was administered intravenously to each heifer. Blood samples were collected via the cannulas during the acclimation period every 30 min and then at intervals of 15 and 30 min for 6 h following the ACTH dose. The concentration of serum cortisol was determined by RIA. Repeated measures mixed models analysis was used to examine prenatal treatment differences over time for the full sampling period and the post-challenge period. The following variables were calculated to compare adrenal responsiveness to exogenous ACTH: peak cortisol concentration, basal cortisol concentration, time to reach peak cortisol concentration following ACTH administration, and time to return to basal cortisol concentration following ACTH administration. Cortisol concentration over time did not differ between prenatal treatment groups for either the full or post-challenge sampling periods ($P \geq 0.12$). Neither basal (6.53 ± 1.15 vs. 5.52 ± 1.10 ng/mL) nor peak cortisol (57.84 ± 4.93 vs. 54.04 ± 4.70 ng/mL) concentrations differed between the prenatally stressed and control treatment groups ($P \geq 0.53$). It appears that there is no difference on the adrenal response to ACTH challenge between prenatally stressed and control heifers. Further research is needed to determine if prenatal stress may have altered the hypothalamic or pituitary components of the hypothalamic-pituitary-adrenal axis in this group of heifers.

Ruminant Animal Production I

77 Starch utilization in cattle fed SFC-based finishing diets containing post-extraction algal residue for nitrogen supplementation.

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Post-extraction algal residue (PEAR) is a byproduct of biodiesel production from microalgae. Feed intake and nutrient disappearance along the digestive tract were evaluated in beef steers consuming steam-flaked corn (SFC) diets with PEAR as an N source. Ruminally/duodenally cannulated steers (n = 6; BW = 432 ± 40kg) were used in a 6x6 Latin square design with six 21-day periods. Following a 14 d adaptation, diet, orts, ruminal, duodenal and urine samples were collected for 5 days. Basal diet contained 79.5% SFC, 10% alfalfa hay, 5% cane molasses, 3% yellow grease, and 2.5% supplement. SFC was replaced as N sources were included as: urea (0.75%; Urea-1) and (1.5%; Urea-2); PEAR, (10%; Algae-1) and (15%; Algae-2); PEAR plus urea at 15 and 0.6%, respectively (Algae-3); and negative control (CON), with no additional N source. Steers fed Algae- 2, Algae-3 and CON had lower DMI compared to steers fed Urea-1, with Algae-1 and Urea-2 being intermediate. Starch intake varied among treatments because of differences in DMI and dietary starch concentration. Starch intake was lowest for steers on Algae-2 and

77 Table 1.

	Algae 1	Algae 2	Algae 3	Control	Urea 1	Urea 2	SEM	*P*-value
DM Intake, kg/d	8.05^{ab}	6.28^{c}	6.70^{bc}	6.89^{bc}	8.67^{a}	7.85^{ab}	0.50	0.02
Starch Intake, kg/d	3.86^{bc}	2.82^{d}	3.18^{cd}	3.77^{bc}	4.71^{a}	4.25^{ab}	0.26	<0.01
Ruminal Starch digestibility,%								
Apparent	76.41^{ab}	67.67^{c}	71.67^{bc}	77.90^{ab}	80.83^{a}	77.34^{ab}	3.04	0.0411
True	80.21^{abc}	73.29^{c}	76.85^{bc}	83.86^{ab}	87.90^{a}	84.15^{ab}	2.93	0.0171
Postruminal Starch digestibility, % entering	81.66^{a}	86.31^{a}	87.37^{a}	66.29^{b}	77.87^{ab}	82.69^{a}	6.22	0.0863
Total Tract digestibility, %	95.74^{a}	95.96^{a}	96.94^{a}	90.51^{b}	93.84^{ab}	95.91^{a}	1.65	0.09

Algae-3 diets and highest for steers on Urea-1. CON, Urea-2, and Algae-1 were intermediate. Apparent starch digestibility was lower for the Algae-2 and Algae-3 diets, but there were no differences among the other four treatments. True ruminal starch digestibility followed a similar pattern. The Urea-1 and Urea-2 diets tended to have higher ruminal starch digestibility than the algae diets; especially at the 15% PEAR inclusion rate. The CON treatment had the lowest post-ruminal starch digestibility; there were no differences in post-ruminal starch digestibility among the other treatments. Total tract starch digestibility averaged 94.8% across treatments and was lowest for the CON treatment while not differing between other treatments. Reduced ruminal starch digestibility with PEAR diets suggests that PEAR in combination with another high DIP source may improve ruminal starch digestibility.

Key Words: algae, starch, steam-flaked corn

78 Prevalence of E. coli O157:H7 shedding at weaning and post-weaning in Brahman calves.

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The bovine gastrointestinal tract hosts multiple enteric bacteria, including enteropathogenic *E. coli* O157:H7, which are shed in bovine manure and can contaminate food and water. The goal of the study was to investigate whether temperament and weaning stress affect *E. coli* O157:H7 prevalence in Brahman calves (6 to 7 months of age; 45 heifers; 33 bulls). Temperament score was calculated as an average of pen score and exit velocity. Calm, intermediate and temperamental animals respectively comprised 30, 55 and 15 % of the sampled calves. Blood samples (obtained by jugular venipuncture to determine serum cortisol concentration by RIA) and fecal samples (obtained by rectal palpation or free catch to determine *E. coli* O157:H7 prevalence) were collected at weaning (d0) and 4 days post-weaning (d4). Fecal samples were incubated in gram negative broth overnight followed by immunomagnetic separation for *E. coli* O157:H7, isolation on sorbitol MacConkey agar plates supplemented with cefixime and potassium tellurite with further confirmation by agglutination testing. *E. coli* O157:H7 was detected in 17 and 25 samples collected on d0 and d4, respectively. Twelve calves shed *E. coli* O157:H7 on both d0 and d4. There was a strong association of increased cortisol concentrations with temperament ($P < 0.05$) and sex (females 21.5±1.7 ng/mL, males 14.6±2.0 ng/mL, $P < 0.05$). These findings support previous data regarding a positive association of serum cortisol concentration and temperament in *Bos indicus* calves. The serum cortisol concentration of the 12 calves shedding *E. coli* O157:H7 (16.9±2.6 ng/mL) did not differ ($P > 0.10$) from that of calves that were negative on either one or both of the sampling days. However, *E. coli* O157:H7 prevalence did not increase with the elevated serum cortisol associated with a more excitable temperament at weaning and post-weaning in Brahman calves. The power test based on determined proportion of *E. coli* O157:H7 shedders indicated that further screening of a larger set of calves (n=184) would help to determine whether *E. coli*O157:H7 prevalence is associated with serum cortisol concentration or temperament.

Key Words: *E. coli* O157:H7 shedding, weaning, temperament

79 Effects of creep feeding a protein supplement on performance of cows and calves grazing limpograss pastures.

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Limpograss (*Hermathria altissima*) is a warm-season grass widely used for cow-calf production in South Florida; however, the low crude protein and rumen degradable protein concentrations may limit animal performance. The objective of this study was to investigate the effect of providing rumen-degradable protein to calves as a creep feed on performance of cow-calf pairs grazing limpograss pastures. The experiment was conducted at the UF/IFAS Range Cattle Research and Education Center from June to August 2013. Brangus crossbred cow-calf pairs (N = 24; calf initial BW = 215 ± 26 kg) were randomly assigned to 8 limpograss pastures (1.0 ha/pasture; 3 pairs / pasture) in a randomized complete block design with four replicates. Calves were 7 mo old at start of study. Treatments were 1) 0 g/d of soybean meal (CON) or 2) 400 g/d of soybean meal (SBM), which were randomly assigned to pastures. Body weight of cows and calves was recorded every 28 d and herbage mass measured every 14 d from June to August (84 d). Treatment and month were analyzed as fixed effects and block as a random effect with month as repeated measure (Proc Mixed of SAS). There was no difference in herbage mass ($P = 0.30$; 3673 ± 675 kg DM/ha) or allowance ($P = 0.39$; 1.64 ± 0.25 kg DM/kg BW) between treatments. Herbage mass and allowance were less ($P < 0.05$) in August than June or July (2816 vs. 4218 and 3985 kg DM/ha, and 1.22 vs. 1.95 and 1.75 kg DM/kg BW, respectively). There was no difference ($P > 0.30$) in BW, BCS, or ADG of cows. However, SBM calves had greater ($P < 0.05$) ADG than CON calves (0.76 vs. 0.58 kg/d, respectively). Growth rate of calves decreased ($P < 0.05$) from June to August (from 1.17 to 0.13 kg/d). In conclusion, 400 g/d of soybean meal improved the performance of calves grazing limpograss pastures, but did not affect performance of dams.

80 Assessment of copper deficiency in beef cattle through blood and skin biomarkers.

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Copper deficiency is one of the most common metabolic and micronutrient problems in beef cattle, with multiple health consequences including poor reproductive performance. Currently, no reliable test exists for copper deficiency aside from a liver biopsy, an inconvenient procedure. Previous researchers used biomarkers selected to indicate failing copper metabolism, and so generally had weak effects found only at artificial and extreme levels of copper deficiency. The objective of this experiment was to develop a sensitive and specific minimally invasive blood or skin test for copper deficiency. Our approach used gene expression array experiments for unbiased discovery of pathways altered in response to moderate levels of copper deficiency found in beef cattle. We collected hair coat scores, skin samples using an ear punch, blood samples, and liver biopsies from a group of 15 Angus crossbred heifers (12-14 mo.) from a contemporary group in Tennessee. Blood and liver samples were sent to a commercial laboratory for mineral analysis. RNA was isolated from blood samples and liquid nitrogen flash-frozen whole homogenized skin samples. Copper deficiency in these animals was at worst moderate, but liver copper levels were not significantly correlated with either serum copper levels or hair coat scores. Liver copper levels did not correlate with serum levels of any of the other metals tested, but was significantly correlated with liver selenium levels ($P < 0.05$ by z-correlation test). Gene array expression analysis identified 415 genes regulated by copper deficiency in skin, and 194 in blood, with 83 overlapping between the two tissues, as determined by separation in group means of more than two standard deviations. The identity of the sets of genes changed, including genes associated with coat color production and cell-cell adhesion, indicating ongoing adaptation to copper restriction on a cellular level. The strength of these results is that they use genes that are part of the adaptive process for copper restriction, which is true even with mild copper deficiency, rather than looking for failure of the adaptive process, which is true only in extreme or end-stage copper deficiency. These results allow design of simple skin or blood tests for copper deficiency with high sensitivity and specificity, useful even in mild to moderate copper deficiency found in well managed herds. We are currently in process of establishing a replication cohort to validate these results, with the goal of moving towards a simple enzymatic test that can be used in the field.

81 The effects of prenatal stress and temperament on feeding behavior in post-weaning Brahman bulls.

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The objective of this study was to examine the effects of prenatal stress and temperament on post-weaning feeding behavior of Brahman bulls. Pregnant Brahman cows (n=96) were split, within cow temperament, into treatment groups with (n=48) control cows and (n=48) cows to receive transportation stress as a prenatal stressor for 2h on 60, 80, 100, 120 and 140±5d of gestation. Bulls (n=25 control and n=18 prenatally stressed) were identified at weaning. Temperament was assessed at weaning using temperament score [TS; (PS+EV)/2], pen score (PS; 1=Calm and 5=Excitable), and exit velocity (EV=m/s). These temperament scores were then converted into temperament classes of calm (TS= < 1.78, n=26), intermediate (TS= 1.78 to 2.90, n=9) and temperamental (TS= > 2.90, n=8). Feeding behavior was characterized by number of visits (NV), meal events [ME; (meals/d)], head down time (HDT; min/d), head down time per meal (HDTM; HDT/ME), average meal size [AMS; kg/(meal*d)], and feeding rate (FR; g/s) using the GrowSafe®system. The HDTM was greater (P = 0.0332) in prenatally stressed bulls (3.85 ± 0.24) than control bulls (3.29 ± 0.23). Feeding behavior variables NV, ME, HDT, AMS and FR did not differ between treatments (P = 0.9462, P = 0.8728, P = 0.9944, P = 0.2488, P = 0.4927, respectively). Table 1 includes number of visits, meal events, head down time and head down time per meal. The interactions of treatment and temperament tended to affect HDT (P = 0.0628) and affected HDTM (P = 0.0083) with the temperamental bulls ranking higher than either calm or intermediate bulls for both treatment groups. Treatment had an effect on the head down time per meal however temperament classes had an effect on number of visits, meal events, head down time and head down time per meal. Coupling the prior observation (Littlejohn et al., 2012 J. Anim. Sci. 91(E. Suppl. 2):593) that prenatal stress increased postnatal excitability of these calves and the current demonstration that temperament can influence feeding behavior leads to the conclusion that there may be long term performance consequences of prenatal and early life stressors.

81 **Table 1.** Feeding behavior variables in temperament classes

	Temperament Classes			
Variable	Calm	Intermediate	Temperamental	P Value
Number of Visits (visits/d)	11.80±0.71	12.50±0.77	13.27±0.80	0.0247
Meal Event (meals/d)	10.56±0.69	11.22±0.74	12.04±0.77	0.0157
Head Down Time (min/d)	29.24±2.94	29.95±3.30	41.75±3.50	0.0001
Head Down Time per Meal [min/(meal*d)]	3.09±0.22	3.27±0.27	4.36±0.29	0.0001

82 Effects of Rumensin and Fenbendazole administration on measures of gastrointestinal parasite load and performance of early weaned beef calves.

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Our objective was to evaluate the effects of Rumensin® and Fenbendazole administration in drench form on measures of gastrointestinal parasite load and performance of early weaned beef calves grazing annual ryegrass (*Lolium multiflorum*) or bahiagrass (*Paspalum notatum*). Sixty-four Brahman crossbred beef calves were weaned at approximately 70 d of age and randomly allocated into 1 of 16 pastures (8 = annual ryegrass and 8 = bahiagrass; 2 heifers and 2 steers/pasture). Treatments were randomly assigned to pastures (4 pastures/trt) and consisted of: (1) Rumensin® (Elanco Animal Health, Greenfield, IN; 50 mg/d of monensin); and (2) no Rumensin supplementation for 84 d. In each experimental unit (pasture), two calves were administered fenbendazole (Safe-Guard® Suspension; Merck Animal Health, Summit, NJ) at a dosage of 5 mg/kg BW on d 0, 28, 56, and 84; and two calves were administered fenbendazole only on d 56. Body weight and fecal samples, for determination of nematode fecal egg count, were individually collected on d 0, 28, 56, and 84. Stomach worm (*Ostertagia ostertagi*), cooperia (*Cooperia spp.*), whipworm (*Trichuris discolor*), nodular worm (*Oesophagostomum radiatum*), and coccidia (*Eimeria spp.*) were assessed. Initial BW differed ($P<0.001$) among fenbendazole treatments; however, initial BW did not differ ($P=0.94$) among Rumensin treatments. There was no effect ($P>0.20$) of fenbendazole or Rumensin treatments on BW and ADG of calves grazing annual ryegrass. However,there was a fenbendazole effect ($P<0.002$) on ADG of calves grazing bahiagrass. There was a fenbendazole x time interaction ($P=0.03$) on BW of calves grazing bahiagrass. Calves receiving fenbendazole 4x had greater BW on d 28, 56, and 84 compared with calves receiving 1x. There were fenbendazole and Rumensin effects ($P=0.001$ and $P=0.03$, respectively) on ADG of bahiagrass calves. Calves receiving Rumensin and 4x fenbendazole had greater ($P<0.001$) ADG. There was no effect ($P>0.14$) of fenbendazole or Rumensin on nematode count for calves grazing annual ryegrass. However, calves grazing bahiagrass and supplemented with Rumensin had less ($P<0.01$) coccidia count. Calves grazing bahiagrass calves and receiving 4x fenbendazole had less ($P<0.01$) *Ostertagia ostertagi* and *Cooperia spp.* count. In summary, Rumensin supplementation contributed to reduce coccidian count and increase ADG for calves grazing bahiagrass. In addition, 4x fenbendazole administration increased BW and ADG, and reduced nematode count of calves grazing bahiagrass pastures.

83 Effect of protein supplementation and forage allowance on heifer growth and reproductive development.

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Stockpiled infected fescue has been shown to be an acceptable winter forage system. When managed with strip grazing, effects of toxicity are reduced during the winter months; however, the fescue alone may not be adequate for developing heifers. This study investigated the effects of two alternative treatments on breeding rates in replacement heifers: increased daily forage allowance (from "normal" (NA) to 125% of "normal" (EA)), and offering a supplemental protein tub (TUB) (Southern States 25% Maxi Tub) versus a high magnesium mineral (M). Main effects and the interaction between the two treatments were analyzed. Angus and Angus-Simmental cattle averaging 304.5 kg were used, including 32 steers and 48 heifers. Groups of 5 (3 heifers and 2 steers with similar body weights) were randomly assigned to 16 pastures in a 2 x 2 factorial arrangement. Pastures were fertilized with 56 kg/ha N in early September and consisted of 54.1% fescue (Ky-31, 42.6% infected) with 12.27% CP and 31.98 %ADF on d 1. Forage mass was determined with pre-grazing mass 5,230.8 kg/ha to 2". Cattle remained on pasture for 9 weeks (including one week for adaptation) from Nov 8 to Jan 8. Forage utilization efficiency (FUE) was less ($P<0.05$) for EA than NA (56.9 and 50.9% to a 2" and 37.5 and 33.5% to ground level for NA and EA, respectively). Forage intake/head/day (DMI) and total intake did not differ between treatments ($P>0.05$). Daily supplement consumption was greater ($P<0.05$) for TUB than M (0.113, 0.340, 0.109 and 0.337 kg/d for NA-M, NA-TUB, EA-M, and EA-TUB, respectively). Average daily gain was higher ($P<0.05$) with TUB than M (0.579 and 0.423 kg/d, respectively). Heifers had an average initial body condition score (BCS) of 5.4. Change in BCS was higher ($P<0.05$) in EA-TUB than all other treatment groups (BCS increased by 0.19, 0.15, 0.19, and 0.56 for NA-M, NA-TUB, EA-M and EA-TUB, respectively). Heifers were synchronized using the Co-synch+7d CIDR protocol and artificially inseminated (AI) followed by bull exposure. All cattle were confirmed pregnant by ultrasonography at 35 and 90 days post AI. Treatment impacted first service conception rates ($P<0.05$; 67, 50, 42, and 92% for NA-M, NA-TUB, EA-M, and EA-TUB, respectively). Total gain, change in pelvic area, and change in reproductive tract scores did not differ between treatments ($P>0.05$). Overall, feeding a TUB increased gain and interacted with EA to increase first service conception rates and BCS ($P<0.05$).

Key Words: Heifer Development, Stockpiled Fescue, Supplementation

84 Effect of replacing dried distillers' grains with post extraction algal residue on performance of growing steers.

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Algae biomass is currently being researched as a next generation biofuel source. A portion of this research is directed at identifying suitable markets for post extraction algal residue (PEAR), a byproduct of algal biofuel production. Following lipid extraction, PEAR is concentrated in protein suggesting it could be used as a protein source for growing cattle. Our goal was to compare differences in consumption and gain between PEAR and dried distiller's grain (DDG) fed at different inclusion rates in a growing ration. Thirty steers (BW = 333 kg) were stratified by weight and implant status and assigned to 1 of 3 diets fed ad libitum. The base diet (0% PEAR) contained 0% PEAR, 30% DDG, 31.8% cracked corn, 28.8% alfalfa hay, and 2.5% mineral premix. For the other two diets DDG was replaced with PEAR such that diets contained 15% PEAR and 30% PEAR. Steers were previously trained to Calan gates. Diets were fed at 0800 for 28 d. Body weights were collected on days 1 and 28. Increasing PEAR from 0 to 30% decreased intake linearly ($P < 0.01$) from 12.1 to 10.9 and 9.9 kg/d for 0, 15 and 30% PEAR, respectively. Similarly, ADG declined linearly ($P < 0.01$) from 1.59 for 0% PEAR to 1.09 and 0.16 kg/d for 15 and 30% PEAR, respectively. In accordance with gain and intake data, G:F decreased linearly (*P*

< 0.01) as PEAR was added from 0.13 to 0.09 and 0.01 kg for 0, 15 and 30% PEAR, respectively. Overall, PEAR inclusion decreased gain, consumption and efficiency. These observations suggest that including PEAR at 30% of a growing ration is not feasible regardless of the cost of PEAR. Additionally, for PEAR to be included at 15% of the ration it would need to be priced at a large discount compared to other feed resources. Additional work is required to determine the impacts of PEAR when fed in growing rations at less than 15% of the diet.

Key Words: cattle, distillers' grains, intake, post-extraction algal residue

85 Evaluation of weight gain and rectal temperature across vaccine type in Bos indicus crossbred steers challenged with bovine viral diarrhea virus.

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Yearling, F_2 and F_3 Nellore-Angus steers (n = 380) from the Texas A&M McGregor Genomics herd were evaluated across 4 years for ADG following vaccination for Bovine Respiratory Disease (BRD) and subsequent intranasal challenge with bovine viral diarrhea virus (BVDV). Steers were stratified by sire over three vaccine groups of modified-live (MLV), killed (KV), and non-vaccinated (NON). Steers in the KV group received initial vaccine injection on d -56 or -49 and a booster injection on d -35 to -25, depending on year. Steers in the MLV group were vaccinated with single injection on day -35 to -25 depending on year, and kept separate from KV and NON steers for 7 to 10 days. The steers of the NON group remained non-vaccinated. On d 0, all steers were challenged via intranasal ingestion of BVDV Type 1b strain CA0401186a. A rectal temperature threshold over 40.0°C was used to classify animals for temperature status during 14 d following challenge, and cattle over this threshold were treated with antibiotic. Weights and rectal temperatures were collected on d 0, 3, 7, 10, 14, 28, and 42. Average daily gain was calculated for three 14-day periods following challenge. Mixed model procedures were used to analyze ADG with fixed effects of pen nested within year, year, vaccine type (VAC), sire, rectal temperature status above 40°C (RTEMP), day-0 weight as a covariate, and 2-way interactions of VAC × RTEMP, and sire × RTEMP. A chi-square test was used to analyze the distribution of RTEMP across VAC. Steers exceeding the rectal temperature threshold of 40°C on d 3 through 14 exhibited a 0.24 kg/d reduction ($P = 0.02$) for the first 14-d period following BVDV challenge, were not different during the second 14-d period, then gained 0.18 kg/d more ($P = 0.02$) during the final 14-d period as compared to steers that did not exceed the 40°C threshold, regardless of VAC. In the second 14-d period, steers in the NON vaccine group, classified as being over the 40°C RTEMP threshold had 0.45 kg/d reduction ($P < 0.001$) in ADG as compared to those under the 40°C RTEMP threshold. Although no VAC main effect was observed for ADG, Chi-square results showed different ($P < 0.001$) distributions in RTEMP where 47.2% of the MLV steers were above the rectal temperature threshold, but 66.1% and 67.5%, respectively, of KV and NON steers were above the threshold.

86 Supplementation of monensin to beef cows consuming low-quality forage during late gestation and early lactation.

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This study investigated the effects of feeding monensin (Rumensin 90®; Elanco Animal Health; Greenfield, IN) to beef cows in late gestation through early lactation on cow performance, milk production, and calf growth performance. Spring calving Angus and Angus x Hereford cows and heifers (N = 84; initial BW = 534 ± 68 kg; initial body condition scoring = 5.27 ± 0.7; initial age = 4.8 ± 2.9 yr) were randomly allotted to one of two treatment combinations in a completely randomized design. Treatment supplements included 1) Cottonseed meal supplement with no monensin (**Control**); 2) Monensin added to control to supply 200 mg·head^{-1}·d^{-1} (**MON**). Supplements were individually fed at 1200 daily at a rate of 0.9 kg·head^{-1}·d^{-1} for duration of the study. During the treatment period, cows had ad libitum access to prairie hay (CP, 4.5%; TDN, 55%; crude fat, 2.8%; DM basis). Milk production was measured through weigh-suckle-weigh procedure on April 19 and May 10. Data were analyzed using Mixed in SAS 9.3 with animal as the experimental unit, treatment and cow age as fixed effects, and calf age used as a covariate where applicable. There were no significant differences ($P > 0.33$) in cow BW or BCS at any time in the study. There were also no differences ($P > 0.19$) in cow BW or BCS change from d 0 to calving, calving to d 60, or d 0 60. Calf birth BW was not affected by dam dietary treatment ($P = 0.24$); however, calves from dams consuming MON weighed significantly more at d 25 and 60 of the study. Calves from dams fed MON also had greater ($P = 0.03$) ADG from birth to the end of the study. Adjusted calf BW at weaning was not different ($P = 0.33$) among calves from dams consuming either treatment. Milk production did not differ between cows on either of the treatments at any collection ($P > 0.26$), nor did MON ($P < 0.39$) affect pregnancy rate. Feeding spring-calving beef cows monensin in the winter supplement will improve subsequent calf growth performance while maintaining cow performance.

87 Effect of stocker production systems on estimated greenhouse gas emissions.

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The greenhouse gases methane and nitrous oxide are produced from enteric fermentation, and fertilizer and manure application to soil. The objective of this study was to evaluate the effect of stocker production systems that alter rumen fermentation and replace fertilizer with feed supplements on greenhouse gas emissions. Mixed-breed steers or heifers (N= 692; 209 ± 28 kg) grazed Plains Old World bluestem pastures (3 pastures/system) in 3 consecutive years using a randomized complete block design comparing 4 grazing systems: (1) non-fertilized, low stocked (336 kg of BW/ha) pastures (**CON**); (2) N fertilized (90 kg N/ha), high stocked (672 kg of BW/ha) pastures (**NFERT**); (3) N and phosphorus (P) fertilized (39 kg P/ha), high stocked pastures (**NPFERT**); and (4) non-fertilized, high stocked pastures plus supplementation of dried distillers grains with solubles (**DDGS**; 0.75% BW·hd^{-1}·d^{-1}). Steers grazed for 135, 63, and 119 d in year 1, 2, and 3, respectively, beginning in May each year. Greenhouse gas emissions were computed from diet TDN, nitrogen

excretion, fertilizer application and production, and published life-cycle assessments of feedstuff production for each pasture in each year (Capper et al, 2009: IPCC, 2006). Data from each year were analyzed separately as a randomized complete block design. In all 3 years, NFERT, NPFERT, and DDGS had greater ($P < 0.05$) methane emissions than CON due to the greater stocking rate. In year 2 and 3, DDGS had similar nitrous oxide emissions as CON with NFERT and NPFERT having greater emissions due to application of nitrogen fertilizer. Total greenhouse gas emissions were greater for NFERT, NPFERT, and DDGS than CON in all 3 years (avg 23475 vs. 8367 kg CO_2e). However, when adjusted for shrunk body weight gain total emissions were similar between DDGS and CON with NFERT and NPFERT having greater total emissions in all 3 years (9.54, 13.47, 12.86, and 9.21 kg CO_2e/kg gain for CON, NFERT, NPFERT, and DDGS, respectively). These data suggest that use of feed supplements such as DDGS in place of nitrogen fertilizer can decrease greenhouse gas emissions to levels similar to low input stocker cattle systems.

Ruminant Animal Production II

120 SS-ASAS Emerging Scholar Award: Influence of Horn Flies and Breed Type on Milk Production, Calf Performance, and Pasture Behavior, of Beef Cattle.

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Improving profitability traits in beef cow calf operations is an important and continuous goal of producers and researchers. Due to the negative impact horn flies have on beef cattle profitability traits and their increased resistance to pesticides, evaluation of more sustainable production methods is necessary. The objectives of this study were to determine the impact of horn flies on milk production, calf performance and pasture behavior of various breed groups of beef cattle. Cows (n = 53) sired by Bonsmara (BONS; n = 7), Brangus (BRAN; n = 13), Charolais (CHAR; n = 8), Gelbvieh (GELV; n = 5), Hereford (HERF; n = 12), and Romosinuano (ROMO; n = 8) from Brangus dams, and their Angus-sired offspring were evaluated. Calf birth weight was determined within 24 hours (h), and calves were weaned at an average of 205 days (d). Estimates of milk yield were collected every 28 d from May to October, utilizing a single-cow portable machine, beginning approximately 60 d postpartum. Milk weight was adjusted to a 24-h milk yield. Milk quality analyses were performed by a commercial dairy laboratory. Beginning in May and ending in October total horn fly counts were recorded every 28 d on individual animals in pasture from 0700 to 0900 h. Pasture behavior of individual cows was recorded twice a day (AM and PM), with cattle behavior observed as either grazing, lying or standing. Horn fly counts were transformed to natural log horn fly count prior to analysis. All data was analyzed by mixed model least squares. The linear model for milk yield and quality and horn fly count included sire breed, cow in sire breed, month, and month x sire breed, while the linear model for calf performance traits included sire breed, calf gender, and sire breed x calf gender. The linear model for pasture behavior included sire breed, behavior (AM or PM), and month. Horn fly counts varied by month ($P < 0.0001$), with the lowest population recorded in May (99 flies) and peaking in August (520 flies). Bonsmara and GELV sired cows had greater milk yield compared to HERF sired cows (8.75 and 8.62 vs. 6.02 kg/d; respectively; $P < 0.05$), with CHAR, ROMO and BRAN sired cows intermediate (7.28, 7.00, and 7.06 kg/d; respectively). The regression of milk yield on fly count differed among sire breeds ($P < 0.05$). Milk yield was reduced by 0.99 and 0.64 kg/d per unit increase in log horn fly count in GELV and BONS sired cows ($P < 0.05$). The impact of horn flies on milk yield was greater in GELV sired cows versus BRAN, CHAR, HERF, and ROMO sired cows ($P < 0.01$), and greater in BONS sired cows versus BRAN sired cows ($P < 0.05$). Increases in log horn fly count were associated with decreases in milk fat ($P < 0.05$), solids-non-fat ($P < 0.05$) and milk urea nitrogen ($P < 0.02$). Milk yield was reduced by increased horn fly numbers ($P < 0.05$) depending upon month of lactation. In May, June and July milk yield was reduced 0.72, 0.68, and 0.71 kg/d per unit increase in log horn fly count. Preweaning average daily gain (ADG) was affected ($P < 0.002$) by sire breed of dam. Romosinuano, BONS, and CHAR calves had greater preweaning ADG (1.00 ± 0.05, 0.99 ± 0.04, 0.99 ± 0.04 kg/d; respectively) compared to BRAN and HERF calves (0.88 ± 0.03 and 0.81 ± 0.03 kg/d), with GELV calves intermediate to ROMO, BONS, CHAR and BRAN (0.98 ± 0.05 kg/day). Preweaning ADG depended upon an interaction of cow sire breed and log horn fly count ($P < 0.10$), with results indicating preweaning ADG reduced by 0.19 kg/d per unit increase in log horn fly count in BONS calves ($P < 0.05$). A one unit increase in log horn fly count resulted in 0.07 kg/d ($P < 0. 10$) increase in postweaning ADG, 19.52 kg increase ($P < 0.10$) in 365-d adjusted yearling weight, and 0.05 kg/d ($P < 0.02$) increase in birth to yearling ADG. Pasture behavior in the AM was not associated ($P > 0.25$) with horn fly counts; however PM pasture behavior was ($P < 0.05$). Cows observed grazing and lying had greater horn fly counts than cows observed standing in the PM (468 ± 52 and 419 ± 38 versus 319 ± 27 flies; respectively). Our results indicate horn fly infestations reduce milk yield and quality of beef cows depending on sire breed and month of lactation. Horn flies indirectly had a negative effect on preweaning performance of calves from certain cow sire breeds. However, a positive indirect effect on postweaning calf performance was documented, but continued research and investigation of the indirect effects of horn flies on calf performance is still needed. Development of sustainable beef production systems may include selecting breed types whose milk yield and quality and calf performance is less influenced by horn flies, allowing for better expression of genetic potential for milk yield in challenging environments.

88 Evaluation of two sugarcane molasses feeding systems on measures of performance of replacement beef heifers.

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Two experiments were conducted to compare two sugarcane molasses feeding systems on measures of performance of replacement beef heifers. In Exp. 1, Brangus crossbred heifers (n = 48; initial BW = 236 ± 28.1 kg) were randomly assigned to 1 of 12 bahiagrass (*Paspalum notatum*) pastures (4 heifers/pasture). In each pasture, 31.8 kg of blackstrap molasses (CP = 5.8% and TDN = 74.3%) and 6.4 kg of cottonseed meal (CP = 46.1% and TDN = 75.0%) were delivered twice weekly. Treatments were randomly assigned to pastures (6 pastures/treatment), consisting of: (1) Slurry: cottonseed meal was thoroughly mixed into molasses; and (2) CSM: cottonseed meal was provided in a concrete bunk, separate from molasses. Shrunk

BW was assessed on d 0, 35, and 70. Blood samples were collected for determination of progesterone concentrations to assess puberty. Puberty was determined if progesterone values from 2 consecutive samples were ≥1.5 ng/mL. On d 70, heifers were combined into 2 groups and exposed to bulls for 84 d. Pregnancy was diagnosed 45 d after the end of the breeding season. Data were analyzed using the MIXED (BW) and FREQ (puberty and pregnancy rate) procedures of SAS. Heifer BW did not differ on d 0 (P=0.91), 35 (P=0.99) and 70 (P=0.80) among treatments. Percentage of heifers attained puberty (12.5% vs. 4.2% for Slurry and CSM, respectively), and pregnancy rate (33.3% vs. 37.5% for Slurry and CSM, respectively) did not differ (P=0.76) among treatments. Experiment 2 was conducted to evaluate forage DMI in a drylot. Sixteen Braford heifers (239 ± 20.4 kg) were stratified by BW and randomly assigned to individual pens. All heifers received a daily supplement of 7.9 and 1.6 kg of blackstrap molasses and cottonseed meal, respectively, for 21 d. Treatments were the same as described in Exp. 1 (n = 8 heifers/treatment). Stargrass (*Cynodon nlemfuensis*) hay was provided *ad libitum*. Individual hay DMI was recorded daily. Data were analyzed using the MIXED procedure of SAS. Shrunk heifer BW on d 0 (P=0.72) and 22 (P=0.70), ADG (P=0.77), and hay DMI (P=0.39) did not differ among treatments. Results from this study indicate that heifers fed molasses and dry feed ingredients, such as cottonseed meal, had similar performance, irrespective of feeding system. Therefore, producers can deliver these supplements without the necessity of having tank mixer equipment to directly create slurries.

89 Performance and carcass traits of different Guzerat-based beef cattle genetic groups.

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Two experiments were conducted over 84 d to evaluate performance of four Guzerat-based beef genetic groups and carcass traits. In exp. 1, 48, 20-mo-old, bulls from 4 genetic groups (n = 12, each experimental group) were evaluated: (1) Guzerat; (2) F1 Guzerat x Holstein ("Guzholstein"); (3) F1 Guzerat x Nellore ("Guzonell"); and (4) ½ Simmental + ¼ Guzerat + ¼ Nellore (Three-Cross). Bulls were subjected to three 21-d periods after 21 d of acclimation in a feedlot facility. They were fed 50:50 sorghum silage and concentrate supplement. "Guzholstein" steers had greater (P<0.05) ADG compared with "Guzonell", but did not differ among Three-Cross and Guzerat. "Guzonell" bulls gained less (P<0.05) BW during the experiment, however feed efficiency did not differ among groups. Dry matter intake was lesser (P<0.05) for Guzerat, compared with other groups; DMI: BW ratio was lesser (P<0.05) for Three-Cross bulls. In exp. 2, 18 bulls from Exp. 1 were randomly selected from "Guzonell", "Guzholstein" and Three-Cross genetic groups (n=6, each group) and utilized in a slaughter trial. Bulls were transferred to a State-inspected slaughterhouse, and humanely slaughtered after 16 h of feed and water withdrawal. Three-Cross bulls had greater carcass weight gain, greater ribs and striploin yield, and lesser leg yield. "Guzholstein" bulls had lesser carcass yield and greater liver yield. "Guzonell" bulls had greater whole rump and rump yield. Hindquarter, flank steak, topside, rump skirt, eyeround, rump cap, head, tongue, lungs and trachea, spleen, heart, and tail yield did not differ among groups. Results from these experiments indicate that Three-Cross bulls were more efficient during the feedlot. Notwithstanding, all groups have potential for meat production because carcass traits meet the Brazilian beef industry standards. "Guzholstein" bulls could be an option for producers to diversify revenues.

90 Relationships among age and body weight at puberty and rate of gain in developing beef heifers: A meta-analysis.

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Heifers are developed to achieve a target body weight prior to breeding to calve at 24 months of age. Previous research indicates that greater rates of gain reduce age at puberty, but may also increase body weight at puberty. The objective of this study was to determine the relationships between age and BW at puberty and rate of gain from weaning to breeding in beef heifers. A literature search was conducted to identify studies that developed beef heifers at 2 or more rates of gain and determined age and BW at puberty. A data set was compiled of 11 studies encompassing 23 trials that met these criteria. Regression analyses were conducted to determine the relationship of age and BW at puberty with ADG, and between age and BW at puberty using a mixed model (PROC MIXED of SAS). The model included fixed effects of ADG and BW at puberty when appropriate and the cross product terms of ADG or BW at puberty with trial as random effects. Trials were weighted using the inverse of the squared standard error of the dependent variable. The mean ADG, age at puberty, and BW at puberty was 0.54 kg/d, 448 d, and 306 kg, respectively. As expected, age at puberty decreased with increasing ADG ($472.8 \pm 21.96 - 61.33 \pm 13.83 \times ADG$; $R^2 = 0.30$). Age at puberty would be expected to decrease ~ 30 d for each 0.5 kg/d increase in ADG from weaning to breeding. Unexpectedly, BW at puberty increased as ADG increased ($273.0 \pm 9.23 + 68.18 \pm 9.78 \times ADG$; $R^2 = 0.72$) suggesting that the target BW at breeding is dependent upon nutritional plane. Interestingly, age at puberty decreased quadratically as BW at puberty increased ($1530 \pm 317.2 - 6.53 \pm 2.03 \times BW + 0.0065 \pm 0.0032 \times BW^2$; $R^2 = 0.76$) indicating that a minimum age at puberty exists regardless of body weight. Increasing BW beyond the point where puberty will be achieved at the lightest BW and youngest age prior to breeding most likely increases feed costs unnecessarily. In conclusion, designing heifer development programs based on a target BW may not be effective.

91 Factors influencing preweaning ultrasound body composition of Brahman calves.

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The objective of this experiment was to examine factors influencing preweaning ultrasound body composition of Brahman calves. Mature cows were assigned to a control (n=42) or a prenatally stressed group (n=43) which was subjected to 2 h of transportation at 60,

80, 100, 120, and 140 ± 5 d of gestation. Calf weight, percent intramuscular fat (IMF), rib eye area (REA), rib eye area per 100 lb BW (REA/cwt), rib fat, and rump fat were recorded for each calf on d -112, -84, -56, -28, and 0 relative to weaning. Temperament was assessed at weaning using temperament score [TS; (PS+EV)/2], pen score (PS; 1=Calm and 5=Excitable), and exit velocity (EV; m/s). Temperament scores were classified as calm (TS= < 1.78, n=40), intermediate (TS= 1.78 to 2.90, n=26) or temperamental (TS= > 2.90, n=19). Data were analyzed using Mixed Models procedures of SAS specific for repeated measures. Step down procedures were utilized with treatment, calf sex, temperament classification and number of days preweaning as fixed effects; sire was a random effect. Males were heavier (P<0.01; 160.71±2.05 kg) than females (145.32±2.05 kg) and BW increased over time (P=0.08). Calf weight was affected by a treatment by temperament interaction (P<0.01). Percent IMF was not affected. The REA was greater (P<0.01) in males (35.11±0.50 cm^2) than females (33.46±0.51 cm^2) and was affected by day (P<0.01) as well as a treatment by temperament interaction (P<0.01). The REA/cwt was greater (P<0.01) in females (1.7±0.01) than males (1.6±0.01) and decreased over time (P<0.01). A treatment by temperament interaction (P<0.01) affected REA/cwt. Rib fat was greater (P=0.05) in females (0.26±0.01 cm) than males (0.25±0.01 cm). Rib fat was affected by day (P<0.01) and a treatment by temperament interaction (P<0.01). Rump fat was greater (P<0.01) in control (0.37±0.01 cm) than prenatally stressed calves (0.35±0.01 cm). Rump fat was affected by a sex by day interaction, with females having significantly greater rump fat thickness than males on d -56, -28, and 0. The REA, rib fat, and rump fat were characterized with peaks near d -84 to -56. In general, the treatment by temperament interactions were characterized by calm control calves having greater values than calm transported calves, intermediate transported calves having greater values than intermediate control calves, and temperamental control and transported calves having similar values. The major factors influencing preweaning body composition were gender, temperament, and prenatal stress.

Key Words: Body Composition, Calves, Prenatal Stress, Temperament, Ultrasound

92 Effect of growth implant timing on health, performance, and immunity of beef stocker cattle.

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The objective of this study was to determine the effects of growth implant timing (d 0, 14, or 28) on health, performance and immunity in newly received beef calves utilized in a 120 d receiving/grazing stocker system. We hypothesized that efficacy of an exogenous growth promoting implant containing 200 mg progesterone and 20 mg estradiol benzoate is reduced when administered on-arrival when calves are typically experiencing a greater degree of physiological stress. Male beef cattle (n=399; 221 ± 26.6 kg) were received at the UA Livestock and Forestry Research Station near Batesville, AR, and assigned to treatments consisting of: 1) negative control (no growth implant), 2) Synovex S growth implant administered on-arrival (d 0), 3) Synovex S growth implant administered on d 14, and 4) Synovex S growth implant administered on d 28. Calves were stratified by d -1 BW and castrate status, then assigned randomly to pen (8 pens for Blocks 1 and 2, 12 pens for Block 3; 12 to 17 calves/pen). Treatments were replicated 2 times during Blocks 1 and 2, and 3 times in Block 3 resulting in a total of 7 pen replicates for each treatment. On d 0, all cattle underwent standard arrival processing procedures, while growth implants were administered based on treatment assignment. There were no differences ($P \geq 0.16$) in steer BW or ADG during the receiving period; however, overall ADG was greater ($P \leq 0.01$) for implanted treatments, regardless of timing. During the first 21 d of the grazing period (d 42 to 63) of Blocks 1 and 2, steers that were implanted later in the receiving period (d 14 and 28) gained weight faster ($P \leq 0.01$) than control. At the end of the grazing period (d 91 to 120) of Blocks 1 and 2, steers implanted on d 28 gained more rapidly ($P \leq 0.01$) than steers that were not implanted or were implanted on d 0 or 14 ($P \geq 0.12$), indicating that the growth response from implants administered early in the receiving period had decreased at this time, whereas implants administered later (d 28) in the receiving period remained active. Respiratory vaccine response, as indicated by BVDV antibody titer concentration, was not impacted by treatment (P=1.00), nor was clinical BRD morbidity ($P \geq 0.52$). Therefore, under conditions of this study, the time of growth implant administration did not affect growth implant efficacy, health, or vaccine response in beef stocker calves.

Key Words: beef cattle, growth implant, health, performance

93 Effects of increasing levels of distillers dried grains on intake and apparent digestibility of moderate quality fescue Hay.

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Increased ethanol production in the United States has sparked a desire to further investigate the uses of distillers dried grains with solubles (DDGS) as an alternative feedstuff. Limited information is available regarding the use of DDGS as a supplement for cattle consuming a forage-base diet, especially long-stem hay. The objectives of this study were to determine how differing levels of DDGS affects intake and digestibility of moderate-quality, long-stem hay (10.5% CP, 41.5% ADF, 64.6% NDF; DM basis). Three ruminally cannulated Hereford steers (mean BW=629.23±36.0 kg) were housed individually in a covered arena in 4x4 m pens. Steers were assigned randomly to treatment in a replicated 3x3 Latin Square design. Steers were fed 1 of 3 levels of DDGS (33.5% CP, 29.7% NDF; DM basis) as a % of BW (DM basis); levels were 0 (CON), 0.4 (MOD), and 0.8% (HI). Steers had *ad-libitum* hay, water, and trace mineralized block available at all times. Each pd consisted of a 10-d adaptation, 7-d collection, and a 10-d washout pd in which steers grazed a common pasture. During collection, hay intake, total fecal output, and orts were measured daily. Data were analyzed using PROC GLM in SAS; the model included treatment and steer. Hay intake tended (P=0.10) to be greater for CON vs. MOD steers (1.64 vs. 1.44% of BW, respectively). No differences were detected for hay intake for MOD vs. HI; however, hay intake was significantly greater for CON vs. HI (1.33% of BW). Due to greater intake of DDGS compared to the reduction in hay DMI, a linear increase (P=0.04) in total DMI intake was observed with increased DDGS supplementation. DDGS supplementation tended (P=0.08) to affect total tract DM digestibility when fed at the HI level. DM digestibility was greater (P=0.05) for

HI vs. MOD (65.7 vs. 58.6%, respectively) and tended (P=0.06) to be greater for HI vs. CON (57.4%) but did not differ between CON and MOD. These results suggest that feeding DDGS improves overall digestibility of the diet and reduces hay intake; however, DDGS supplementation does not have a 1:1 forage-sparing effect, as the reduction in hay DMI was less than the increase in DDGS supplementation level.

Key Words: DDGS, intake, digestibility, long-stem hay

94 Application of technologies in cattle finishing programs.

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A variety of technologies are available for use in cattle finishing but there is growing concern about the use of technology by the general public and some producers in the cattle industry. To determine the value of adding technology in a finishing program, 60 Angus and AngusX steers were fed in Calan gates. Diets were formulated to 14% CP and were 68% corn silage:32% concentrate during growing and 15% corn silage:85% concentrate during finishing (dry basis). Concentrate was based on corn and soybean meal. Treatments included 1) a control that received a non-medicated feed (C), 2) Rumensin® at 24 mg/kg DM in the 84 d growing period and 36 mg/kg during finishing (R), 3) R plus Revalor-XS® implant (RI), and 4) the same as RI with 8.3 mg/kg DM Zilmax® for 20 d after harvest of the RI cattle followed by a 5 day withdrawal (RIZ). Steers were initially 380 kg, and days on feed was 152 for C, R and RI, and 177 for RIZ. Average daily gain (kg/d) was higher (P<0.05) during the growing period and overall for RI and RIZ than for C or R (1.38, 1.29, 1.99, and 1.82; 1.14, 1.00, 1.63 and 1.60 for C, R, RI and RIZ, respectively). Overall DMI was higher (P<0.05) for RI than for R (10.60, 10.06, 11.45, and 11.23 kg/d for C, R, RI and RIZ, respectively). Overall G:F was higher (P<0.05) for RI and RIZ than for C or R (0.107, 0.098, 0.142, and 0.143 for C, R, RI and RIZ, respectively). Carcass weights were lowest for C and R, higher (P<0.05) for RI and highest (P<0.05) for RIZ (342.9, 331.0, 390.3 and 423.6 kg for C, R, RI and RIZ, respectively). Yield grade was lower (P<0.05) for C and RI than for RIZ (2.88, 3.05, 2.78 and 3.34 for C, R, RI and RIZ, respectively). Ribeye area (cm^2) was higher (P<0.05) for RI and RIZ than for C or R (85.7, 82.9, 94.4 and 95.2 for C, R, RI and RIZ, respectively). Quality grade (17 = low choice, 18 = mid choice) was higher (P<0.05) for RIZ than for RI (17.8, 17.9, 17.3 and 18.3 for C, R, RI and RIZ, respectively). Use of RI dramatically improved performance without reducing quality grade. Use of RIZ allowed additional days on feed with improved carcass weight and quality grade.

Key Words: Cattle, finishing, technology

95 Methodology to measure void space and bulk density of feed ingredients.

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Feeding bulky rations containing large amounts of forage to cattle in confinement creates logistical challenges and reduces the efficiency of feed delivery. Describing void space and bulk density of feed ingredients may improve feeding logistics by allowing formulation to optimize the amount of feed delivered per load with efficient ingredient combinations. Our objective was to develop a rapid method of determining bulk density and void space of commonly used feed ingredients. Sorghum X sudangrass, alfalfa, and wheat straw were individually processed through a commercial tub grinder fitted with a 5 cm screen. Concentrate ingredients included rolled corn and dried distillers' grains (DDG). Bulk density was measured by filling a fixed volume cylinder (15 cm diameter) with each ingredient, and weighing the sample. Ingredients were then compressed within the cylinder using a constant mass plate; change in volume (a function of linear compression) was recorded to calculate void space as a percentage of initial volume. Bulk density was similar for wheat straw (18 $kg \cdot m^{-3}$) and sorghum X sudangrass (33 $kg \cdot m^{-3}$; $P = 0.52$) and greater ($P < 0.01$) for alfalfa (89 $kg \cdot m^{-3}$). The void space of wheat straw (66.4%), hay grazer (62.9%), and alfalfa (28.1%) all differed ($P < 0.04$). Rolled corn and DDG differed in bulk density (657 $kg \cdot m^{-3}$ vs 581 $kg \cdot m^{-3}$; $P < 0.05$), but had a similar void space (1.8 vs 0.4% $P = 0.32$). Concentrates differed from roughages ($P < 0.01$) in both bulk density and void space. In a separate evaluation, sorghum X sudangrass was chopped for 5, 10, 15, 30, and 60 min in a twin-auger vertical mixer to evaluate processing time effects on bulk density and void space. Bulk density increased between 5 min (17.2 $kg \cdot m^{-3}$) and 15 min (24.5 $kg \cdot m^{-3}$; $P < 0.05$) and again from 30 min and 60 min (27.0 $kg \cdot m^{-3}$ to 54.2 $kg \cdot m^{-3}$; $P < 0.01$). Void space did not change ($P = 0.41$) between 5 min and 30 min, but decreased ($P < 0.01$) from 60.7 to 36.1 % when chop time changed from 30 min to 60 min. Use of bulk density and void space data may allow optimization of mixing and reduce delivery costs of high-roughage diets to large numbers of cattle in confinement systems.

Key Words: Bulk density, Confinement feeding, Feed mixing

Small Ruminant Production I

96 Evaluating the impact of breed and pregnancy on body temperature of hair sheep ewes in the tropics.

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Hair sheep are well adapted to the hot, humid tropics. The objective of this study was to evaluate the impact of breed and pregnancy on body temperature and respiration rate (RR) of hair sheep. St. Croix White (STX; n = 9) and Dorper X STX (DRPX; n = 9) ewes (3.6 y of age) were evaluated at 126 d of gestation and at 46 d postpartum. Temperature data loggers recorded vaginal temperature (VT) at 10-min intervals for 96 h. Rectal temperature (RT) was measured using a digital veterinary thermometer and RR was visually measured as breaths per minute (bpm). Ewes were evaluated over 4 d, during gestation and postpartum, in the shade and sun and in the morning (AM; 0900 to 1200 h) and afternoon (PM; 1300 to 1600 h) after a 20 min acclimation to each condition on each day. Data were analyzed using GLM procedures of SAS with breed, pregnancy status, sun exposure and time of day as the main effects. Mean temperature, relative humidity, THI and solar radiation were 27.7 °C, 84.1 %, 79.7 and 234.7 W/m^2, respectively. There was no difference (P = 0.13) in RT and RR between DRPX and STX ewes (38.9 ± 0.2 vs. 38.7 ± 0.2 °C and 77.6 ± 2.2 vs. 72.8 ± 2.2 bpm, respectively). Pregnant ewes had lower RT and higher RR (P < 0.007) than open ewes (38.5 ± 0.2 vs. 39.1 ± 0.2 °C and 79.5 ± 2.2 vs. 72.1 ± 2.2 bpm, respectively). During the PM,

RT and RR were higher ($P < 0.05$) than in the AM (39.2 ± 0.2 vs. 38.3 ± 0.2 °C and 78.3 ± 2.2 vs. 72.1 ± 2.2 bpm, respectively). In the sun, RR was higher ($P < 0.001$) than in the shade, but there was no difference ($P = 0.08$) in RT (88.1 ± 2.2 vs. 62.3 ± 2.2 bpm and 38.6 ± 0.2 vs. 38.9 ± 0.2 °C, respectively). The DRPX ewes had higher ($P < 0.0001$) VT than STX ewes (39.3 ± 0.02 vs. 38.8 ± 0.02 °C, respectively), and pregnant ewes had higher ($P < 0.001$) VT than open ewes (39.2 ± 0.02 vs. 38.9 ± 0.01 °C, respectively). The elevated RR of pregnant ewes may have contributed to the lower RT but did not decrease VT when compared to open ewes. Supported by USDA-NIFA Special Research Projects TSTAR Grant # 2008-34135-19505.

97 Response to increasing levels of soy hull supplementation in hair sheep lambs grazing fescue pasture.

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Growth rates of hair sheep lambs on pasture are moderate and may benefit from strategic supplementation with agro-byproducts. Thus growth rates and gastrointestinal parasite burden in hair sheep lambs of two breeds rotationally grazing predominantly Jesup tall fescue with Max-Q© enodphyte (Pennington Seed, Madison, GA) pasture (12.9 to 14.8% CP; 37.6 to 49.1% ADF; 53 to 62% TDN) in were evaluated Spring. Thirty-two, 6-mo old Barbados Blackbelly and St. Croix ram lambs were allocated to 4 treatment groups balanced by breed, and supplemented with pelleted soy hull (10.0% CP; 50.6% ADF; 52% TDN) at either 0, 1, 2 or 3% BW. Lambs grazed as a single group and were moved to a new pasture strip at 3 to 6 d intervals based on visual appraisal of forage availability. Supplement was fed daily at individual Calan© feeding stations. There was occasional incomplete consumption of soy hull at the 3% supplementation level, resulting in an actual intake of 2.9% BW. Body weight and condition, fecal egg counts and FAMACHA© anemia score (scale 1 to 5; increasing with paleness) was recorded at 14-d intervals and the experiment terminated after 80 d. Data were analyzed with supplement level and breed day as main effects and included starting body weight as a covariate. There were no supplement level by breed interactions. Final BW and ADG increased linearly ($P < 0.01$) from 32.9 to 41.3 kg, and 52 to 157 g/d, respectively, with increasing levels of soy hull supplementation. Final BW and ADG was greater ($P < 0.01$) in St. Croix (38.5 and 122 g/d) than Blackbelly lambs (36.6 kg and 99 g/d). Body condition score was greater ($P < 0.01$) in lambs supplemented with 2 and 3% soy hull than in those with 0 and 1% supplementation. Supplementation and breed had no effect ($P > 0.1$) on fecal egg counts (mean: 548 eggs/g; ranging from 105 to 1194 eggs/g at individual collections) or FAMACHA score (mean: 1.11), and no lambs were treated with anthelmintics before or during the experiment. Results indicated that soy hull supplementation can improve growth performance of hair sheep lambs on pasture, thus reducing the time for lambs to reach a marketable weight.

98 Evaluating the impact of breed, hair coat and pregnancy on sweating rate of hair sheep ewes in the tropics.

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Hair sheep are adapted to hot, humid tropical environments and there is interest in determining what physiological traits contribute to this adaptation. The objective of this study was to evaluate the impact of breed, hair coat, and pregnancy on sweating rate of hair sheep. St. Croix White (STX; n = 9) and Dorper x STX (DRPX; n = 9) ewes (3.6 y of age) were evaluated at 126 d of gestation and again at 46 d postpartum. Each ewe had a 300 cm^2 area on the right flank shaved and the left flank was left unshaved. Sweating rate (SR) was calculated from measured air properties passing over the shaved and unshaved area of the ewes' body by a Bovine Evaporation Meter. Ewes were evaluated over 4 d, during gestation and postpartum, in the shade and sun and in the morning (0900 to 1200 h) and afternoon (1300 to 1600 h) after a 20 min acclimation. Data were analyzed using GLM procedures of SAS with breed, pregnancy status, sun exposure, hair coat and time of day as main effects. Mean temperature, relative humidity, THI and solar radiation on the days of data collection were 27.7 °C, 84.1 %, 79.7 and 234.7 W/m^2, respectively. There was no difference ($P = 0.42$) in SR between STX and DRPX ewes (81.0 ± 3.1 vs. 77.5 ± 3.1 $g/m^{-2}/h^{-1}$, respectively). Pregnant ewes had lower ($P < 0.001$) SR than non-pregnant ewes (70.2 ± 3.1 vs. 88.3 ± 3.1 $g/m^{-2}/h^{-1}$, respectively). Ewes had lower ($P < 0.005$) SR in the morning than in the afternoon (73.1 ± 3.1 vs. 85.5 ± 3.1 $g/m^{-2}/h^{-1}$, respectively). The SR in the shade was lower ($P < 0.001$) than in the sun (67.3± 3.1 vs. 91.2 ± 3.1 $g/m^{-2}/h^{-1}$, respectively). There was no difference ($P > 0.69$) in SR between shaved and unshaved sites (80.1 ± 3.1 vs. 78.4 ± 3.1 $g/m^{-2}/h^{-1}$, respectively). During gestation, SR was not different ($P > 0.22$) between ewes carrying singletons vs. twins (67.7 ± 4.1 vs. 76.2 ± 5.7 $g/m^{-2}/h^{-1}$, respectively). The sweating rate of hair sheep was not influenced by their hair coat which may be part of their adaptation to the high heat and humidity found in the tropics. Supported by USDA-NIFA Special Research Projects TSTAR Grant # 2008-34135-19505.

99 Effects of protein supplementation on growth of parasitized organic lambs while grazing.

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Maintaining growth in grazing lambs is paramount especially when the use of anthelmintics is limited in organic production systems. Previous data collected from the WVU Organic farm have indicated that supplementation with a 16% CP ration at 1% BW maintained growth of lambs comparable to lambs given anthelmintic. Thus, the objective of this study was to determine which of three sources of protein supplement would best support post-weaning growth in parasitized, organic lambs. Spring-born Suffolk crossbred lambs weaned at 90 days were assigned randomly, by weight, to one of three supplementation groups (n=15/group). Group 1 was supplemented with alfalfa pellets (15% CP), group 2 with corn and soybean meal (19% CP) and group 3 with corn, soybean meal and fish meal (19% CP). Protein supplementation began at a rate of 35g/hd/day, equating to approximately 1.28% of BW for lambs in group1 and 1% of BW in groups 2 and 3. Groups were grazed in small plots on predominantly fescue pastures and moved every 3 d without returning to a previously grazed paddock. Data were collected in 2-wk intervals which included BW, FAMACHA and fecal egg count (FEC) and analyzed using the MIXED procedure of SAS. Fixed effects included treatment, period and two-way interactions whereas lamb was used as the random effect. Data reported are least squares means and associated standard error of the LS mean. The 4 wks immediately following weaning were considered a transition period and initial weight, FEC and FAMACHA scores did not vary among groups. Significant differences were observed in ADG where group 1 maintained slight

gains (0.003 ± 0.022 kg/d) while group 3 lost weight (-0.07 ± 0.02 kg/d; $P = 0.02$). No difference in ADG was observed between group 2 (-0.05 ± 0.02 kg/d) and either groups 1 or 3 ($P > 0.05$). For 4 wk after transition no differences were observed in either FEC or FAMACHA indicating an equivalent parasitic load across groups. During this period, ADG significantly increased in group 2 (0.12 ± 0.02 kg/day) and 3 (0.18 ± 0.02 kg/day) compared to group 1 (0.04 ± 0.02 kg/day; $P \leq 0.01$). Average daily gain of group 3 tended ($P < 0.06$) to be higher than that of group 2. These results indicate that under the same level of parasitism, concentrate supplementation with greater rumen bypass protein may support higher growth rates of organic lambs grazing fescue pastures.

Key Words: Organic, Sheep, GIN, Protein

100 Evaluation of forage yield in sequential grazing of cattle and goats under an intensive rotational system.

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Louisiana and the Gulf Coast region have the forage resources needed for livestock production, and one management system that efficiently utilizes this available forage is through the use of sequential grazing. Hence, a study was conducted to evaluate forage yield in sequential grazing of cattle and goats under an intensive rotational grazing system. Thirty six does and 24 Brangus cows were randomly divided into three treatments, goats grazing alone (GGA, control), goats followed by cattle (GFC) and cattle followed by goats (CFG). A total area of approximately 18-ha was divided into one 2-ha and two 8-ha Bermuda-grass *(Cynodon dactylon*) pastures. The one 2-ha pasture was used for the GGA treatment and was divided into two blocks (replicated pastures). Each pasture was sub-divided into 8 grazing paddocks to facilitate intensive grazing using electric fencing. Similarly, each of the 8-ha grazing pasture was sub-divided into two replications and eight paddocks for the CFG and GFC treatments. Animals were moved to new paddocks twice a week. Forage samples were collected bi-weekly to determine plant height and fresh forage yield from July to September, 2013. Dry forage yield was estimated after drying the fresh sample for 72 hours. Forage available for consumption by animals was estimated as the difference of yield of forage before and after grazing each pasture. Data was analyzed using SAS's GLM procedure. Plant height ranged from 15 cm in September to 24 cm in July and was significant ($P < 0.05$) in all treatments and sampling dates. Fresh forage yields ranged from 5,960 ± 838 kg/ha in September to 11,387 ± 838 kg/ha in August. Fresh forage yields were highest ($P < 0.05$) in GGA pastures (9,264 ± 548 kg/ha) and lowest in CFG pastures (5,779 ± 548 kg/ha). A similar trend was observed in dry forage yields. The amount of forage consumed by goats was 330, 1,340 and 2,037 kg/ha, for GFC, CFG and GGA, respectively. Similar results were observed with forage dry matter content except there was no significant difference in forage consumption between CFG and GFC. Although the amount of available forage is much less, preliminary results show that goats in CFG can survive and perform when following cattle in sequential grazing. More data are needed to evaluate the system.

101 Effect of feeding sericea lespedeza leaf meal pellets on Eimeria spp and gastrointestinal nematodes in lambs and kids.

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Infection with internal parasites, including coccidia oocytes and gastrointestinal nematodes (GIN) is the most serious threat to sustainable small ruminant (sheep and goat) production in the United States. Pelleted sericea lespedeza (SL; *Lespedeza cuneata*) has potential as a natural alternative to anthelmintic drugs and coccidiostats for small ruminants. Two 21-day confinement trials were completed with lambs and kids fed 3 pelleted rations at the Fort Valley State University Agricultural Research Station, Fort Valley, GA, during summer, 2013. The diets were 90% SL leaf meal pellets made in 2012, similar SL pellets made in 2013 (similar levels of CP and condensed tannins), and a commercial (control) pellet. In Exp 1, twenty 4-month-old Katahdin-cross lambs (initial coccidia oocytes per gram (OPG) and GIN eggs per gram (EPG) of 670 and 1930, respectively) were group-fed the 3 diets in pens (control, 2012 SL pellets, n = 7; 2013 pellets, n = 6). In Exp 2, sixteen 4-month-old Spanish kids (initial OPG and EPG of 1600 and 1500, respectively) were group-fed the 3 pelleted rations (2012, 2013 SL pellets, n = 5; control, n = 6). All diets were offered ad libitum. For each study, fecal and blood samples were collected from individual animals every 7 days for 21 days to determine OPG and EPG, and packed cell volume, respectively. In lambs, feeding 2013 SL pellets reduced OPG relative to control on day 14 ($P < 0.003$) and EPG on days 7 ($P < 0.03$) and 21 ($P < 0.003$), while the 2012 SL pellet diet tended to reduce EPG on day 14 ($P < 0.10$). In the kids, the 2013 SL pellet-fed animals had less OPG than kids fed the control pellets on days 7 ($P < 0.02$), 14 ($P < 0.003$), and 21 ($P < 0.04$), and tended to have lower EPG on day 7 ($P < 0.06$). The kids given 2012 SL pellets had less OPG than control animals on day 7 ($P < 0.03$) and tended to be less on day 21 ($P < 0.07$), while EPG were lower in 2012 SL-fed kids on day 7 ($P < 0.04$). There was no effect of diet on PCV in either lambs or kids. Feeding SL pellets reduced coccidia OPG and GIN EPG at times in feces of both lambs and kids and can be useful tool for parasite management in small ruminants, although year may affect pellet efficacy.

102 Quebracho tannins aid in the control of Eimeria spp. and alter serum concentrations of trace minerals in lambs.

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The objective was to examine the effects of supplementary quebracho on control of coccidiosis, gastrointestinal nematodes (GIN) and changes in serum concentrations of minerals in naturally infected lambs. Katahdin lambs were weaned in mid-January 2013 at 88 ± 0.4 d of age. Six d later (d 0), lambs were moved to an area to graze wheat/rye pastures. Animals were blocked by gender and randomly assigned to receive 250 g/d of 16% CP supplemental feed with or without 100 g/lamb quebracho daily between d 0 and 28 (n = 10/diet). Fecal oocyst counts (FOC), fecal egg counts (FEC), fecal score (1 = solid pellets; 5 = slurry), dag score (degree of soiling around rear quarters; 1 = clean;

5 = heavily soiled), and packed cell volume (PCV) were determined every 7 d between d 0 and 42 (or 2 wk after treatment ended; PCV between 0 and 28 d). Data were analyzed using mixed models of SAS. The predominant GIN was *Haemonchus contortus* (78-92%). While FOC increased in control lambs by d 7, they were reduced within 7 d in lambs fed quebracho (diet × time, $P < 0.001$). During post-treatment, FOC of control lambs were reduced within 14 d, whereas quebracho fed lambs remained low (diet × time, $P < 0.001$). The FEC were similar between diets between d 0 and 28 ($P = 0.19$), but were lower by d 42 in control lambs (diet × time, $P = 0.002$). The PCV ($P = 0.19$) and fecal score ($P = 0.42$) were similar between groups, but dag score indicated greater soiling initially in quebracho fed lambs (diet × time, $P = 0.01$). Serum concentrations of cobalt, molybdenum, and selenium were reduced by d 28 in quebracho compared with control fed lambs. BW increased more in control compared with quebracho fed lambs (diet × time, $P < 0.001$), but was similar 14 d post-treatment ($P = 0.55$). Quebracho supplementation led to a more rapid reduction in FOC compared with control lambs, but clinical signs of coccidiosis were essentially the same between dietary groups. The supplementary condensed tannin led to a reduction in serum concentrations of cobalt, molybdenum and selenium, which could impact production and health of the animal.

103 Withdrawn by Author.

104 Sire breed differences in pregnancy rate of hair sheep ewes following liquid semen vaginal artificial insemination.

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The experiment evaluated the effect of sire breed and number of inseminations in hair sheep ewes bred by vaginal AI using liquid chilled semen. Mature Barbados Blackbelly and St. Croix hair sheep ewes (n=122), at approximately 3 mo postpartum, were moved from pasture to pens (n=8) in late October and implanted with controlled internal drug release (CIDR) devices for 10 d. At time of CIDR removal, vasectomized teaser rams with marking harnesses were placed in each pen for twice daily estrus detection (0600 and 1800 h). Ewes showing estrus were inseminated without a speculum (shot-in-the-dark) 12 h after first detection of estrus using semen stored at 5°C for 12 h, and half of the ewes, balanced by breed, were inseminated a second time with the same semen after an additional 12 h of 5°C storage. Semen was collected twice daily (am and pm) via an artificial vagina from 4 St. Croix, 5 Blackbelly and 3 Dorset (wool) rams. Semen was extended in a simple UHT skim milk and egg yolk (5% v/v) extender to a final concentration of 350 million sperm/ml, packaged in 0.5 ml straws, and allowed to cool from the collection and processing temperature (28°C) to the storage temperatures (5°C) in a water filled beaker placed in refrigerator.Semen was examined for motility after 12 and 24 h of storage using computer-assisted sperm analysis. Half the ewes were inseminated with semen from Dorset rams, while remaining ewes were bred to sires of like breed. Pregnancy rate to artificial insemination was determined by transrectal ultrasonography 24 d after the last insemination. Effects of AI frequency and breed on pregnancy rate were analyzed using chi-squared test. Estrous response to synchronization (ewes in heat within 4 d of CIDR removal) was 94%. Pregnancy rate was not different ($P = 0.48$) between once or twice inseminated ewes (17 vs. 22%), but higher ($P < 0.01$) using hair sheep than Dorset semen (29.5 vs. 7.5%). There was no difference ($P = 0.60$) in pregnancy rate between dam breeds. There was no difference ($P > 0.1$) in motility of semen stored for 12 and 24 h (78.3 vs. 75.83%) or breed (Blackbelly: 75.4%, Dorset: 80.2%; St. Croix: 75.6%). Pregnancy rates, though lower than we observed in earlier trials during the breeding season, suggested breed type may have a significant effect on the outcome of pregnancy in liquid semen vaginal AI.

Small Ruminant Production II

105 Sustainable year-round forage system for goat production in southern USA.

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A series of experiments were conducted to measure biomass production, animal performance, and to develop sustainable year-round forage production system with sunn hemp, forage soybean or bermudagrass system in the summer-fall, and annual ryegrass (**RG**) or RG + legume (Austrian pea (**AP**), bersim clover (**BC**), and hairy vetch (**HV**)) pasture system in the winter-spring of goat production for the Southeastern U.S. Forty-eight cross breed goats were randomly assigned by initial body weight and placed on 12 paddocks with 2 replicates (n = 4 goats) and spent approximately 45 days in each plot during 2 years. After grazing period, goats were transported to Mississippi State University Meat lab and were slaughtered according to the USDA guidelines and carcass characteristics and traits were determined. Performance and all the data were analyzed using Proc. GLM of SAS. The results indicated that animals on sunn hemp (as a summer-fall forage) or RG + BC combination (as a winter-spring forage) grew 18-44% faster ($P<0.05$) and reached expected slaughter weight in less time when compared to burmugagrass or RG pasture systems, respectively. The sunn hemp in the summer and fall and the RG+ BC for winter and spring grazing systems were the most productive with regards to biomass production and ADG in meat goats. Goats grazing RG+BC and RG+ HV+AP in March, April and May 2011 had higher body weight and carcass ($P<0.05$) weights than other forage combinations. This is probably due to higher nutritive values of forage diets throughout the year. The soil contained significantly higher ($P<0.05$) percent of OM, N, Ca, Mg, Fe, Al and S in the RG + BC clover systems compared to other treatments. Raising goats on sunn hemp was the least expensive system in terms of inputs required and was profitable. The RG + BC or RG + HV system were also comparatively better than the traditional pasture system. The bermudagrass pasture system was found to be the least sustainable because of the need for higher amounts of supplemental feeds. We feel that using proper legume forages for the winter grazing followed by summer forages can provide for profitable year-round foraging system. However, combination of forages used for grazing should be selected to optimize animal performance, enhance the soil property and reduce environmental impacts from animals while reducing dependency on petrochemical fertilizers.

106 The effect of sequential grazing on the performance of does under an intensive rotational system.

R. Marshall, C. Adams, S. Manuel, Y. Ghebreiyessus and S. Gebrelul, Southern University Ag. Center, Baton Rouge, LA*

Grazing cattle and goats together produce more meat per hectare and less parasitic loads resulting in more economic benefit for the producer. One management strategy that influences the efficient utilization of available forage resources is through the use of sequential grazing. This study was designed to study the effect of sequential grazing under an intensive grazing management system for forage utilization and doe performance. Thirty six does and 24 Brangus cows were randomly divided into three treatments, goats grazing alone (GGA, control), goats followed by cattle (GFC) and cattle followed by goats (CFG). A total area of approximately 18 ha was divided into one 2-ha and two 8-ha bermudagrass *(Cynodon dactylon*) pastures. The one 2-ha pasture was used for the GGA treatment and was divided into two blocks (replicated pastures). Each pasture was sub-divided into 8 grazing paddocks to facilitate intensive grazing using electric fencing. Similarly, each of the 8-ha grazing pasture was sub-divided into two replications and eight paddocks for the CFG and GFC treatments. Animals were moved to new paddocks twice a week. Goat BW, hearth girth (HG), BCS (1=thin, 5=fat, BCS), FAMACHA® scores (1=pink, healthy eye, 5=white, anemic,), fecal and blood samples were taken bi-weekly from June to September, 2013. Fecal egg count per gram of feces (EPG) and packed cell volume percent (PCV) were evluated in the lab. Data were analyzed using SAS's mixed model with goats as random effects and treatments as fixed effects. Differences in treatments ($P < 0.05$) were observed in BCS, FAMACHA® and PCV but not in BW, HG or EPG. Goats in GGA were 0.14 and 0.62 points higher in BCS and 0.39 and 0.62 points lower in FAMACHA® than goats in GFC and CFG, respectively. Similarly, goats in GGA were 4.5 and 6.5% higher in PCV than goats in GFC and CFG, respectively. Sixty percent of the goats in GGA had FAMACHA® of 2 or lower as compared to 24 and 10% in GFC and CFG, respectively, the difference being significant ($P < 0.05$). Preliminary results show that goats in GGA performed better in BCS, FAMACHA® and PCV but not in BW, HG and EPG. More data is needed for detailed evaluation of the sequential grazing system.

107 The effect of sequential grazing on the performance of kids under an intensive rotational system.

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Raising goat kids on pastures has economic benefits for the producer but controlling parasitic infections is a challenge. Sequential grazing can reduce parasitic loads and maximize efficient utilization of available forage resources. Therefore, effects of sequential grazing under an intensive grazing management system on kid goat performance were evaluated. Fifty kid goats and 24 Brangus calves were randomly divided into three treatments, goats grazing alone (GGA, control), goats followed by cattle (GFC) and cattle followed by goats (CFG). An area of 18 ha was divided into one 2-ha and two 8-ha bermudagrass *(Cynodon dactylon*) pastures. The one 2-ha pasture was used for the GGA treatment and each of the 8-ha pastures was used for the CFG and GFC treatments. Each pasture was sub-divided into 8 grazing paddocks to facilitate intensive grazing. Animals were moved to new paddocks twice a week. Goat BW, BCS, hearth girth (HG), FAMACHA® score, fecal and blood samples were taken bi-weekly for ten weeks from June to September, 2013. Fecal egg count per gram of feces (EPG) and packed cell volume percent (PCV) were evaluated in the lab. Data were analyzed using a mixed model (SAS) with treatments as fixed effects. Goats in GFC treatment had greater ($P < 0.05$) BCS (2.3 ± 0.1) and PCV (29.3 ± 0.9), and less EPG (129.0 ± 180) than goats in GGA and CFG, respectively. Averages for goats in GGA and CFG were 1.9 ± 0.1, 22.2 ± 0.9 and 919.5 ± 196, and 2.0 ± 0.1, 21.2 ± 0.9 and 693.5 ± 190 for BCS, PCV and EPG, respectively. Goats in GFC were 4.6 and 1.8 kg heavier ($P < 0.05$), and had 5.7 and 1.8 cm greater HG vs. goats in GGA and CFG, respectively. Goats in GFC (2.3 ± 0.1) had less ($P < 0.05$) FAMACHA® than goats in GGA (2.6 ± 0.1), which was less than goats in CFG (3.0 ± 0.1). Less than 5% of the goats in GFC had BCS < 2 as compared to 20% for goats in GGA and 12% for goats in CFG. Sixty five percent of the goats in GFC had FAMACHA® of 2 or less as compared to 30% and 40% for kids in GGA and CFG, respectively. Preliminary results showed that kid goats grazing before calves can improve performance of goats. More data is, however, needed to evaluate the system of sequential grazing.

108 Suitable winter forages for goats: Productivity, quality, and goats' preference.

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Goat production is gaining popularity among many small-scale farmers in Alabama. However, making this business sustainable is a challenge, especially with the existing poor pastures and grazing practices. Not much information is available on suitable forages for improving goat pastures and managing them sustainably. The objectives of this study were 1) to identify suitable winter forages for goats, and 2) to evaluate the productivity and quality of these forages. The study was conducted in Selma and Phenix City, Alabama as a randomized complete block design with three replications in each site. Five treatments: combination of annual ryegrass (*Lolium multiforum*) and one of the selected cool-season legumes (arrowleaf clover, *Trifolium vesiculosum*; berseem clover, *Trifolium alexandrinum*; crimson clover, *Trifolium incarnatum*; hairy vetch, *Vicia villosa*; and winter peas, *Pisum sativum*) and a control of pure annual ryegrass plantings were tested during the cool-season portion of 2012 and 2013 (December/January-April). Forage biomass and quality (acid detergent fiber, ADF; crude protein, CP) before grazing, and forage height both before and after grazing were measured. The average total forage-biomass production for ryegrass-hairy vetch (1.71 ± 0.176 t ha^{-1}) and ryegrass-crimson clover (1.76 ± 0.199 t ha^{-1}) treatments remained higher than other treatments, except ryegrass-peas combination in Selma. The CP content was lower for ryegrass-berseem clover combination (11.5 ± 1.09%) versus ryegrass-crimson clover, ryegrass-peas, and ryegrass-hairy vetch treatments in Selma. However, in Phenix City, the sole ryegrass treatment had lower CP content (13.9 ± 1.02%) compared to ryegrass-crimson clover (16.8 ± 1.02%) and ryegrass-winter peas (17.0 ± 1.02%) treatments. Goats readily ate all types of forages at their first exposure except winter peas, which was eaten well at the subsequent exposures. Both legume and grass heights were significantly reduced after grazing at both study sites. This research showed that ryegrass-crimson clover and ryegrass-hairy vetch combinations can be promising for developing quality winter pastures for goats if the soil type and climatic conditions support the growth of these forages.

Key Words: annual ryegrass, clover, cool-season legumes, rotational grazing, peas, vetch

109 Using webinar short courses to educate small ruminant producers.

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Webinars are teaching tool that can be utilized by extension educators. In particular, they are a means to extend the reach of extension programs to people and places that may lack extension services or access to expertise. In 2011, the University of Maryland Extension Small Ruminant Program initiated webinar short courses as a means of educating producers. Since 2011, five short courses, consisting of two to six individual webinars each, have been held: 1) Ewe and Doe Management (2011); 2) Internal Parasites (2011); 3) Feeding and Nutrition (2012); 4) Foot Health (2012); and 5) Breeding and Genetics (2013). The Foot Health webinar series was held in cooperation with University of Maine Extension, as part of their SARE-funded Sheep Foot Health Research & Education Project. Each webinar lasted for approximately 1 h. An additional h was reserved for questions and comments Most participants logged in from their home computers. Approximately 25% of log-ins included more than one participant. Interaction was via a chat box, which was monitored by a second "expert" who answered questions. All of the webinar short courses were recorded and made available for public viewing via Adobe Connect. The PowerPoint presentations that accompanied each webinar were uploaded to SlideShare (www.slideshare.net/schoenian) and made available for immediate viewing and downloading. Participation in individual webinars varied from 35 to 100 individuals. According to webinar polls, participants were from many Maryland counties, states, provinces, and countries. More than 90% were small farmers who had been raising sheep, goats or both for < than five years. Webinars were promoted via newsletters, web sites, social media, and e-mail. There are 205 subscribers to a webinar listserv, which provides information about upcoming webinars. Follow-up surveys, conducted via SurveyShare (www.surveyshare.com), showed that 90 to 100% of webinar participants learned something new that they planned to apply to their sheep or goat enterprises. On a scale of 1 to10, participants rated the information presented in the webinars as useful (8.8), easy-to-understand (8.8 to 9.0), and interesting (9.0 to 10.0). Webinar short courses have proven to be an effective tool for educating small ruminant producers and will be continued in the future, based on needs and interests of participating producers.

Undergraduate Student Competition

110 Palatability of teff grass by horses.

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Forages commonly used to feed horses in the southeastern US have potential negative aspects including blister beetles or excessive fiber concentrations. Teff grass (T) is a warm-season annual forage that has the potential to be a suitable alternative to bermudagrass and alfalfa hay due to its potential quality and lack of observed disorders. The objective of this study was to compare preference by horses for teff grass harvested under different conditions with that of bermudagrass (B) harvested at 2 maturities. Five mature horses (511 ± 17.4 kg BW) were used to evaluate preference for 6 different forages: T harvested at the late vegetative stage (TLV), T at late bloom that incurred 48 mm of rainfall between mowing and baling (TLBR), T with caryopsis visible (TES), T at soft dough (TSD), and B harvested at late vegetative (BLV) and mid-bloom (BMB) growth stages. A balanced incomplete block experimental design was used such that each forage was offered in combination with each other forage a total of 4 times during a 6-d period, and each horse received a different combination of 4 forages each day. Horses were housed in individual 5.4 × 5.4-m stalls, and the 4 different forages were suspended in hay nets in each corner of their stall. Horses were offered their daily forages at 0830 h daily, and unconsumed hay was removed and sampled at 0630 h daily. Each hay was offered at 50% of the average daily total hay consumption measured during a 5-d adaptation period in order to force horses to choose among remaining forages after consuming preferred forages. Forage preference as measured by individual forage DM consumption (kg and % of total DM consumed across the 4 forages) was greatest ($P < 0.05$) from TLV followed by BLV. Preference (kg and % of total DM consumed) of BMB was greater ($P < 0.05$) than that of TLBR, TES, and TSD, which did not differ from each other ($P \geq 0.60$). When preference was expressed as a percentage of the original amount of DM offered from a particular forage, TLV and BLV did not differ ($P \geq 0.29$) but the other trends remained the same. Therefore, within a specific growth stage, horses apparently preferred teff grass, but effects of maturity and rainfall had a much more dramatic effect on preference by horses.

111 Effect of Hydration Hay™ on water intake, blood urea nitrogen to creatinine ratio and vital signs of horses transported long distances during the summer.

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Dehydration in horses is a serious concern for horse owners and professionals during summers in Texas. Risk of dehydration increases during long-haul transit due to limited water intake. Feeding Hydration Hay™ (HH, Purina Animal Nutrition LLC) is being investigated as a way to potentially avoid dehydration during long haul transit. This compressed hay brick product yields a high-moisture feed when soaked in 4.73 L of water. Ten mature horses were randomly divided into treatment and control groups and were transported together for approximately 9 hours (721 km on Haul 1 and 695 km on Haul 2) on a commercial horse trailer. Mean daily temperature was 33.3°C for Haul 1 and 27.2 °C for Haul 2. The control group was assigned a diet of ad libitum coastal bermudagrass hay (93.1% DM) and the treatment group was supplemented 2 bricks of HH daily (1.20 kg per feeding, 22.5% DM), which was fed for 3 d prior to haul. In a crossover design, control and treatment groups were then reversed and, after a one-week recovery period, the study was repeated. Prior to, at midpoint of, and at completion of each haul, blood samples were obtained for measurement of blood urea nitrogen (BUN) and serum creatinine, and skin turgor and capillary refill time (CRT) were recorded. Additional blood samples were obtained for analysis

of BUN and serum creatinine on the first and second days following the hauls. Daily voluntary water intake was measured beginning three days prior the haul, on the day of the haul, and for the two days following the haul. Overall water intake accounted for water offered in HH. Data were analyzed using the MIXED procedure of SAS. Treatment did not affect ($P \geq 0.17$) BUN, serum creatinine, or BUN:serum creatinine. Skin turgor and CRT were not affected ($P \geq 0.25$) by treatment. Overall water intake of HH horses was 3.3 L/d greater ($P < 0.01$) than control; while voluntary water intake was 6.6 L/d lower ($P < 0.01$) for HH horses. There was also a treatment × day interaction ($P = 0.02$) for voluntary water intake. Three days prior to hauling there were no differences ($P = 0.24$) in voluntary water intake, whereas on the day of transport, HH horses consumed 12.4 L less ($P < 0.01$) than control horses. However, when accounting for water provided in HH, overall water intake the day of transit was not different ($P = 0.56$) between treatments. Results indicate that offering HH promotes increased water intake without affecting blood metabolites.

112 Neuropeptide and adipokine gene expression profiles differ between lean and obese Mangalica pigs.

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Alabama is at the epicenter of an obesity epidemic precipitating increased incidences of type 2 diabetes. To study the underlying mechanisms linking obesity and diabetes, the Mangalica pig was imported to Auburn University given its extreme, early onset, morbidly obese phenotype. Energy balance is regulated both by the brain through effects on hunger and metabolic rate and by adipose tissue though adipokines such as leptin and proinflammatory cytokines crosstalk with the brain. Our objectives were 1) to determine if the extreme obesity in the Mangalica breed is associated with a metabolic phenotype and 2) to examine how obesity alters expression of key neuronal satiety factors and adipokines that are known to act on the brain or influence peripheral energy metabolism. To achieve this, a growth trial was conducted where obese and lean groups were created by either allowing *ad libitum* access to feed or restricting energy intake to 65% of *ad libitum* levels. Circulating glucose was measured in whole blood samples taken from pigs following fasting or administration of an oral glucose dose. Body composition was then determined and hypothalamic (ARC) and subcutaneous adipose tissues (SC) were harvested. Total RNA extracted from these tissues was used to synthesize cDNA which then facilitated gene expression studies using real-time PCR. Obese pigs exhibited 2.5-fold greater SC mass ($P < 0.001$) but no differences in muscle mass ($P < 0.39$) compared to lean counterparts. Obese pigs exhibited severe fasting hypoglycemia and impaired glucose tolerance following oral glucose challenge suggesting development of insulin resistance. The mRNA expression of orexigenic factors, neuropeptide-Y and agouti-related protein, was 58- and 2.95-fold higher while mRNA for the proinflammatory cytokines, tumor necrosis factor-alpha and interleukin-6, was 2.2- and 1.44-fold higher respectively in ARC of obese versus lean pigs ($P < 0.01$). Expression of interleukin-6, tumor necrosis factor-alpha, leptin, adiponectin, and relaxin were 4.72-, 3.74-, 1.51-, 2.79- and 2.96-fold higher respectively in the SC of obese versus lean Mangalica ($P < 0.01$). These data provide evidence that obese Mangalica pigs indeed develop a metabolic phenotype consistent with insulin resistance and this is associated with a proinflammatory shift in gene expression in SC and a pattern of gene expression in the ARC that is consistent with hyperphagia and leptin resistance.

113 Relationship between circulating concentrations of bovine pregnancy associated glycoproteins (bPAGs) and embryonic growth during early gestation.

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Reproductive success is an economically important trait in the beef industry, and failure to maintain a pregnancy can occur at various stages during gestation. The mechanisms associated with these losses remain unclear; however decreased placental function is a likely cause. Binucleate trophoblast cells constitute 15-20% of the ruminant placenta trophoblast population, appear around d 19-20 of gestation in cattle and secrete bPAGs. Bovine PAGs are commonly used to diagnose pregnancy success and have recently been reported as a potential marker/predicator of embryonic mortality during the time of placentation in beef cows (Pohler et al., 2013a,b). Cows undergoing pregnancy failure between d 28 to 70 of gestation have significantly lower circulating concentrations of bPAGs at d 28 compared to cows that maintain pregnancy. The objective of this study was to examine the relationship between fetal size/growth and circulating concentrations of bPAGs, at d 35 and d 53 of gestation. Postpartum suckled beef cows (n=82) were inseminated artificially at a fixed time following synchronization of ovulation. Pregnancy was determined on d 35 and d 53 via real-time ultrasonography, and measurements of fetal crown rump length and fetal width were measured along with collection of serum samples (bPAG, progesterone) from all pregnant cows (n=37). Cows with increased circulating concentrations of progesterone on d 35 resulted in a significant increase in crown rump length on d 53 ($P < 0.05$), embryo volume on d 53 ($P < 0.05$), and embryo growth rate between d 35 and 53 ($P < 0.05$). However, there was no relationship between circulating concentrations of bPAGs and any measures of fetal growth on d 35 or 53, In summary decreased bPAG secretion in cows not maintaining pregnancy is most likely reflective of poor placental function and not due to a decrease in the size of the fetus alone.

114 Magnesium bioavailability from dolomitic limestone using ram lambs.

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Bioavailability of calcium from dolomitic limestone has been evaluated previously, but little information is available about the bioavailability of its magnesium. Our objective was to determine the bioavailability of magnesium from dolomitic limestone ground to two different particle sizes. Twenty intact ram lambs (35.3 ± 0.54 kg initial BW) were allocated randomly to one of four treatments: control (no supplemental magnesium; CON), magnesium oxide (MGO), fine-ground dolomite (FMG) or coarse-ground dolomite (CMG). Rams were fed a total mixed basal diet of cottonseed hulls, corn and cob meal, urea, and soybean oil at 2% of BW in two meals daily at approximately 0800 and 1630 h. Mineral supplements were hand-mixed into individual rations immediately before feeding. Rams were housed in individual pens for a 6-d adaptation period. Thereafter, four lambs per treatment were placed in individual metabolism crates for an additional 6-d adaption followed by 7 d of total

fecal and urine collections. The additional one lamb per treatment remained in its individual pen for a 6-d adaptation period followed by 7 d of total fecal collection using fecal bags. Mineral concentrations of feed, feces, urine, and mineral supplement were determined by inductively coupled plasma atomic emission spectroscopy. Data were analyzed using PROC MIXED of SAS, where animal served as the experimental unit. Magnesium intake was greater ($P < 0.05$), and fecal Mg excretion (g/d) tended to be greater ($P < 0.10$), from FMG, MGO and CMG compared with CON. Urinary Mg excretion (g/d), and Mg apparently absorbed (g/d and g/g) or retained (g/d, g/g and g/g absorbed) were not different ($P \geq 0.21$) across treatments. Calcium intake was greater ($P < 0.05$) from FMG and CMG compared with MGO and CON, but fecal excretion, apparent absorption, and apparent retention of Ca were not different ($P \geq 0.12$) among treatments. Intake, apparent absorption, and apparent retention of P was not different ($P \geq 0.49$) among treatments. Although lambs were offered a diet at a constant percentage of body weight, lamb-to-lamb variability was quite large in the mineral balance estimates. Therefore, dolomitic limestone exhibited the same effectiveness as magnesium oxide as a magnesium supplement, but none of the magnesium sources differed from the control.

Key Words: dolomite, magnesium, mineral bioavailability

115 Influence of ambient temperature on exercise performance in young horses.

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Heat stress affects many livestock species, but horses are a particular concern due to the regular exercise they receive. To determine the influence of ambient temperature on exercise performance in young horses, fourteen Quarter horses (2 to 5 yr; 338 to 540 kg) were utilized in a randomized complete block design. Horses were blocked by BW, age, and sex and randomly assigned to one of two groups that included horses performing a 25 min standardized exercise test at either 0600 h (AM; n=7) or 1300 h (PM; n=7). The ambient temperature for the AM group was 23.31°C, while the ambient temperature for PM group was 34.70°C. Whole blood lactate (LAC) and clinical parameters including heart rate (HR), respiration rate (RR), rectal temperature (RT), and ocular temperature (OT), were obtained prior to the onset of exercise (0 min) and immediately following (25 min) exercise. Differences after exercise (25 min) were determined using the PROC MIXED procedure in SAS utilizing the corresponding onset (0 min) value as a covariate to account for differences in initial heat load prior to exercise. At 25 min, no differences were detected in either HR or RR ($P > 0.12$). Following exercise, OT was greater ($P < 0.01$) in the PM group (39.94±0.41°C) compared to the AM group (38.27±0.41°C). Additionally, the PM group had a numerically higher ($P = 0.12$) RT after exercise than the AM group. This was also seen in LAC values where the PM group (11.75±2.18 mMol/L) had a higher numerical value ($P = 0.12$) than the AM group (5.90±2.18 mMol/L). No differences were detected in HR or RR following exercise, suggesting that these horses were of similar fitness levels. The greater OT and numerically greater RT suggest that horses exercising in the PM group may have had an impaired ability to dissipate heat due to the higher ambient temperature. During exercise, LAC values of above five indicate that the animal is entering a state of anaerobic metabolism. In the current study, the PM group had a LAC value well above the threshold for anaerobic metabolism. This suggests that these animals exercising at a higher ambient temperature may require an increased recovery time due to the increased demands of anaerobic metabolism. Understanding the physiological responses of exercise at different temperatures may enable industry professionals to adapt daily exercise regimens to better prepare the equine athlete to perform at their full potential.

116 The alleviation of pain associated with disbudding.

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Disbudding, the removal of the horn buds of a calf, is a necessary management procedure because it eliminates costs associated with horns and improves safety. However, disbudding is known to cause pain and distress in calves. Extra-label use of some pharmaceuticals allows for some of the alleviation of the pain and distress, but it is not the best way. A FDA-approved pharmaceutical would be the best option to alleviate the pain and distress, however one does not exist. Therefore, pharmaceuticals are often used extra-label to alleviate pain and distress. This study evaluates the effectiveness ethyl alcohol (EtOH) to produce a cornual nerve block, when the area surrounding the horn is numb. To test this, calves were given 1 of 4 treatments: 5 ml saline solution (SAL), solution mixture of 2.5 ml 2% Lidocane and 2.5 ml 75% EtOH (MIX), or 5 ml 75% EtOH (ALC). The calves were needle pricked in the area surrounding the horn bud at 5, 10, 15, 20, 30, and 60 minutes after the treatment on day 1 to determine the onset of the cornual nerve block. To test the duration of the cornual nerve block they were pricked once daily from days 2 - 14. The behavioral response to the prick test was evaluated as either “blocked” or “not blocked”. “Blocked” was defined as no movement in response to the prick test, and “not blocked” was defined as pulling on halter, throwing head back, backing away from handler, or falling down. The study found that SAL calves exhibited “not blocked” behaviors at all needle pricking time points; all other treatments exhibited initial “blocked” behaviors at 5 minutes post-treatment. The study also found that the MIX and ALC treatments were effective at maintaining a cornual nerve block for 2 weeks when needle pricked daily from days 2-14. These results indicate there is potential in utilizing EtOH as a form of non-restricted pain relief for disbudding calves, which would be beneficial for management practices on farms today. Future research incorporating the removal of the horn buds after EtOH administration will further evaluate the effectiveness of EtOH as a cornual nerve block.

117 Hair shedding scores relating to maternal traits and productivity in beef cattle.

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The objective of this study was to measure variation in hair coat shedding and determine if any relationships existed between coat shedding and production traits in cows managed at the University of Arkansas beef research unit near Fayetteville. Angus based commercial beef cattle (n = 199) were observed over a five-month period in 2012. Once monthly, at approximately 28-day intervals, mature cows and replacement heifers were evaluated for shedding on a scale

from 1 to 5. A score of 5 indicated the cow/heifer had a full winter coat and a score of 1 represented a slick, short summer coat. For each cow, the first month a score of 3 (approximately 50% shed) or less was reached was considered the month of first shedding (MFS), and MFS were observed for April, May, June or July. Data for calf birth weight (BRWT) and adjusted weaning weight (WWT), cow BW at pre-breeding, cow BCS at pre-breeding and pregnancy rate were analyzed with mixed model procedures. The model included the fixed effects of MFS and sire breed and cow/heifer was considered random. Observed MFS was highest for June (84%), followed by May (10%), July (3.5%) and April (2%), respectively. Mean BRWT was highest ($P = 0.012$) for cows with MFS in May and lowest for cows with MFS in July. Mean WWT was similar ($P = 0.75$) for cattle with MFS in April, May, June and July (193 ± 17.3, 198 ± 5.6, 205 ± 2.1 and 193 ± 12.3 kg, respectively). No differences for MFS were found in mean BCS of cows at pre-breeding. Mean BW at pre-breeding was highest ($P = 0.002$) for cows with MFS in May (537 ± 15.9 kg) and lowest in cows with MFS in July (398 ± 32.3 kg). In these data, shedding score had no impact on pregnancy rates. Shedding of the winter hair coats were related to maternal BW at pre-breeding during the production year and also related to BRWT. These data suggest that the time of hair coat shedding in the production cycle may be an indicator of general well-being in beef cattle.

Key Words: Hair Shedding Scores, Maternal Traits, Beef Cattle

118 Isoflupredone acetate as ancillary therapy for bovine respiratory disease in high-risk stocker calves.

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The objective of this study was to evaluate the use of isoflupredone acetate as ancillary therapy in the treatment of bovine respiratory disease. Crossbred beef steers (n = 103; BW = 200±4.2 kg) were acquired from regional auction markets and were transported to the University of Arkansas Stocker and Receiving Cattle Unit located near Savoy. Calves were observed daily for signs of respiratory illness, and antibiotic treatment was administered if calves displayed signs of illness and rectal temperature was ≥40°C. Calves (n = 31) requiring antibiotic treatment for respiratory illness were assigned randomly to either treatment 1 (injection of florfenicol) or treatment 2 (injection of florfenicol with isoflupredone acetate). Treatments occurred between d 4 and d 14 of the study. Both treatment groups were rechecked 48 h post treatment to determine treatment efficacy. Blood was collected twice (treatment and recheck) via jugular venipuncture to evaluate complete blood count. Weights were recorded on d 0, 14, 28, 45, and 46. No difference in ADG ($P = 0.52$) or rectal temperature ($P \geq 0.73$) was evident among treatments. Calves that did not receive isoflupredone acetate tended to have a greater repull rate ($P = 0.10$) and had a numerically greater ($P = 0.63$) medical cost. No difference existed in overall white blood cell count or lymphocytes at initial treatment ($P = 0.91$ and 0.72, respectively) or recheck ($P = 0.73$ and 0.23, respectively). Upon recheck, neutrophils tended to decrease to normal for calves that received only antibiotic therapy but remained above normal for calves that also received isoflupredone acetate ($P = 0.10$). At recheck, the neutrophil to lymphocyte ratio was greater ($P = 0.03$) in calves that received isoflupredone acetate. Monocytes at recheck were greater ($P= 0.02$) in calves that did not receive isoflupredone acetate. Results indicate that fewer calves required subsequent antibiotic treatment when receiving an injection of isoflupredone acetate. Further investigation of isoflupredone acetate is needed to evaluate effects on treatment cost and post treatment gains in newly received stocker calves.

Key Words: bovine respiratory disease, ancillary therapy, isoflupredone acetate

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1990	Virgil Hays	Kentucky
1989	Frank Baker	Arkansas
1988	Clarence B. Ammerman	Florida
1987	Lowell E. Walters	Oklahoma
1986	Lemuel Goode	North Carolina
1985	O.M. Hale	Georgia
1984	L.C. Ulberg	North Carolina
1983	C.J. Brown	Arkansas
1982	W.C. McCormick	Georgia
1981	Elliot R. Barrick	North Carolina
1980	J.A. Whatley, Jr.	Oklahoma
1979	Marvin Koger	Florida
1978	Thomas J. Marlowe	Virginia
1977	Sam Hansard	Tennessee
1976	J.C. Hillier	Oklahoma
1975	J.K. Riggs	Texas
1974	T.J. Cunha	Florida
1973	O.D. Butler	Texas
1972	George W. Litton	Virginia
1971	Ray H. Dutt	Kentucky
1970	Robert C. Carter	Virginia
1969	Henry H. Leveck	Mississippi
1968	Wesley P. Garrigus	Kentucky
1967	Byron L. Southwell	Georgia
1966	Charles S. Hobbs	Tennessee

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2006	Allen F. Harper	Virginia
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2004	Roger L. McCraw	North Carolina
2003	Darrh Bullock	Kentucky
2002	Warren Gill	Tennessee
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2000	Tom R. Troxel	Arkansas
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1990	Joe Hughes	Oklahoma
1989	Henry Webster	Clemson
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1987	H. John Gerken, Jr.	Virginia
1986	M.K. Cook	Georgia
1985	W.G. Luce	Oklahoma
1984	Charles Cooper	Virginia
1983	C.W. Absher	Kentucky
1982	C.M. Triplett	Georgia
1981	Arden N. Huff	Virginia
1980	A.L. Eller, Jr.	Virginia

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2011[1]	J. Chance Brooks	Texas Tech
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2007[1]	L. Anderson	University of Kentucky
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2006[1]	Michael L. Looper	USDA, ARS
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1992[1]	David S. Buchanan	Oklahoma State University
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1991[2]	Wayne Greene	Texas A&M University
1990[1]	J.W. Mabry	University of Georgia
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1988	S.B. Smith	Texas A&M University
1987	D.L. Thompson, Jr.	Louisiana State Univ.
1986	G.J. Hausman	USDA, ARS, Athens, GA
1985	J.W. Savell	Texas A&M University
1984	D.R. Notter	VPI & SU
1983	T.S. Stahly	University of Kentucky
1982	D.N. Marple	Auburn University

[1]Education
[2] Research

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2011	Mark Estienne	Virginia Tech
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2008	Sung Woo Kim	North Carolina State Unversity
2007	Chad O'Gormon	Texas A&M University
2006	Jeffery A. Carroll	USDA, ARS
2005	Zelpha B. Johnson	University of Arkansas
2004	Jason Apple	University of Arkansas
2003	Theo van Kempen	North Carolina State University
2002	Kim Cole	University of Arkansas
2001	G. E. Conatser	University of Tennessee
2000	Not given	
1999	Not given	
1998	Robert A. Cushman	North Carolina State University
1997	M. Todd See	North Carolina State University
1996	William L. Flowers	North Carolina State University
1995	M. Todd See	North Carolina State University
1994	Robert Dove	University of Georgia

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2006	L. R. Legleiter	Orlando	North Carolina State University
2005	M. 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
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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
1984	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
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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
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1963	C.B. Ramsey	Memphis	University of Tennessee
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Year	Awardee	Place of Meeting	University
2013	A. Arellano	Orlando	Texas A&M University
2010	W. N. Tapp III	Orlando	University of Arkansas
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2008	C.R. Boldt	Dallas	Texas A&M University
2007	K. Starkey	Mobile	University of Arkansas
2006	D. Sykes	Orlando	Mississippi State University
2005	N. Burdick	Little Rock	Texas A&M University-Kingsville
2004	J. L. Roberts	Tulsa	Oklahoma State University
2003	M. Seitz	Mobile	Mississippi State Univ.
2002	B. Spader	Orlando	University of Missouri
2001	R. Horsley	Ft. Worth	Virginia Polytechnic Univ.
2000	B. Robbins	Lexington	Virginia Tech
1999	J. L. Bardugone	Memphis	Virginia Tech
1998	S. F. Flohr	Little Rock	Virginia Tech
1997	T. M. Weick	Birmingham	Louisiana State Univ.
1996	K. J. Goodson	Greensboro	Texas A&M University
1995	B. C. Bloom	New Orleans	Auburn University
1994	Beth Good	Nashville	Oklahoma State University
1993	C. J. Kirby	Tulsa	North Carolina State University

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2011	R. S. Fry	North Carolina State University
2010	Christina Taylor-Edwards	University of Kentucky

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

AUTHOR INDEX

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