abstracts

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ABSTRACTS
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Breeding and Genetics

1   Relationships between feed utilization and performance traits in developing Angus heifers. B. L. Winslow*, J. P. Cassady, M. H. Poore, C. S. Whisnant, G. B. Huntington, K. A. Gray, and G. R. Hansen, *North Carolina State University*, *Raleigh*.

The objective of this study was to evaluate relationships of feed utilization with performance traits in Angus heifers. Data were collected over 3 yrs (2006-2008) at the Upper Piedmont Research Station in Reidsville, NC. Year 1 heifers (n = 49) began the feeding trial at age 299 ± 3.2 d, weighing 270 ± 4.9 kg, and Year 2 heifers (n = 54) began at age 286 ± 2.8 d, weighing 290 ± 4.8 kg. Year 3 heifers (n = 53) began at age 256 ± 2.5 d, weighing 250 ± 3.2 kg. Heifers were allowed a 2-wk period of adaptation to Calan® gates and the roughage-based ration (target gain rate of 1 kg/d). Following adaptation, heifers began an 84-day test. Feed offered was recorded daily and body weights were taken every 14 d. Linear regression of weight on time was used to estimate ADG. Residual feed intake (RFI) was calculated with a model including the dependent variable DMI/d, fixed effect of year, and regression covariates 42-d midweight and ADG. Means and SE for ADG and DMI were 0.93 ± 0.014 kg and 6.70 ± 0.107 kg/d, respectively. Average feed conversion ratio (FCR; DMI/d /ADG) was 7.41 ± 0.157. At the beginning, middle, and end of the test ultrasound scans were taken and hip heights recorded. Partial correlation coefficients adjusted for year were found to be 0.30 (P < 0.01) between RFI and FCR and 0.40 (P < 0.01) between RFI and DMI/d. No phenotypic correlations between RFI and ultrasonic measurements of body composition or hip height were statistically different from zero. Heritabilities of RFI, ADG, DMI/d, and FCR were found to be 0.22 ± 0.199, 0.52 ± 0.216, 0.68 ± 0.213, and 0.38 ± 0.215, respectively. DMI/d and FCR were not genetically correlated. Genetic correlations of ADG with DMI/d and FCR were 0.84 and -0.88, respectively. Genetic correlations of RFI with ADG, DMI/d, and FCR were 0.79, 0.84, and 0.75, respectively. It was concluded that an unfavorable genetic correlation exists between ADG and RFI. This result was surprising as previous studies have concluded that the genetic correlation between RFI and growth rate was either zero or favorable. Thus, further investigation of the genetic relationship between these traits is needed.

Key Words: Feed efficiency, Beef cattle, Residual feed intake

2   Effects of breed and diet on beef quality characteristics. T. N. Rojas*[1], H. A. Brown[1], F. W. Pohlman[1], M. A. Brown[2], Z. B. Johnson[1], P. Dais-Morse[1], L. McKenzie[1], and L. Mehall[1], [1]*University of Arkansas*, *Fayetteville*, [2]*Grazinglands Research Labratory*, *El Reno, OK*.

Progeny from 6 grandsire breeds were utilized to evaluate grandsire and sex effects for sensory characteristics. Fed progeny resulted from a post-weaning management system studying the effects of forage versus conventional feeding practices. Fatty acid profiles (FA), Warner -Bratzler shear force (WB), cook loss (C), moisture content (M) and sensory myofibrillar tenderness (MYO), connective tissue (CON), overall tenderness (OT), juiciness (J), beef flavor (BF) and off flavor (OF) were assessed. Longissimus muscles from heifers fed concentrate diets required more (P<0.05) force to shear than muscles from heifers fed a forage diet. Furthermore, longissimus muscles from heifers on a concentrate ration required more (P<0.05) energy to shear than for heifers on a forage diet and steers on either feeding regimen. Grandsire breed and feedtype interacted (P<0.05) to affected MYO, OT, BF, and OF sensory traits. Evaluated CON was impacted (P<0.05) by grandsire breed. The ranking for connective tissue from most to least was Romosinuano (6.21)> Charolais (6.23)> Gelbvieh (6.43)>Bonsmara (6.51)> Brangus (6.53). Additionally, a grandsire breed and sex of animal interaction (P<0.05) influenced MYO and OT sensory characteristics. These implications suggest that programs should consider the significance of grandsire effects on sensory attributes.

Key Words: Sensory characteristics, Carcass, Sire breeds

3   Relationship of fecal egg counts and temperament scores to prolactin promoter polymorphisms in Angus calves. A. R. Starnes*, A. H. Brown, Jr., Z. B. Johnson, J. G. Powell, J. L. Reynolds, and C. F. Rosenkrans, Jr., *University of Arkansas*, *Fayetteville, AR*.

The objective of this study was to determine the relationship between single nucleotide polymorphisms (SNPs) of the prolactin promoter, temperament scores and fecal egg counts of internal parasites in purebred

Angus calves (n=110). Data was collected over a four year period (2005-2008) and includes chute scores, BW, and fecal egg counts at d 0, 21, 66, 111, 156, 201, and 246. All calves used were spring born and treated with anthelmintic at weaning in the fall. Calves were genotyped using genomic DNA prepared from buffy coat and our previous published primers. Genotypes were homozygous cytosine (n=9), heterozygous (n=80), and homozygous thymine (n=21). Prolactin genotype was related ($P < 0.05$) to nematodirus egg counts at weaning (9 vs 1, and 7 eggs per gram for CC, CT, and TT, respectively). The prolactin genotype did not show a significant relationship to any other traits considered. However, the age of the calf at the time of fecal sampling did show a relationship to strongyle egg counts at d 0 ($P = 0.05$), d 66 ($P < 0.05$), and d 111 ($P < 0.05$). The results suggest a need for a larger sample size for each year in the study to test the relationships between prolactin genotypes, fecal egg counts, and temperament scores in Angus calves.

Key Words: Prolactin, Internal parasites, Chute score

4   Health measures in beef steers of known genetic background following BVDV challenge. C. A. Runyan*[1], A. D. Herring[1], J. F. Ridpath[2], M. S. Cabaniss[1], C. T. Muntean[1], and J. E. Sawyer[1], [1]*Texas A&M University*, *College Station*, [2]*USDA-ARS*, *Ames, IA*.

Angus-sired steers (n = 95) born in the spring of 2008 produced from TAMU McGregor Genomics Project cows were evaluated for health measures following challenge to BVD virus. Steers were not vaccinated for BRD prior to trial initiation, and were verified to be BVD-free. Prior to BVDV challenge, steers were assigned to BRD vaccination treatments (VACTRT) of killed (KV; n = 29), modified-live (MLV; n = 34) or non-vaccinated (NON; n = 31) with sires and genomics cow families stratified across VACTRT. On d -56, KV steers were administered their first injection; on d -35, KV steers were administered a booster injection and MLV steers were administered their only injection. On d 0, all steers were given an intranasal challenge with BVDV strain CA0401186a (Type1b) from the National Animal Disease Center. Serum neutralizing IgG titers for IBR, BVD Type1 (BVD1) and BVD Type2 (BVD2) were evaluated on d -56, -35, 0, 14, 28, and 42. Weights and rectal temps were collected on these days as well as d 1, 3, 7, and 10. Rectal temperature (RTEMP) and IgG titers (log base 2 transformed) were analyzed through mixed model procedures as repeated measures with VACTRT, day, VACTRT × day, sire, and VACTRT × sire in the models. Differences in RTEMP were observed (P < 0.05) due to VACTRT, day, VACTRT × day, and sire. Peak RTEMP was observed on d 7 (39.6 ± 0.05° C). At d 7 MLV steers had lower (P < 0.05) RTEMP (39.2) than KV or NON steers (both 39.8). Differences in BVD1 and BVD2 titers showed similar patterns with VACTRT, day, VACTRT × day, and sire accounting for variation; a VACTRT × sire interaction was present for BVD1 (P = 0.08) that was not present for BVD2 (P = 0.50). IBR titers showed large differences due to VACTRT, day and VACTRT × day, but not sire or VACTRT × sire. KV steers had higher (P < 0.05) titers for IBR, BVD1, and BVD2 than MLV steers, which in turn were higher (P < 0.05) than titers of NON steers. On d 0, KV and MLV steers had equal BVD1 titers, but KV steers had higher BVD2 than MLV steers. There were large titer differences among individuals in all VACTRT, and it appears substantial genetic variation exists in response to BRD vaccines.

Key Words: BVD, Health, Genetics

5   Feed intake and weight gain in beef steers of known genetic background following BVDV challenge. C. A. Runyan*[1], A. D. Herring[1], J. F. Ridpath[2], M. S. Cabaniss[1], C. T. Muntean[1], and J. E. Sawyer[1], [1]*Texas A&M University*, *College Station*, [2]*USDA-ARS*, *Ames, IA*.

Angus-sired steers (n = 95) born in the spring of 2008 produced from TAMU McGregor Genomics Project cows were evaluated for individual feed intake and ADG for 42 d following challenge to BVD virus. Steers were not vaccinated for BRD prior to trial initiation, and were verified to be BVD-free. Prior to BVDV challenge, steers were assigned to BRD vaccination treatments (VACTRT) of killed (KV; n = 29), modified-live (MLV; n = 34) or non-vaccinated (NON; n = 31) with sires and genomics cow families stratified across VACTRT. On d -56, KV steers were administered their first injection; on d -35, KV steers were administered a booster injection and MLV steers were administered their only injection. On d 0, all steers were given an intranasal challenge with BVDV strain CA0401186a (Type1b) from the National Animal Disease Center. Cattle were weighed on d 0, 14, 28 and 42 following challenge. Rectal temperature (RT) was used to evaluate health status; steers over 40.0° C were treated with an antimicrobial. Cattle were fed by hand daily in 4 pens equipped with GrowSafe feed bunks. Daily feed intake (DFI) was analyzed (as fed) through mixed model repeated measures with a model that included VACTRT, day, VACTRT x day, pen, maternal grandsire (MGS) and VACTRT x MGS. Large differences were observed in DFI due to VACTRT, day, and VACTRT x day. MLV steers consumed approximately 0.5 kg more than KV and NON steers. The most substantial differences in DFI across VACTRT appeared to occur from d 7 to 10 following challenge with NON steers consuming 0.8 to 3.1 kg less that vaccinated steers. Differences in DFI were also seen due to MGS with a difference of 1.4 kg across MGS means (11.4 ± 0.14 to 12.8 ± 0.14, as fed) and VACTRT x MGS with a range of 0.4 to 1.0 kg across VACTRT within MGS groups. DFI was also compared between steers with > 40.0° C RT within 14 d following challenge and those ≤ 40.0° C; steers > 40° C RT consumed 0.4 to 3.9 kg less DFI during d 7 to 10. ADG was evaluated for the 3 14-d periods due to VACTRT, pen, MGS, VACTRT x MGS and d-0 weight as a covariate, but no differences existed due to VACTRT or MGS in any period.

Key Words: BVD, Feed intake, Genetics

6   Penalization of records in genetic analyses of FAMACHA©️ scores of Merino sheep. D. G. Riley*[1] and J. A. Van Wyk[2], [1]*Texas A&M University*, *College Station*, [2]*University of Pretoria*, *Onderstepoort, South Africa*.

Internal parasites such as *Haemonchus contortus* cause production loss and death of sheep worldwide. FAMACHA©️ (**Fc**) scores are subjective clinical color assessments of the ocular conjunctivae from 1 to 5; higher scores indicate lighter color, and hence, more anemia and higher worm burden. Treated sheep often have better scores than if not treated, but exclusion results in loss of useful information. The objective was to evaluate record penalization methods in Fc genetic analyses. Monthly scores for Merino lambs (n = 1671) in a South African flock were recorded for 5 summers. Moderate and heavy worm challenge times were determined from flock treatment records each year. Animal models included year, sex and age in days as a linear covariate. Separate single-trait analyses were conducted in which records of treated lambs were 1) included without modification, 2) excluded, or penalized by 3) adding the average improvement of Fc score, 4) assigning, in turn, Fc values of 5 through 10. In moderate worm challenge, estimates of heritability ranged from 0.07 ± 0.04 (records of treated lambs excluded) to 0.16 ±

0.04 (records of treated lambs given values of 6, 7, 8, 9, or 10). In heavy worm challenge, estimates of heritability ranged from 0.17 ± 0.05 (no penalization) to 0.23 ± 0.05 (penalties were Fc values of 5). Assigning any Fc value 6 through 10 to records of treated lambs resulted in lower estimates (0.19 to 0.22). In both worm challenge levels, breeding values produced when no penalties were included were moderately correlated with those from penalized data (correlation coefficients ranged from 0.3 to 0.75) and ranked somewhat differently (correlations ranged from 0.33 to 0.83). Use of any penalty resulted in breeding values that were similar to each other (correlation coefficients ranged from 0.9 to 0.99) and similar rank (correlation coefficient range 0.82 to 0.99). Assignment of Fc scores of 5 to records of treated lambs appeared to appropriately penalize those individuals and adequately distinguish breeding values.

Key Words: Heritability, Lambs, Parasite resistance

7   Effects of breed and sex on cytochrome P450 gene expression in cattle liver. M. S. Ashwell*, R. S. Fry, J. W. Spears, A. T. O'Nan, and C. Maltecca, *North Carolina State University, Raleigh*.

Many of the cytochrome P450 monooxygenase enzymes are involved in the metabolism and elimination of xenobiotics. Studies have shown that genetic variation in some of these enzymes contributes to inter-individual responses to these drugs, sometimes having significant clinical effects. Our objective was to evaluate differences in basal hepatic gene expression of several P450 genes in two breeds of cattle and the two sexes. We compared expression levels of eight P450 genes in 7 Black Angus and 7 Simmental pregnant cows and 10 castrated male and 9 female Black Angus calves. Cows were individually fed a corn silage-soybean meal-based diet. Average age for these cows was 6.25 years and all were approximately 4 months bred at the time of biopsy. Calves averaged 157 days of age when samples were collected. These pre-weaned calves were allowed to graze tall fescue pasture in addition to a free choice mineral supplement. Relative gene expression of eight major P450 genes involved in drug metabolism was evaluated in these animals. When comparing Angus calves, heifers had higher gene expression than steers for 7 of the 8 genes, with *Cyp3a4* being significantly up-regulated, *Cyp1a1* having a tendency to being higher in females, and *Cyp2c19* having a tendency to being lower in females. When comparing Angus and Simmental pregnant cows, Angus had higher gene expression, with *Cyp2b6* and *Cyp2e1* being significantly up-regulated and *Cyp1a1* and *Cyp2d6* showing tendencies of being higher in the Angus cows. Evaluation of P450 mRNA levels is just the first step toward determining if differences exist between breeds and sexes in enzyme catalytic activity. However, other groups have shown significant correlations between gene expression levels and catalytic activity in other cattle breeds. Therefore, administering a standard dose of a xenobiotic without considering the breed and/or sex of the individual needing treatment may lead to harmful drug residues in foodstuffs as well as improper treatment of disease conditions.

Key Words: Beef cattle, Cytochrome P450, Gene expression

8   Construction of a goat myostatin gene promoter-GFP translational fusion to study promoter regulation. M. Singh*[1], A. Sharma[2], X. Ma[1], E. Amoah[1], and G. Kannan[1], [1]*Fort Valley State University, Fort Valley, GA*, [2]*Myo Clinic, Rochester, MN*.

Myostatin (MSTN) gene product which belongs to the TGF-β super family of structurally related cell regulatory proteins has been shown to be a negative regulator of muscular development in several animal species including mammals. Inhibition of expression of the MSTN gene has been suggested to have great potential in agricultural meat production including goat meat which is naturally lean, provides high quality protein, is low in saturated fats and is increasingly in high demand in US market. Sufficient literature exists to demonstrate the role of MSTN gene in muscle mass inhibition. However, the regulation of myostatin gene expression is still poorly understood. To study the regulation of MSTN gene promoter in goats, we earlier cloned and partially characterized ~1200 bp of the upstream promoter region including a short stretch of flanking MSTN gene coding sequence in pGLO plasmid vector background. Restriction analysis of the selected clones confirmed the correct orientation of the promoter region with respect to GFP reporter sequence. To demostrate conclusively that the GFP reporter gene is in-frame with MSTN gene promoter region we sequenced the promoter GFP reporter junction region in both forward and reverse orientations for one of the selected clones named as pPRO-3. We have observed that the goat MSTN gene promoter associated initiation codon is in-frame with GFP reporter initiation codon. Complete sequence and its analysis will be presented.

Key Words: Myostatin, Promoter regulation, GFP fusion

9   Growth characteristics of antibiotic free Yorkshire crossbreds raised in the hoop barn. S.-H. Oh*[1], M. Dudley[2], J. Talton[2], B. Hardison[2], J. Gonzales[1], A. Meier[2], M. Morrow[3], and T. See[3], [1]*North Carolina A&T State University, Greensboro*, [2]*NCDA, Cherry Research Farm, Goldsboro, NC*, [3]*North Carolina State University, Raleigh*.

The objective of this study is to analyze the growth characteristics for antibiotic free Yorkshire crossbreds to be raised in the hoop barn. The Center for Environmental Farming Systems (CEFS) in Goldsboro, NC has been raising antibiotic free Yorkshire sows. Twenty four sows were impregnated with the semen of Berkshire, Large Black, and Yorkshire as a control group. Total eleven sows were pregnant, which were five from Berkshire, two from Large Black, and four from Yorkshire breed. Sixty eight pigs in total from sows were weaned, and reared within deep-bedded hoop houses. The deep bedding, generally straw, corn stalks, or hay, was spread approximately 14-18 inches thick and provided a comfortable environment for the animals which allows rooting and other natural behaviors. Birth litter weights, weaning weights and ADG for 94 days from weaning were measured and analyzed with GLM in SAS 9.01 including breeding group and sex as fixed effects. Least square means of weaning weights were, respectively, 5.87kg, 6.47kg, and 5.58kg in Berkshire, Large Black, and Yorkshire breeding group. Least square means of ADG for 94 days from weaning were, respectively, 0.495kg, 0.510kg, and 0.543kg in Berkshire, Large Black, and Yorkshire breeding group. Least square means of birth litter weight were, respectively, 12.07kg, 19.28kg, and 13.00kg in Berkshire, Large Black, and Yorkshire breeding group. However, breeding group and sex did not have any significant effects on birth litter weights, weaning weights and ADG for 94 days from weaning.

Key Words: Growth characteristics, Antibiotic free Yorkshire, Hoop

Extension

10 Enhancing livestock extension agent skills through specialized training. A. D. Shaeffer*, M. H. Poore, and M. J. Kistler, *North Carolina State University*, *Raleigh*.

Historically, NC Cooperative Extension held an annual statewide conference including subject matter training. During the 1990s, the conference was reduced in length and then eventually in the early 2000s it was eliminated due to the state budget. As a result, livestock extension agents went 5 yrs with little subject matter training. During this time, extension faced decreased job satisfaction and a high turnover rate among agents. Communication and interaction between the agents and specialists also declined. In 2005, based on agent input, an annual Forage/Livestock Agent Training Conference was established. The conference is now an annual event held in August. The conference consists of 3 d and is located in Raleigh, NC. The first d is split with the morning strictly devoted to new agents (5 yrs or less experience). This session is geared toward program orientation and introduction to other new agents and specialists. The remainder of the conference includes all agents. After the conference, agents responded to an online survey via the Extension Learning Management System (XLMS). The survey included 24 questions with a scale of 1 to 5 with 1= Strongly Disagree, 2= Disagree, 3= Neutral and 4 = Agree and 5= Strongly Agree. The number of participant responses was: 45 in 2005, 41 in 2006, 51 in 2007, 60 in 2008, and 27 in 2009. The survey data was analyzed using one way ANOVA with the SPSS system. Selected questions and mean evaluation score $\pm$ SD over the 5 yrs were; the training was relevant to my needs (4.56 $\pm$ 0.60), well organized (4.53 $\pm$ 0.54), was at the appropriate level (4.51 $\pm$ 0.55), I will use what I learned to enhance my professional responsibilities (4.48 $\pm$ 0.60), I can relate program content to practical solutions (4.50 $\pm$ 0.54), I can use the knowledge and skills gained to impact my Extension clientele (4.46 $\pm$ 0.70), knowledge gained on the topics presented will be used to enhance my program (4.48 $\pm$ 0.60). Comparison across years showed no increase or decrease in mean evaluation scores (P>0.2). The Forage/Livestock Agent Training Conference has enhanced agent capability, and has fostered improved relationships and communication among agents and specialists.

Key Words: Agent training

11 Utilizing audience response systems in extension stocker cattle programs. R. L. Stewart, Jr.*, D. W. Hancock, R. C. Lacy, R. W. Ellis, D. W. Clark, J. D. Aaron, C. Talton, and G. W. Nichols, *The Universityof Georgia*, *Athens*.

The University of Georgia Extension Service conducted two stocker cattle training programs in North and South GA in August of 2009. The meetings covered four topics including Economics, Forages, Health, and Nutrition and Management for the purpose of educating County Extension personnel, current, and potential stocker operators. Through the use of an audience response system (ARS; Macmillian, Gordonsville, VA), questions were incorporated into the program to characterize the management practices of cattle producers in attendance and administer a pre-quiz to understand the knowledge base of attendees. Participants at the north (n=20) and south (n=26) GA locations were given remote answering devices and asked a series of questions prior to the educational program. Participants were given 30 s to respond to each question and the results were displayed before moving to the next question. Traditional methods of collecting data from producers in this setting included post-meeting paper surveys and direct input by polling the audience. These

methods have the potential of erroneous feedback due to participants not completing paper surveys or not answering live questions due to intimidation by peers. The ARS allowed maximum participation and minimized peer influence. Additionally, by understanding the management practices of the audience prior to the program, presenters can adapt the discussion of the program to the needs of the audience. Audience responses indicated marked differences in production background between north and south GA. North GA participants were more apt to be cow-calf producers considering stockering as an option, while a higher proportion of south GA participants were already stockering or finishing calves. Management practices also differed between regions. In south GA, 71% of participants indicated they preconditioned calves; while only 52% in north GA preconditioned. Utilization of ARS can be a beneficial tool in obtaining data during Extension programs and understand the knowledge base while minimizing lack of participation.

Key Words: Audience response system

12 Reaching extension clientele using an email marketing service. B. L. Barham*, *University of Arkansas*, *Little Rock*.

Extension is constantly looking at ways of evolving to meet the changing times which can make it difficult to maintain contact with our clientele. Traditional printed newsletters have been an important form of communication between Extension and our clientele. In times of shrinking budgets, it is getting more difficult to justify mailing these traditional newsletters. The printed newsletters are slow, expensive and are impossible to track their use. The use of email to deliver newsletters is a great way to increase the speed at which newsletters can be sent and decrease printing and mailing costs. Maintaining large email lists is a time consuming task and the issue of tracking the actual use of the newsletters is still problematic. The use of an email marketing service is one way to alleviate the hassle of email list maintenance and provides a tracking mechanism to determine the use of electronically delivered newsletters. In the spring of 2008, the Animal Science section at the University of Arkansas Division of Agriculture made the decision to discontinue mailing copies of all newsletters originating at the state level and to transition to electronic delivery. An email marketing service was utilized to deliver HTML based email newsletters. Since April 2008, 79,776 emails have been sent. Of those 4.0% have bounced back as undeliverable, 28% have been opened and 43% of the opened emails have had links contained in the email clicked (called click-through). These numbers may seem low, but when compared to other industry averages reported by the email marketing service, they exceed the average of comparable industries. Rates reported by "Education and Related Services" are 6% bounce, 19% open and a 15% click-through rate. Rates reported by "Government Agencies" are 7% bounce, 23% open and a 15% click-through rate. The industry with the highest open rate is "Crafts" with 27% and "Publishing" has the highest click-through rates with 28%. These results indicate that electronic delivery of newsletters utilizing an email marketing service is a viable method. This method lowers costs and provides feedback data on the read and click-through success of each email.

Key Words: Email, Newsletters, Marketing

13   Development of mobile communication device applications for beef cattle producer education and decision making. J. A. Parish*, J. D. Rhinehart, S. Hankins, M. L. Smith, C. W. Pumphrey, and R. D. Brook, *Mississippi State University*, *Mississippi State*.

Use of mobile communication devices, such as smartphones, is increasing in the general population and among the agricultural community. Mississippi State University Extension Service beef cattle specialists recognized this media as a potential outlet for beef cattle producer education programs. To date, very few applications (apps) for mobile devices are available that address beef cattle management. In autumn 2009, specialists developed a priority list of beef cattle apps to run on BlackBerry® and iPhone mobile devices. The objectives of this effort were to develop 1) interactive decision-making tools to assist in cattle operation management and 2) educational modules to provide app users with reference materials on relevant beef cattle production topics. Extension Computer Applications and Services personnel provided programming expertise and services for app development. Beef cattle specialists provided concepts, supporting materials, and instructions for app development. First, a Cattle Feed Valuation app was developed that compares the relative value of potential livestock feedstuffs accounting for nutrient composition at delivered prices. Next, an estrus synchronization app was built to assist breeders in planning estrus synchronization programs. Subsequently, a ranch unit conversion app was developed to provide easily accessible references on frequently used unit conversions in livestock production. App development continues on a wide variety of beef cattle production and marketing topics. Each app is developed first as a BlackBerry® app and then separately as a comparable iPhone app. Upon completion, apps are submitted for inclusion in BlackBerry App World and the App Store for iPhone. All apps include user instructions. An awareness campaign to promote use of these apps includes use of Internet, popular press, producer meeting, newsletter, and radio outlets. App download activity and user reviews will be monitored over time to determine app usage and user satisfaction levels. Existing apps will be updated with new versions containing expanded features, current information, and program improvements as warranted.

Key Words: BlackBerry®, iPhone, app

14   Developing a meat goat performance testing program in Maryland. S. Schoenian*[1], J. Semler[2], J. Dietz-Band[2], W. Lantz[3], D. Gordon[4], M. Bennett[5], and D. O'Brien[6], [1]*University of Maryland Extension, Keedysville*, [2]*University of Maryland Extension, Boonsboro*, [3]*University of Maryland Extension, Mt. Lake Park*, [4]*University of Maryland Extension, Derwood*, [5]*West Virginia University Extension, Berkeley*, [6]*Delaware State University, Dover*.

To assist meat goat producers in identifying genetically superior bucks and developing more profitable meat goat enterprises, a pasture-based meat goat performance testing program was initiated at the University of Maryland's Western Maryland Research & Education Center in 2006. The purpose of the annual test is to evaluate the genetic differences in meat goats consuming a pasture-only diet with natural exposure to gastro-intestinal parasites. While on test, the goats are evaluated for growth, parasite resistance, and parasite resilience. They are handled bi-weekly for data collection. Ultrasound carcass measurements are taken towards the end of the test. In 2009, the first goats were harvested to collect actual carcass data. In 2008, the program was expanded to include a field day and sale. Bucks meeting gold, silver, and bronze standards of performance and minimum standards for reproductive soundness and structural correctness were eligible to sell. In 2009, a youth skil-lathon was added to the event to expose 4-H youth to the commercial side of the meat goat industry. Since 2006, 195 male goats consigned by 34 producers from 14 states have been evaluated in the Maryland performance-testing program. The testing program is increasing the awareness and application of performance testing as evidenced by increasing consignments to the test, an improvement in the performance of goats by consigners, increased attendance at the field day, and a growing demand for performance-tested bucks (9 bucks averaged $514 in the 2009 sale). Eighty-nine percent of respondents (past and potential consigners and buck buyers) to an online survey value the copious parasite data that is being collected from the bucks on test. The success of the Maryland performance testing program is promoting other states to start similar forage-based small ruminant performance testing programs.

Key Words: Goat, Performance, Pasture

15   The effect of breed type and year on real-time ultrasound carcass traits, performance and scrotal circumference of bucks enrolled in the Kentucky Buck Development Program. J. Carter*, A. Raymer, L. Melzer, R. Miculinich, T. Platt, and T. Wistuba, *Morehead State University, Morehead, KY*.

Bucks were weighed, scrotal circumference was measured, and ultrasonically scanned to study breed and year differences for performance, scrotal circumference, and 12th rib fat depth, in August of 2005, 2006, 2007, and 2009. Boer and commercial bucks (n = 24 in 2005, 30 in 2006, 30 in 2007, 28 in 2009) were delivered to Bowling Green KY, for the Kentucky Buck development program. Bucks were acclimated for 14 d with minimal supplementation and were then fed for 60 d in a performance type test. At the end of the test, scrotal measurements were taken by an experienced veterinarian and carcass measurements were obtained by a CUP certified ultrasound technician. Measures of 12th rib fat depth and longissimus muscle area were taken with an ALOKA 500V ultrasound unit equipped with a 17.2 cm, 3.5 MHz linear transducer. Ultrasound images were then submitted to the ILIA lab (Harrison, AR) for determination of 12th rib fat depth and longissimus muscle area. There were no statistical differences for breed or the breed by year interaction, therefore data were combined and analyzed for year differences. Longissimus muscle areas were larger ($P < 0.05$) for 2009 when compared to 2007. However, bucks in 2007 were leaner at their 12th rib ($P < 0.05$).

The effect of year on performance of bucks enrolled in the Kentucky Buck Development Program.

	Initial Wt.	Mid Wt.	Final Wt.	ADG	SC
2005	40.5[a]	54.0[a]	58.3[a]	0.21[b]	29.0 [a]
2006	29.5[b]	40.4[b]	45.2[c]	0.20[c]	26.4[b]
2007	33.9[b]	53.2[a]	53.1[ab]	0.23[a]	27.2[b]
2009	35.4[ab]	47.7[ab]	52.3[ab]	0.20[bc]	26.8[b]

[abc]Means within a column without a like superscript differ $P < 0.05$.

Key Words: Ultrasound, Goat, Carcass characteristics

16 Impact of 25 years of progress in swine genetics and feeding programs on nutrient digestibility, ammonia emission, and odor in manure. E. van Heugten*[1], W. Zhang[1], D. J. Hanson[1], J. P. Cassady[1], M. T. See[1], and T. van Kempen[1,2], [1]*North Carolina State University, Raleigh*, [2]*Provimi, RIC, Brussels, Belgium*.

This study was designed to determine the environmental impact of changes made in the past 25 yr in swine genetics and feeding programs. Pigs representative of 1980 or 2005 genetics were fed either a feeding program representative of 1980 or 2005 from weaning. Pigs (n=28) were adapted to metabolism cages for 7 d and fed either the 1980 diet (corn-soybean meal, meal form) or the 2005 diet (pelleted, supplemented with amino acids and phytase) containing, respectively 13.3 vs. 14.7% CP, 3317 vs. 3655 kcal/kg ME, 0.67 vs. 0.43% Ca, 0.56 vs. 0.41% P, and 0.62 vs. 0.94% total lysine. Feces and urine were collected quantitatively for 3 d and mixed at the ratios they were produced to create fresh and aged (21 d) manure. Pig ADG was greater for the modern genetics and feeding program, resulting in heavier BW when the metabolism study was initiated (69.9 vs. 63.5 kg, P = 0.04 and 73.1 vs. 60.3 kg, P < 0.001, respectively). Intake of N tended (P = 0.07) to be greater (1.15 vs. 1.02 g·BW$^{-0.75}$·d^{-1}) and intake of P was lower (P < 0.001; 0.20 vs. 0.26 g·BW$^{-0.75}$·d^{-1}) for the 2005 diet. Feces (15.1 vs. 20.0 g·BW$^{-0.75}$·d^{-1}) and urine (37.7 vs. 48.3 g·BW$^{-0.75}$·d^{-1}) production were lower (P < 0.01), fecal N excretion (0.168 vs. 0.196 g·BW$^{-0.75}$·d^{-1}) tended to be lower (P = 0.08) and fecal P excretion was lower (P < 0.001; 0.117 vs. 0.162 g·BW$^{-0.75}$·d^{-1}) for the 2005 diet. Digestibility of N (85.3 vs. 80.3%) and GE (88.9 vs. 85.3%) was greater (P < 0.05) for the 2005 diet. Urinary N excretion was greater in 1980 pigs when fed 2005 compared to 1980 diets (0.35 vs. 0.16 g·BW$^{-0.75}$·d^{-1}), but not in 2005 pigs. Cumulative ammonia emission in fresh manure was greater (P = 0.05) for 2005 pigs only at 24 h. In aged manure, ammonia emission was 86, 52, 29, 18, and 12% greater (P < 0.05) for the 2005 diet at 12, 24, 36, 48, and 96 h, respectively. No differences in manure odor were observed. In conclusion, 2005 genetics and 2005 diets increased growth rate, which in combination with improved nutrient utilization for the 2005 diet reduced manure output and nutrient excretion; however, modern feeding programs may increase ammonia emission.

Key Words: Genetics, Nutrition, Excretion

17 Growth efficiency and carcass compositions of pigs raised on pasture in the summer season. D. L. Kuhlers*, K. Nadarajah, C. L. Bratcher, C. R. Kerth, and W. F. Owsley, *Auburn University, Auburn, AL*.

Sustainable or alternative livestock production systems aim to produce differentiated niche livestock products that are to be sold directly to the public who are concerned with production methods by the confinement swine industry. One such concern for some consumers is the animals are not allowed to express their common behaviors. Therefore, production of pigs on pasture has been of interest. A study was conducted with 96 pigs to examine the growth efficiency and carcass performance of pigs that were raised on one of three system treatments in two trials during the summer season. Two of the treatments were on half-acre pasture plots, one with continuous grazing, and the other the pigs were rotated every 2 wks. The third system treatment was a confinement on concrete floors. The pasture system treatments plots all had a shade, while the confinement system had sprinklers for the animals comfort. The traits studied were pen ADG, feed conversion, carcass backfat thicknesses and loin eye area of the individuals. The model used for the pen ADG and feed conversion ratios included system treatment, trial and interaction. The model for the carcass traits was system treat-ment, trial, sex, kill date within trial and their interactions with the covariate of HCW. Differences in LS means were tested by lsd. Pen ADG were higher in the confinement system than the continuous and rotational pasture systems (6.3 vs 4.9 vs 4.3 kg/d, P<0.01). However, pen feed conversion ratios did not differ significantly. For the carcass traits, first rib, last lumbar and 10th-rib fat thicknesses did not differ significantly between any of the system treatments. Carcasses from confined pigs were fatter at the last rib than those that were continuously grazed (2.54 vs 2.26 cm, P<0.05), but not for those pigs that were rotated on pasture. Loin eye areas for the pigs raised in confinement were larger than those on the continuously grazed pasture pigs (53.3 vs 49.6 cm2, P<0.05), but not those pigs that were rotated on pasture. Raising pigs outside on pasture will result in slower growth rates, but little difference in carcass traits from those raised in confinement.

Key Words: Pigs, Pasture, Performance

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

"The Master Beef Producer Program" is a 12-wk educational program to provide information to Tennessee's beef producers, to improve the profitability and sustainability of their operations, compete with other states in the production of feeder cattle and to help the Tennessee beef industry become one of the best in the country. Each participant of the course was requested to complete a registration form which asked for information pertaining to the producer, land and pasture, cattle inventory, breeding, nutrition, herd health, management and marketing practices. Participants were grouped into one of two categories: Group I. 45 yr and younger, Group II. 46 yr old and older. Age of producers ranged from 14 to 90 yr and was used to compare the marketing practices used. The frequency that producers of different age groups checked the market and how many livestock markets the producers checked before they decide on where to sell their cattle was evaluated. Producers were asked how often they checked market prices, either daily, weekly, monthly, or never. Most producers evaluated market prices weekly in both age groups, but there was no significant difference in the frequency that producers checked the market between age groups (P> 0.71). When producers were asked if they checked prices at more than one market, the younger producers were more likely to check multiple markets when compared to those over the age of 45 (P <0.004). Of the producers under the age of 45, 59% of them check multiple markets while only 51% of those over the age of 45 compared multiple markets. The differences observed here may show that the older producers have a loyalty, or traditionally use one market compared to their younger counter parts that do not, or they may have the experience to know which market generally has the highest prices.

Key Words: Beef, Market

19 The effect of producer characteristics on adoption of reproductive practices. J. B. Neel*[1], B. T. Campbell[1], C. D. Lane[1], F. D. Kirkpatrick[1], and W. W. Gill[2], [1]*The University of Tennessee, Knoxville*, [2]*Middle Tennessee State University, Murfreesboro*.

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best in the country. Each participant of the course completed a registration form which asked for information pertaining to the producer, land and pasture, cattle inventory, breeding, nutrition, herd health, management and marketing practices. The age of participants was grouped into two categories: Group I. 45 yr and younger, Group II. 46 yr old and older. Age of producers ranged from 14 to 90 yr and was used to compare the reproductive management practices used. These practices were artificial insemination (AI), semen testing for bulls, and pregnancy checking for cows and heifers. The use of AI was greater for those producers under the age of 45 yr (P<0.0007). Of the producers under the age of 45 yr, 21% were currently using AI in their production system while only 15% of those over the age of 45 yr were using AI. When the use of semen testing for bulls was analyzed there was no difference found between those producers who were over the age of 45, or those younger (P>0.05). There were 17.5% of the producers over the age of 45 yr that had semen analysis run on their bulls and there were 19% of the producers under the age of 45 yr have semen analysis checked on their bulls. When the number of producers that pregnancy checked their cows was analyzed there were greater numbers of producers under the age of 45 yr who did pregnancy checks than their older counter parts with the averages being 23% and 19% respectively (P<0.05). Knowing what practices are used by producers of certain demographics can help to design more pertinent extension programs for each group of people.

Key Words: Beef, Reproduction

20   Feedlot performance and carcass traits for Southeast or Midwest calves. W. D. Busby[1], D. Strohbehn[1], G. D. Fike*[2], and M. E. King[2], [1]*Iowa State University*, *Ames*, [2]*Certified Angus Beef LLC*, *Wooster, OH*.

Calves (n=47,526) from 19 states fed at 18 Iowa feedlots through the Iowa Tri-County Steer Carcass Futurity over eight years (2002-09) were used to evaluate the effect of origin of calves on feedlot performance and carcass traits. A common diet was fed and similar implant and health programs were administered to all calves. Twelve Southeast (SE) states (n=31,155) and seven Midwest (M) states (n=16,371) were represented. Calves were sorted and harvested when they were visually evaluated to have one centimeter of fat cover. Delivery weight (kg), delivery age (days) and final weight (kg) were 295.1, 319.6 and 533.5; and 285.9, 255.4 and 535.0 for SE and M calves, respectively (P<0.01 for each pair of values). Calf ADG was the same, 1.45 kg/day, for both regions. Morbidity rate (%), treatment cost ($/head) and mortality rate (%) for SE and M calves were 15.8, 5.53 and 1.35; and 22.1, 8.49 and 1.81, respectively (P<0.05 for each pair of values). The percentage of Prime, Choice, Select and Standard carcasses for SE and M calves were 1.08, 65.25, 30.99 and 2.68; and 0.8, 67.27, 29.41 and 2.52, respectively. Of the black-hided Angus-type calves eligible for the *Certified Angus Beef®* program (CAB®), a significantly higher (P<0.001) percentage of the SE versus M calves (18.43% and 16.91%, respectively) were accepted. When considering feedlot and carcass traits and all associated costs, the SE calves had a profit/head of $37.34 versus $23.79 for M calves (P<0.001). Southeast calves had fewer health problems, higher CAB® acceptance rates and more profit/head.

Key Words: Health, Region of origin, Quality grade

21   Performance and carcass traits of pasture- vs. grain-finished steers in Florida. J. M. B. Vendramini*[1], J. D. Arthington[1], C. Carr[2], F. Frigoni[1], P. G. M. A. Martins[1], M. M. Salin[1], and R. Cassiolato[1], [1]*University of Florida*, *Ona*, [2]*University of Florida*, *Gainesville*.

Beef cattle producers are interested in alternative cattle finishing regimes that potentially will make beef production more profitable. The objective of this study was to compare performance and carcass traits of beef steers finished on pastures or feedlot. The study was conducted at the UF Range Cattle Research and Education Center, Ona FL from November 2008 to September 2009. Treatments were pasture-finished or grain-finished regimes replicated three times in a completely randomized design. Twenty-four Angus crossbred steers (227 ± 17 kg) were randomly allocated to one of six experimental units (4 steers/experimental unit). All treatments were on pastures of warm-season or cool-season grass and receiving 1% BW of concentrate (14% CP, 76% TDN) from November 2008 to April 2009. On April 2009, the grain-finished steers were moved to a feedlot and slaughtered after 128 d. The pasture-finished steers stayed on pastures receiving 1% BW supplementation and were slaughtered after 154 d. There was no difference ($P > 0.10$) in herbage mass (2200 ± 150 kg/ha), herbage allowance (1.49 ± 0.09 kg DM / kg LW), and animal performance (ADG; 0.88 ± 0.08 kg/d) when all treatments were on pastures. The grain-finished steers had greater ($P = 0.03$, SE = 0.07) ADG than the pasture-finished steers after they moved to the feedlot (0.94 vs. 0.68 kg/d). Grain-finished steers tended ($P = 0.09$, SE = 0.03; 12.1 vs. 8.4 mm) to have greater adjusted fat thickness but, there was no difference in USDA yield grade ($P = 0.40$, SE = 0.16; 2.8 vs. 2.6). Additionally, there was no difference ($P = 0.88$, SE = 21; Slight 92 vs. Slight 86) between treatments for marbling, though a greater proportion of carcasses of grain-finished steers graded USDA Choice (42 vs. 33%) than pasture-finished steers. Carcasses of grain-finished steers had lighter ($P = 0.04$, SE = 1.14; 77 vs. 72) and less yellow (lower b* values; $P = 0.04$, SE = 0.79; 18.6 vs. 23.7) external fat than carcasses of pasture-finished steers. The differences in carcass traits may require specific markets to commercialize pasture-finished beef in Florida.

Key Words: Pasture-finished, Supplement, Carcass traits

22   Demonstration and education for custom replacement beef heifer development. J. D. Rhinehart* and J. A. Parish, *Mississippi State University*, *Mississippi State*.

A consignment program was developed to address the need for properly and economically developing replacement beef heifers in Mississippi. Extension Beef Cattle Specialists and commodity representatives developed guidelines based on successful programs in other states. Briefly, heifers were at least 11 mon of age, 307 kg, vaccinated for blackleg and respiratory diseases, dehorned and healed. There was no minimum number of head required to consign if the heifers fit the projected breeding season. Sixty five heifers were consigned and delivered to a custom beef replacement heifer development center in Philadelphia, MS (November 2008). On arrival, the heifers had been vaccinated for blackleg and respiratory diseases (modified live) and weighed an average of 318 kg. After delivery, they were vaccinated for Vibrio (Campylobacter fetus) and Lepto (Leptospira Canicola-Grippotyphosa-Hardjo-Icterohaeorrhagiae-Pomona) to guard against

poor fertility. Sixty days after arrival, a pelvic area measurement and reproductive tract score was taken (avg. = 175 cm^2 and 4.3, respectively). Nutritional management was based on a total mixed ration of ryegrass baleage, commodity feeds and a complete mineral mix. Average daily gain was 1.2 kg per head. The heifers were artificially inseminated (AI) after estrous synchronization and a clean-up bull was introduced for 60 d beginning 7 d after AI. Conception rate to AI was determined by ultrasound after 30 d (79.6%; 43/54). The heifers were returned to the consigner 50 d after the latest possible pregnancy to avoid pregnancy loss due to shipping stress. The total cost to consigners averaged $324 per heifer returned pregnant, which included cost of open heifers and culls from insufficient pelvic area measurement and reproductive tract scores. This program provided a low-cost option for producing heifers that should be long lived in the cow herd.

Key Words: Heifer development, Beef, Extension

23   The impact of reducing the length of the calving season. T. R. Troxel* and B. L. Barham, *University of Arkansas, Little Rock.*

Reducing the length of the calving season can be the first step toward improved beef production efficiency. The objectives of this demonstration were to reduce the length of the calving season and to document the production and economic impact when converting a long calving season (> 200 d) to a short calving season (< 90 d). A 3-part plan was developed for 6 cow-calf herds to reduce the length of the calving season. The average number of yrs to reach the cooperator's desired cowherd calving season was 3.8 ± 0.75 yr (mean ± SD). The percentage of cows calving during the desired calving season was higher for the final year compared to the benchmark year ($92.0 \pm 11.66\%$ vs. $46.3 \pm 14.01\%$, respectively; P < 0.002). The mature cow calving percentage did not change from the benchmark year to the final year ($89.2 \pm 6.05\%$ and $87.2 \pm 9.47\%$, respectively; P > 0.75). The average length of the calving season decreased from 273.3 ± 84.88 d in the benchmark year to 85.2 ± 4.75 d in the final year (P < 0.002). Due to the limited number of farms and large variability, there were no differences for herd break-even (P > 0.24), specific costs/animal unit (AU; P > 0.68) and income over specified costs/AU (P > 0.14) from the benchmark year to the final year. When comparing means, break-even decreased 30% from 0.28 ± 0.10/kg to 0.20 ± 0.11/kg from the benchmark year to the final year, respectively. Specified costs/AU decreased 40% from 209.70 ± 145.68 to 126.20 ± 40.41, whereas income over specified cost improved 100% from 95.00 ± 68.27/AU to 189.70 ± 133.50/AU, from the benchmark year to the final year, respectively. A short controlled calving season forms the cornerstone for additional prudent management practices. Without a short calving season (≤ 90 d), opportunities for increasing production efficiency and reducing the cost per calf weaned are limited. These results provided evidence that farms increased beef production efficiency and improved profitability by decreasing the length of the calving season.

Key Words: Breeding season, Cattle production, Efficiency

24 Impact of a dairy beef quality assurance program on producer cull cow management practices and meat quality knowledge. A. Imler*, M. Hersom, C. Carr, T. Thrift, and D. Johnson, *University of Florida, Gainesville.*

Dairy cattle comprise nearly one-half of the estimated cattle harvested at cull cow processing facilities annually. Consequently, with the current economic situation and the dairy herd liquidation underway, it is critical that dairy producers understand and implement management strategies that will maximize their cow salvage value as well as improve the welfare status and meat quality of all cull cows marketed. A 2-d Dairy Beef Quality Assurance (BQA) program was conducted with a total of 38 participants, representing approximately 25,000 dairy cows or 20% of the Florida herd currently in production. A total of 19 participants responded to the exit survey. In the survey's 1st section, designed to measure the degree of learning achieved across workshop sessions, 88% of respondents indicated that they gained some degree of new knowledge, ranging from 'A Great Deal Learned' to 'Some New Knowledge' attained. The 2nd section was a series of 8 true-false questions to evaluate producer knowledge of BQA principles. Mean score was 75% correct. In the third section, 34% of respondents indicated that the timely marketing of cull cows was the most important production control point they could manage to improve meat quality. Additionally, 100% of respondents indicated that they would adopt at least one new production practice as a result of attending the workshop, with 29% of respondents indicating they would adopt three or more new practices. Producers were also asked to indicate the degree to which they would alter current management for 7 production and marketing practices that would lead to improved welfare status and/or meat quality of culled cows. Among respondents, 50% indicated they would make at least one degree change (on a 4-point scale) in their management practices. Finally, 100% of respondents indicated that the workshop was an effective method of teaching producers to improve the marketability and value of cull dairy cattle, which denotes that similar BQA workshops targeting dairy producers would be successful in other states.

Key Words: Dairy, Beef, Quality assurance

25 The impact of antibiotic administration in reducing somatic cell counts and improving udder health. D. Tearney* and R. Natzke, *University of Florida, Gainesville.*

The use of antibiotic therapy in response to elevated somatic cell count (SCC) in cows is being used to reduce cell numbers and improve udder health. The objective of this study was to determine the efficacy of treating sub clinical mastitis infections in cows exhibiting a elevated SCC. Cows that appeared on the dairy herd improvement (DHI) hot-list were studied. Cows that were confirmed to have an elevated SCC, using the California Mastitis Test (CMT), had milk samples submitted for bacterial plate culture. Cows with Gram + bacteria were treated with the antibiotic Prilimycin hydrochloride 40mg. Data were collected for one year from a 3200 cow North Florida herd, with a relatively low annual SCC. A total of 342 cows appeared on the hot-list during the study and were assigned to one of four experimental groups: untreated cows with no bacterial growth, treated cows with gram + bacteria, untreated cows with gram-bacteria, and cows that appeared on the list but had a negative CMT when tested 4-7 days after the DHI test. The initial SCC and (number of cows) in the groups were 1,716,106 (47), 1,873,798 (173), 2,420,125 (16) and 1,344,250 (8) respectively. In the subsequent month the respective SCC (% reduction) were 1,099,511(36), 1368,705 (27), 1,637,813 (32), and 2,158,625 (+61). The reduction in SCC was less in the cows which were administered with than it was in the non-treated gram - cows or the non-treated no bacteria cows. The hot-list cows were monitored for one year to assess subsequent appearances on the hot-list or the occurrence of clinical mastitis. Within that lactation 33% of the treated cows were re-treated at least once due to clinical mastitis. That compares to 50% of the non-treated cows becoming clinical. Since the described procedure adds the cost of antibiotics, bacterial plating and time to administer and appears to be of very limited value in reducing SCC and subsequent clinical cases of mastitis, one must question its utility.

Key Words: Somatic cells, Mastitis, Bacterial culture

Graduate Student Competition

26   Beef cattle performance, forage productivity and quality from mixed small grain/ryegrass pasture. M. K. Cline*, J. C. Lin, B. Gamble, C. R. Kerth, and R. B. Muntifering, *Auburn University, Auburn, AL*.

Opportunities exist for optimizing combinations of cool-season forages that differ in their growth distribution in order to provide greater uniformity and extended availability of high-quality forage throughout the winter grazing season. For this reason, we evaluated oats (O; *Avena sativa*), rye (R; *Secale cereale*) and ryegrass (RG; *Lolium perenne*) in mixtures as winter pasture for grazing beef cattle. Replicate 1.42-ha paddocks of O + RG, R + RG, and O + R + RG were established in November 2008 and stocked initially with 3 yearling crossbred steers per paddock (392 ± 31 kg initial BW) on January 8, 2009 when mean forage availability had reached approximately 2,000 kg DM/ha. All steers had free-choice access to salt-mineral mix and water. Forage mass and nutritive quality were determined by clipping 0.25-m^2 quadrats (8 per paddock) prior to the beginning of grazing and every 2 wk during the trial. Stocking rates were adjusted using put-and-take steers to maintain forages in a vegetative state, and grazing was discontinued on May 28 when forage availability and quality could no longer support satisfactory animal performance. Data from the 140-d grazing trial were analyzed as a completely randomized design by the PROC GLM procedure of SAS. Average daily gain was higher ($P < 0.05$) for O-RG (1.39 kg/d) than R-RG (1.13 kg/d), but was not different from O-R-RG (1.26 kg/d). No differences were observed among treatments for forage concentrations of NDF, ADF, ADL and CP. Number of steer-grazing days was lower ($P < 0.05$) for R-RG (547 d) than O-RG (655 d) and O-R-RG (625 d), primarily as a result of more rapid decline in forage availability and quality during the month of May. Results indicate that cool-season forage mixtures containing oats were superior to R + RG for supporting beef cattle production from winter grazing.

Key Words: Small grains, Ryegrass, Beef cattle

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

Johnsongrass(*Sorghum halepense*) is a widely adapted warm-season pasture grass in the southeastern US, where a continuous supply of broiler litter(BL) is available for use as fertilizer. Continuous land application of BL based on crop N requirement systematically leads to over-application of P relative to crop P requirement, which over time can lead to P accumulation in surface soil. An experiment was conducted to evaluate productivity and nutritive quality of Johnsongrass(JG) to which diammonium phosphate(DAP) or BL was applied on the basis of soil-test P and supplemented as necessary with ammonium nitrate(AN) to meet crop N requirement. In June 2007, JG was planted in 24 field plots (18-m^2), with (+CLO) or without Regal Graze ladino clover(*Trifolium repens*), and fertilized with DAP+AN, pressure-compacted(0.69 g/cm3) BL (BL-C) or non-compacted(0.41 g/cm^3) BL (BL-N) (4 reps/trt). The BL treatments(trts) were supplemented with AN to be isonitrogenous with DAP+AN, which was applied at a rate equivalent to 67-56-45(N-P-K). The experiment was repeated on the same plots beginning in May 2008, and fertilizer trts were reapplied at the same rates as in 2007. Plots were harvested twice each yr(August and October), and data were ana-lyzed by PROC MIXED procedures in which yr was treated as a random effect and harvest as a repeated measure. No differences were observed in DM yield or forage concentrations of NDF, ADF, ADL, Ca, P, Al, Cu or Fe between forages or among fertilizer-source trts. Concentration of CP was higher in JG+CLO than JG forage($P = 0.0735$), but no difference was found among fertilizer-source trts. Foliar concentrations of K and Mg were higher in JG+CLO mixture than JG($P = 0.0022$ and $P = 0.0001$, respectively), and forage in BL plots tended to have higher foliar concentrations of K than forage amended with DAP+AN($P = 0.1224$). Forages amended with DAP+AN had lower foliar Zn concentration than BL-N($P = 0.0223$) and BL-C($P = 0.0636$). Results indicate that BL+AN was comparable to DAP+AN for supporting productivity and nutritive quality of JG when applied on the basis of soil-test P.

Key Words: Johnsongrass, Broiler litter

28   Investigating components of the pomegranate byproducts as a potential natural de-worming source for goats. S. LeShure*, A. Ludwick, and G. Pritchett, *Tuskegee University, Tuskegee, AL*.

Researchers have been exploring medicinal uses of pomegranates since the late 1800s to present. Most of the studies have focused on the antioxidant properties that the pomegranate possesses and how it affects different health issues in the body. Limited research has been reported on the use of pomegranate by-products on intestinal parasites. Our objective was to investigate the pomegranate root bark and husk as a natural means to deworm goats. To achieve this objective the active compounds found in the root bark were investigated to determine if their presence was also in the husk. The compounds under investigation were pelletierine and tannins. The husk was tested for the presence of condensed tannins by use of two dimensional thin layer chromatography (2-D TLC) because recent condensed tannins (CT) research showed that CTs have a potential to be a powerful natural de-wormer. The assay of the 2-D TLC proved CTs were present in the husk. Fourier transmission infrared (FTIR) was used to compare the husk and root bark extracts and the spectra showed that the compounds in both extracts are very similar. Pelletierine was synthesized and bought commercially for testing the presence of the compound in the extracts.1H and 13C NMR was done to prove the pelletierine synthesis was successful. HPLC was used to determine that pelletierine was present in both extracts. In conclusion, pomegranate husk, which is a waste product of the fruit, contains CTs and pelletierine that can possibly be utilized a natural deworming agent for small ruminants.

Key Words: Pomegranate root bark/husk, Pelletierine, Condensed tannins

29   Effect of vaccination against porcine circovirus type 2 (PCV2) on ejaculate characteristics and antibody titers in serum of boars. K. A. Alberti*[1], M. J. Estienne[1], A. F. Harper[1], and X. J. Meng[2], [1]*Virginia Polytechnic Institute and State University, Blacksburg, VA*, [2]*Virginia-Maryland Regional College of Veterinary Medicine, Blacksburg, VA*.

Research has demonstrated that PCV2 can be shed into collected semen, raising the possibility that AI may be an important route by which disease associated with PCV2 is transmitted. The objective of this experiment was to determine the effect of vaccination against PCV2 on ejaculate characteristics and antibody titers in serum of PCV2-positive boars.

Semen and blood samples were collected weekly from wk 0 to wk 8. After collection at wk 0, boars received a vaccination against PCV2 (n = 5) (Suvaxyn PCV2 one dose; Fort Dodge Animal Health, Fort Dodge, IA) or served as un-vaccinated controls (n = 5). Semen characteristics (sperm concentration, percent motility, velocity, etc.) were assessed using a computer-assisted sperm analysis system (Integrated Visual Optical System, Version 12; Hamilton Thorne Research, Beverly, MA) and sperm morphology was assessed using light microscopy after staining. The PCV2 antibody titers were determined in serum using an ELISA (Iowa State Veterinary Diagnostic Laboratory; Ames, IA). An effect of treatment x wk was detected for serum antibody titers ($P < 0.01$). Compared with controls, antibody titers (titer/mL) in vaccinated boars were greater at wk 0 (1.13 ± 0.05 vs. 1.01 ± 0.05; $P = 0.09$) and 2 (1.15 ± 0.05 vs. 1.01 ± 0.05; $P = 0.04$) but lesser at wk 7 (1.01 ± 0.05 vs. 1.23 ± 0.05; $P < 0.01$) and 8 (1.05 ± 0.05 vs. 1.17 ± 0.05; $P = 0.07$). There were no significant effects of treatment or treatment $\times$ wk for semen characteristics ($P > 0.1$). In summary, vaccination against PCV2 can lower antibody titers when given post-infection and has no effect on indicators of semen fertility. (Supported by the Virginia Agricultural Council and Smithfield Premium Genetics)

Key Words: Porcine circovirus type 2, Vaccine, Semen

30   Effect of vitamin D supplementation on fecal shedding of E. coli O157:H7 in naturally-colonized cattle. R. L. Farrow*, T. S. Edrington, K. M. MacKinnon, T. R. Callaway, R. C. Anderson, and D. J. Nisbet, *Food and Feed Safety Research Unit, ARS-USDA, College Station, TX.*

Previous research conducted in our laboratory demonstrated that seasonal shedding of E. coli O157:H7 (EHEC) in cattle is related to physiological responses within the animal to changing day-length. Continuing this research, we examined the effect of vitamin D (VIT D) supplementation in cattle naturally-colonized with EHEC. Experiment I was conducted with 14 crossbred beef calves (avg. BW 225 kg) and 12 Holstein steers (avg. BW 454 kg) randomly assigned to one of two treatments: control or 0.5×10^6 IU VIT D administered daily via oral bolus for 10 days. Fecal samples were collected from individual animals via rectal palpation daily [6 d prior to (phase 1) and throughout the 10-d treatment administration (phase 2)] for culture of EHEC. No differences in the percentage of cattle shedding EHEC were observed during phase 1. During phase 2, more calves in the VIT D treatment tended ($P = 0.11$) to shed EHEC compared to controls. The percentage of Holsteins shedding EHEC tended ($P = 0.12$) to be higher in the control (34.9%) compared to the VIT D (22.7%) treatment. Serum concentrations of VIT D were markedly higher ($P < 0.0001$) in treated (782 nMol/L) versus control (258 nMol/L) calves but only tended ($P = 0.10$) to be higher in the treated Holsteins. In Experiment II, three successive VIT D dosage rates (2400, 4800, and 9600 IU/d; 14 d each) were administered to 14 Holstein steers (avg. BW = 150 kg) as above. No significant differences in fecal preva-lence of EHEC or VIT D concentrations were observed for any of the dosages. Differences in fecal shedding among the Holsteins and the beef calves in Experiment I are likely due to the difference in the VIT D dose administered per unit of BW, as reflected in the serum concentrations of VIT D. While no differences were observed in fecal shedding of EHEC in the second experiment, the concomitant lack of a treatment effect on serum concentrations of VIT D, suggest dose was a limiting factor.

Key Words: E. coli O157:H7, Vitamin D, Cattle

31   Identification of single nucleotide polymorphisms of the lactate dehydrogenase-B gene and association with cow and calf perfor-mance. B. C. Williamson*[1], C. F. Rosenkrans, Jr.[1], S. T. Reiter[1], J. D. Thompson[1], M. A. Sales[1], and M. L. Looper[2], [1]*University of Arkansas, Fayetteville*, [2]*USDA/ARS, DBSFRC, Booneville, AR.*

Lactate dehydrogenase (LDH) is the last enzyme of the glycolytic path-way that converts lactate to pyruvate and vice versa. Objectives were to investigate the polymorphic nature of the bovine LDH-B gene, and to determine the association of those polymorphisms with performance of cows and calves. Primers (5'- GTACAGTCCTGCCTGCATCA -3' and 5'- CCATTGTTGACACTGGGTGA -3') were designed to amplify a 452-base pair fragment (bases 489 to 940 of accession number aj401268) of the bovine LDH-B gene. Five single nucleotide polymorphisms (SNPs) were identified: C541A, A606G, A618G, C652T, and C669T. Brahman-influenced cows (n = 90) were managed to achieve either thin (BCS = 4.3 ± 0.1) or moderate (BCS = 6.4 ± 0.1) body condition (BC). Cows from each BC grazed either common bermudagrass (CB; n = 3 pastures) or endophyte-infected tall fescue (EI; >85% of stand; n = 2 pas-tures) during a 60-d breeding period. A blood sample was collected, and BW and BC of cows were recorded on d 0, 30, and 60. At weaning, BW of calves were recorded and pregnancy of cows determined. Forty-seven percent (42/90) of cows were heterozygous for all five SNPs. Genotype of cow affected ($P < 0.01$) calf birth weight. Cows with SNPs within the LDH-B gene had smaller calves (33.8 ± 0.6 kg) at birth than cows without SNPs (36.0 ± 0.6 kg). Genotype did not influence ($P > 0.10$) BW or BC change during the breeding period. Cows grazing CB pastures gained ($P < 0.01$) BC while EI-cows lost BC; cows grazing CB gained more ($P < 0.02$) BW than cows grazing EI during the breeding period. Cows in moderate BC had calves with heavier adjusted 205-d weaning weights ($P < 0.03$; 241 ± 5 kg) compared with calves from thin cows (226 ± 5 kg). Pregnancy rate was not influenced ($P > 0.10$) by genotype, forage type, or BC; pregnancy rate averaged 88%. Identification of cows with specific genotypes within the LDH-B gene may be useful in developing molecular breeding values for birth weight, and assist beef producers in selecting cows that would complement their grazing system.

Key Words: Birth weight, Bovine, Lactate dehydrogenase-B gene

32   Prevalence of Salmonella spp. in cow-calf herds grazing on pastures treated with poultry litter. M. Voyles*[1], T. Platt[1], T. Wistuba[1], J. Phillips[1], and G. Loneragan[2], [1]*Morehead State University, Morehead, KY*, [2]*West Texas A&M University, Canyon.*

Food-borne illness has become a significant issue in the United States. Salmonella enterica is an important cause of said food-borne illnesses. Annually, salmonellosis is responsible for an estimated 1.4 million illnesses and 500 deaths; most of which are attributable to contami-nated foods or beverages. Pork, poultry and fresh produce are the most commonly associated foods with salmonellosis; however, Salmonella enterica are also common inhabitants of the gastrointestinal tract of all animals including cattle. As a result, beef and dairy products can and do serve as a vehicle for human exposure to this organism. Our objec-tive is to determine if the serotypes recovered from cow-calf operations utilizing poultry litter as fertilizer are the same as those being recovered from feed-lot animals harvested for consumption. Eighty fecal pat samples were collected using aseptic techniques from the surface of 4 separate pastures in central Arkansas that were treated with poultry litter. Additionally, 20 samples were collected from 2 pastures that have

never been treated. Finally, 5 poultry litter samples were collected from a neighboring broiler house floor. All samples were shipped overnight on ice to West Texas A&M University for analysis. Standard microbiological methodology was used to detect Salmonella prevalence. No Salmonella spp. isolates were recovered from any sample collected; however, samples from other studies were analyzed concurrently in the lab; thus a methodology error seems unlikely. Results could indicate that treating pastures with poultry litter has little affect on Salmonella spp. prevalence in animals that will later be shipped to feed-yards.

Key Words: Salmonella, Cow calf, Food-borne illness

33 The effect of breed type on performance, pelvic measurements, and ultrasound carcass characteristics of heifers enrolled in the Eastern Kentucky Heifer Development Program. W. Turner*, R. Miculinich, T. Platt, and T. Wistuba, *Morehead State University, Morehead, KY.*

Young heifers were weighed, pelvic area was determined, and ultrasonically scanned to study breed differences for performance, pelvic area, 12th rib fat depth, longissimus muscle area, and intramuscular fat. Angus (AN), Angus cross (AC), Hereford cross (HC), Gelbvieh (GV), Gelbvieh cross (GC), Limousin (L), Limousin cross (LC), Red Angus cross (RA), and Saler cross (SC) heifers (n = 183) were delivered to Hazard, KY for the Eastern Kentucky Heifer development program. Heifers were grazed for 138 d with minimal supplementation and then pelvic measurements were taken by an experienced veterinarian and carcass measurements were obtained by a CUP certified ultrasound technician. Measures of 12th rib fat depth, longissimus muscle area, intramuscular fat, and rump fat were taken with an ALOKA 500V ultrasound unit equipped with a 17.2 cm, 3.5 MHz linear transducer. Ultrasound images were then submitted to the ILIA lab (Harrison, AR) for determination of 12th rib fat depth, longissimus muscle area, and intramuscular fat. Initial, mid test and end weights did not differ between breed and averaged 265.2, 317.1, and 346.4 kg, respectively (P > 0.05). However, there were differences in total gain and ADG (P < 0.05). There were no consistent results for pelvic area although GC heifers did have larger (P < 0.05) pelvic areas than LC or HC heifers. The RA heifers had the largest longissimus muscle area (46.4 cm2) and SC had the smallest (40.1 cm2) where as the AN, AC, HC, GV, GC, L, LC were intermediate. In addition, HC heifers had the greatest 12th rib fat depth, while the AN heifers had the greatest amount of intramuscular fat. These results support the knowledge that earlier developing breeds of cattle have increased intramuscular fat and subcutaneous fat depots.

Key Words: Ultrasound, Beef, Heifer

34 Evaluation of in vitro gas production pattern and bacteria profile of corn milling (co)products using 16S rDNA bacterial tag-encoded FLX amplicon pyrosequencing. W. L. Williams*[1], L. O. Tesechi[1], P. J. Kononoff[2], T. R. Callaway[3], S. E. Dowd[4], K. Karges[5], and M. L. Gibson[5], [1]*Texas A&M University, College Station*, [2]*University of Nebraska, Lincoln*, [3]*Food and Feed Safety Research Unit, USDA-ARS, College Station, TX*, [4]*Medical Biofilm Research Institute and Research Testing Laboratory, Lubbock, TX*, [5]*Dakota Gold Research Association, Sioux Falls, SD.*

The objective of this study was to evaluate the degradation dynamics of two commonly-fed corn (co)products fermented in vitro and investigate the shifts of the rumen bacterial populations. Previous studies have indicated that processing methods of ruminant feeds directly affect the substrate availability and fermentation rates of corn products and that fat content of ruminant feeds have variable effects on digestibility of nutrients, but little information is available regarding the changes in the ruminal bacteria population. In this study, intact and defatted forms of two corn (co)products of different processing methods (BPX and HP-DDG) were fermented in replicates for 24 or 48 h using the in vitro gas production (IVGP) technique. The IVGP is based on the assumption that the gas produced from the anaerobic fermentation is directly related to the amount of substrate fermented. Fermentation profiles of the corn (co)products were compared to alfalfa hay, an internal laboratory standard. In addition, the 16S rDNA bacterial tag-encoded FLX amplicon pyrosequencing (bTEFAP) technique was used to determine the bacterial profile at 24 and 48 h of the in vitro fermentations. Bacterial populations were analyzed at the species level. A bacterium was only used if its DNA comprised more than 5% of the total DNA recovered from the incubated samples. Bacteria were grouped by their known substrate affinities for cellulose, hemicellulose, pectin, starch, sugars, protein, lipids and lactate. Results of the fermentation profile indicated that removal of lipids before incubation reduced fermentation lag time (P = 0.015) and the fractional fermentation rate (P = 0.018) of the low heat-processed feed (i.e. BPX). Defatting the feeds also increased the activity of the fiber carbohydrate and proteolytic bacteria guilds (P <0.001), and decreased lactate-utilizing bacteria populations (P = 0.015). Information of fermentation kinetics and bacterial population shifts may lead to more accurate ration formulations for ruminants using nutrition models.

Key Words: Gas production, Distiller grains, Bacteria profile

35 Duodenal copper transporters in cattle are affected by breed. R. S. Fry*, M. S. Ashwell, and J. W. Spears, *North Carolina State University, Raleigh, NC.*

Copper (Cu) deficiency is a problem in ruminants and genetic differences among breeds may contribute to this issue. As previously reported, Simmental have lower Cu status and higher Cu excretion in bile than Angus when both breeds are fed a diet marginal in Cu. Thus, a study was conducted with pregnant multiparous cows (n = 16) in a 2×2 factorial design to evaluate the effects of breed (Angus vs. Simmental) and dietary Cu on transporters and chaperones that regulate Cu metabolism. Cows were randomly assigned within breed to a corn silage-based diet formulated to be either adequate (+Cu) or deficient (–Cu) in Cu. Cows were individually fed using Calan gates. Plasma and liver samples were collected at 28 and 56 day intervals, respectively. Cows were harvested on day 112 or 113 and duodenal scrapings and liver samples were obtained for mRNA and protein analysis. All transporters and chaperones were measured at the mRNA level while only copper transporter1 (CTR1) and CCS proteins were measured. Plasma and liver Cu concentrations were affected ($P < 0.05$) by dietary Cu, breed, and a Cu $\times$ breed interaction. Plasma and liver Cu were lower ($P < 0.01$) in Simmental vs. Angus when fed –Cu diets, but were not affected by breed in cows fed +Cu. Copper transporter1, the major import protein for Cu, was lower ($P < 0.05$) at the mRNA level in Simmental vs. Angus when the –Cu diet was fed, but was not affected by breed in cows fed +Cu. Simmental tended ($P < 0.10$) to have lower duodenal CTR1 protein than Angus. The Cu exporter from enterocytes, ATP7A, tended ($P < 0.10$) to be lower at the mRNA level in Simmental than in Angus. Neither dietary Cu nor breed affected mRNA for Cu chaperone proteins which deliver Cu for incorporation into superoxide dismutase (CCS), cytochrome c oxidase (COX17), or the secretory pathway (ATOX1) in

the Golgi network of the intestine or liver. In liver, mRNA of ATP7B and COMMD1, proteins responsible for biliary excretion of Cu, were not affected by dietary Cu or breed. Lower gene expression of duodenal CTR1 and ATP7A in Simmental may explain why Simmental cattle are more susceptible to Cu deficiency than Angus.

Key Words: Cattle, Copper, Transporters

36   Anthelmintic resistance in gastrointestinal nematodes of sheep and goats in the Mid-Atlantic U.S. E. K. Crook*[1], D. J. O'Brien[1], S. B. Howell[2], B. Storey[2], N. C. Whitley[3], S. Schoenian[4], J. M. Burke[5], and R. M. Kaplan[2], [1]*Delaware State University, Dover*, [2]*University of Georgia, Athens*, [3]*North Carolina A&T University, Greensboro*, [4]*University of Maryland Cooperative Extension, Keedysville*, [5]*USDA, ARS, Dale Bumpers Small Farms Research Center, Booneville, AR*.

DrenchRite® Larval Development Assays (LDA) were used to evaluate anthelmintic resistance of gastrointestinal nematodes (GIN) on 19 goat and 13 sheep farms in the Mid-Atlantic U.S. over a 2-year period. On each farm, fecal samples were collected rectally from a minimum of 10 individual animals, pooled, and then express-mailed to the University of Georgia. Nematode eggs were isolated from the feces and evaluated for resistance to benzimidazole (BZ), moxidectin (MOX), ivermectin (IVM), and levamisole (LEV). The predominant species found was Haemonchus contortus (84%), but resistance is reported based on the predominant species for each farm tested. Resistance or a low level of resistance to BZ was reported on 97% (31/32) and 3% (1/32) of farms tested, respectively. Resistance to IVM was reported on 56% (18/32) of farms while susceptibility was reported on 22% (7/32) of farms. A low level of IVM resistance was reported for 6 farms (19%) and suspected resistance was reported for 1 farm (3%). The drug, MOX, was effective against GIN on 50% of tested farms (16/32), while a low level of resistance or resistance was found on 19 and 31% of farms, respectively. Susceptibility to LEV was present on 72% (23/32) of farms while a low level of resistance or resistance was found on 6 and 9% of farms, respectively. Suspected resistance to LEV was reported on the remaining 13% of farms. This data demonstrates that anthelmintic resistance in gastrointestinal nematodes is a serious problem on sheep and goat farms in the mid-Atlantic region of the U.S. and the most predominant parasite species is H. contortus.

Key Words: LDA, Anthelmintic resistance, H. contortus

37   Using limited acreage of non-toxic, novel endophyte-infected tall fescue for spring and fall-calving cows grazing toxic, wild-type endophyte-infected fescue. J. Caldwell*[1], K. Coffey[1], D. Philipp[1], J. Jennings[3], D. Hubbell, III[1], J. Tucker[1], A. Young[1], T. Hess[1], D. Kreider[1], M. Looper[2], M. Popp[1], M. Savin[1], E. Kegley[1], and C. Rosenkrans, Jr.[1], [1]*University of Arkansas, Fayetteville*, [2]*USDA-ARS, Booneville, AR*, [3]*University of Arkansas Cooperative Extension Service, Little Rock, AR*.

Replacing toxic *Neotyphodium coenophialum*-infected tall fescue (E+) with non-toxic, novel endophyte-infected fescue (NE+) has improved cow performance greatly, but producer acceptance of NE+ has been slow. Spring (S) and fall-calving (F) cows grazed either E+ or NE+ at different percentages of the total pasture area to determine the extent of having limited access to NE+ will enhance cow/calf performance. Crossbred cows (n = 178) were stratified by BW and age within calving season and allocated randomly within calving season to 1 of 14 groups

representing 5 treatments: 1) F on 100% E+ (F100; n = 3); 2) S on 100% E+ (S100; n = 3); 3) F on 75% E+ and 25% NE+ (F75; n = 3); 4) S on 75% E+ and 25% NE+ (S75; n = 3); and 5) S on 100% NE+ (NE100; n = 2). Cow BW at breeding, BW and BCS at the end of breeding, BW, BCS, and hair score (HRSC) at weaning, and calving rates were greater ($P < 0.05$) for F vs. S. A calving season by NE+ % interaction ($P < 0.05$) was detected for calving rates, HRSC at weaning, and cow PRL at breeding. Cow BCS and HRSC at the end of breeding were greater ($P < 0.05$) for F100 and S100 vs. F75 and S75, but the reverse was true ($P < 0.05$) for calving rates and cow PRL at breeding. Calf gain, weaning weight, and ADG were greater ($P < 0.05$) for F vs. S, and calf gain was greater ($P < 0.05$) for F75 and S75 vs. F100 and S100. Therefore, a fall-calving season may be more desirable for cows grazing E+, resulting in greater calving rates, BW and BCS at critical times, and heavier calves at weaning. Limited access to NE+ may improve calving rates, cow PRL at breeding, and calf gain through weaning. This project was supported by the National Research Initiative of the National Institute of Food and Agriculture, USDA, grant # 2006-55618-17114.

Key Words: Cattle, Novel fescue, Prolactin

38   Leptin regulates angiogenic hormone expression in developing luteal tissue. R. A. Katchko*[1], J. R. Wiles[1], E. A. Aguirre[1], C. W. O'Gorman[3,1], D. H. Kiesler[3], R. L. Stanko[1,2], and M. R. Garcia[1], [1]*Texas A&M University, Kingsville*, [2]*Texas A&M University AgriLife Research Station, Beeville, TX*, [3]*University of Missouri, Columbia*.

Infertility in females is the inability to become and maintain pregnancy, which can be caused by the abnormal development of a corpus luteum (CL). Abnormal development is linked to incomplete angiogenesis, which leads to an overall decrease in P_4 production. Angiogenesis is regulated by factors, such as fibroblast growth factor-2 (FGF-2), vascular endothelial growth factor (VEGF), and angiopoietin-1 (Ang-1) all of which are expressed in developing luteal tissue. Leptin, a potent satiety hormone, influences the expression of FGF and VEGF in non-ovarian tissue, and is also produced in the CL. Hence, it is hypothesized that leptin influences the production of FGF-2, VEGF, and Ang-1 in the developing CL. The objectives of the study were to 1) characterize angiogenic factor expression in the developing CL and 2) determine the effect of leptin on FGF-2, VEGF, and Ang-1 expression in dispersed luteal tissue. Thirty mature crossbred gilts of similar age were randomly allocated to one of five days of CL development (day 3, 4, 5, 6, or 7 of the estrous cycle; n=6/day) for tissue collection. Pigs were checked twice daily for classical, behavioral estrus using a boar for detection. Blood samples were collected on the day of CL harvest for serum P_4 analysis. Luteal tissue was divided and either embedded for immunohistochemistry, frozen in liquid N_2, or enzymatically digested and dispersed for culture. Dispersed cells were cultured with or without leptin (0, 10^{-12}, 10^{-11}, 10^{-10}, 10^{-9}, 10^{-8} M; n=3 wells/dose/female) for 24 hrs. Total expression for VEGF, FGF-2, Ang-1, and the leptin receptor (OB-Rb) was determined in all samples. All angiogenic factors and OB-Rb were localized to vascular endothelial cells, small luteal cells and large luteal cells; however, concentration and predominant cellular location varied by day of development. The expression of FGF-2 was highest (P=0.05) on day 6 and leptin increased linearly (P=0.005) as the CL developed. Leptin dose dependently decreased (P $\leq$ 0.05) VEGF, FGF-2 and Ang-1, relative to day of luteal development, by 10, 17 and 16.8%, respectively. Therefore, leptin is likely involved in the angiogenic process in developing CL tissue.

Key Words: Leptin, Angiogenesis, CL

39   Utilizing corn byproducts for beef cattle stockering and finishing operations in the southeastern United States. J. R. Segers*, R. L. Stewart Jr., T. D. Pringle, M. A. Froetschel, and A. M. Stelzleni, *University of Georgia*, *Athens*.

Two trials were conducted to evaluate two corn byproducts as CP supplements in stocker and feedlot diets. In trial one, 81 weaned steers (BW=306 kg ± 56.69 kg) were stratified by weight and assigned to one of three corn silage based diets: 1) dried distillers grains (DDG), 2) corn gluten feed (CGF) or 3) soybean meal and ground corn (SBM). On d 0, 28, 56, and 84, BW, hip heights (HH) and BCS were measured, and ultrasound data was recorded. During the stocker phase, steers fed SBM had increased (P<0.05) BCS compared to cattle fed byproducts. There were no differences in ADG or HH across treatments (P>0.10). The DDG decreased (P<0.05) feed to gain ratio (F:G) compared to CGF and SBM. However, cost per kg of gain was similar (P>0.70). Ultrasound data indicated steers fed SBM had larger ribeye areas (REA) than those fed CGF and DDGS (P<0.05) and intramuscular fat (IMF) was higher (P<0.05) in SBM and CGF fed calves than those fed DDG. In trial two, a subset of 36 steers (12 per treatment) was randomly selected to evaluate the same CP supplements in a 100-d finishing phase. Steers received a finishing diet and remained on the same CP treatments utilized in trial one. Weight was recorded every 25d and BCS and ultrasound data were collected d 1, 50, and 100. At the end of finishing, steers were harvested and carcass data were collected. There was no treatment effect on ADG, DMI, and BCS (P<0.05) in trial 2. Compositional ultrasound data showed that diet did not influence (P>0.05) REA or IMF, but SBM steers had increased (P<0.05) fat over the rib and rump. Post-harvest data suggested that CGF increased (P<0.05) lean L and b values as well as fat L values. Also, an increase (P<0.05) in lean maturity score was recorded for carcasses from SBM steers compared to DDG and CGF steers. Unaffected (P>0.05) carcass characteristics include HCW, DP, KPH, REA, IMF, pH, redness, texture, firmness and overall maturity. These data indicate DDG and CGF can be utilized in stocker and finishing operations without compromising economically important traits.

Key Words: Corn byproducts, Stocker, Feedlot

40   Age at weaning and diet influence age at puberty in *Bos indicus* influenced heifers. M. D. Mahan*[1], E. A. Aguirre[1], M. R. Garcia[1], and R. L. Stanko[1,2], [1]*Texas A&M University*, *Kingsville*, [2]*Texas AgriLife Research*, *Beeville, TX*.

Early weaning and a high-concentrate diet can induce precocious puberty in heifers. The objectives were 1) to wean *Bos indicus* influenced (25%) heifers at different ages to determine if precocious puberty could be initiated through dietary manipulation and 2) to determine IGF-I dynamics associated with puberty. Crossbred (Angus x Hereford/Brahman F1) fall- (trial 1, n=12) and spring-born (trial 2, n=12) heifers were weaned at 173 ± 4 d of age and 171 ± 0.1 kg, and at 117 ± 3 d of age and 137 ± 3 kg, respectively. Heifers were blocked by BW and randomly allocated to be fed a high-concentrate (60% corn; H) or control diet (30% corn; C). Heifers were bunk fed (2.5% BW) to gain 0.45 and 0.91 kg/d for C and H groups, respectively. Heifers were weighed every 14 to 21 d. Blood samples were collected weekly and assayed for progesterone to determine age at puberty. Blood samples collected at -10 wk (trial 1) or -20 wk (trial 2) to wk of puberty were assayed for IGF-I. Heifers fed the H diets had greater (P<0.01) ADG than C heifers in both trial 1 and 2 (0.97 ± 0.07 vs. 0.57 ± 0.05 kg/d and 0.84 ± 0.06 vs. 0.61 ± 0.04 kg/d, respectively). Age at puberty (d) was similar (P>0.1) between the C (354

± 12) and H (342 ± 16) fed heifers in trial 1, but was reduced (P< 0.01) in the H (303 ± 28) compared to C (462 ± 32) fed heifers in trial 2. Body weight (kg) at puberty was similar (P>0.1) between C (303 ± 10) and H (332 ± 18) fed heifers in trial 1, but was lower (P<0.05) in H (301 ± 36 kg) compared to C (412 ± 28 kg) fed heifers in trial 2. Serum IGF-I concentrations did not differ between C and H heifers in trial 1 during the 10-wk prior to puberty. However, in trial 2, serum IGF-I concentrations were greater (P< 0.01) during the 20-wk prior to puberty in H than C fed heifers. Early weaning (4 mo) and feeding a high-concentrate diet hastened onset of puberty in *Bos indicus* influenced heifers. Increased serum IGF-I may influence onset of puberty in early weaned heifers.

Key Words: IGF-1, Weaning, Puberty

41   Effects of Ractopamine-HCl (RAC) on carcass quality, muscle fiber types, sensory evaluation and shear force measurements in yearling heifers. E. N. Hunter*, C. R. Kerth, L. K. Anderson, C. L. Bratcher, and T. Brandebourg, *Auburn University*, *Auburn, AL*.

Seventy-two commercial crossbred yearling heifers were fed a high-concentrate, finishing ration ad-libitum twice a day at the Auburn University Beef Cattle Evaluation facility. Heifers were sorted based on initial height and weight, divided into one of nine groups and each group was randomly assigned to one of the following DOF groups: 79 (n=16), 100 (n=16), 121 (n=16), 142 (n=16), or 163 (n=7) days. Within these nine groups, heifers were randomly assigned to a treatment of either 300 mg/hd/d Ractopamine-HCl (RAC, Elanco Animal Health, Greenfield, IN) for the final 35 d prior to slaughter or a control group (0 mg/hd/d RAC). All animals were humanely slaughtered at the Lambert-Powell Meats Laboratory in Auburn, AL. Twenty-four hours postmortem, carcass characteristics were completed on each group. Longissimus muscle samples from the twelfth rib were removed and fiber type samples were frozen in isopentane, submerged in liquid nitrogen, followed by storage in a deep freezer until analysis (-80C). At this time, loins from the right carcass side were removed from each animal, vacuum-packaged, and aged for twenty-one days in the cooler. Loins were then removed from the vacuum package and strip steaks (2.54 cm thick) were cut for sensory and shear force analysis. Data were analyzed using general linear models in SAS (SAS Inst. Inc., Cary, NC, 2002), with a significance level of 0.05. Days on feed had a significant effect (p<0.05) on hot carcass weight, 12th rib fat thickness, adjusted fat thickness, KPH fat and yield grade in heifers. Marbling scores resulted in a DOF by ractopamine interaction with an average marbling score of modest. Fiber type analysis resulted in DOF having a significant effect (p<0.05) on only Type IIA (intermediate) fiber types, which had a mean fiber area of 3290.81 µm. There were no significant (P>0.05) differences among treatments in shear force or sensory analysis.

Key Words: Ractopamine, Fiber types, Shear force

42   Relationships between feed efficiency traits, and scrotal circumference and semen-quality traits in yearling bulls. A. N. Hafla*[1], P. A. Lancaster[2], G. E. Carstens[1], D. W. Forrest[1], J. T. Fox[3], M. E. Davis[4], R. D. Randel[5], and J. W. Holloway[6], [1]*Texas A&M University*, *College Station*, [2]*Oklahoma State University*, *Stillwater*, [3]*Kansas State University*, *Manhattan*, [4]*Ohio State University*, *Columbus*, [5]*Texas AgriLife Research*, *Overton, TX*, [6]*Texas AgriLife Research*, *Uvalde, TX*.

A meta-analysis was conducted to examine phenotypic correlations between feed efficiency traits, scrotal circumference and semen-quality traits in yearling bulls. Data evaluated were obtained from 4 postwean-

ing trials involving Angus (N = 92) and Bonsmara (N = 62) bulls fed diets that ranged from 1.70 to 2.85 Mcal ME/kg DM. Following an adaptation period of 24 to 28 d, feed intake was measured daily and BW measured at 7- or 14-d intervals during the 70-77 d trials. Ultrasound carcass traits (12th rib backfat thickness, BF; longissimus muscle area, LMA) and scrotal circumference (SC) were measured at the start and end of each trial. Semen samples were collected by electroejaculation within 50 d of the end of the trials when age of bulls averaged from 365 to 444 d, and were evaluated for progressive sperm motility and morphology. Residual feed intake (RFI) was calculated as the difference between actual DMI and expected DMI from linear regression of DMI on ADG and mid-test $BW^{0.75}$; with trial, trial by ADG, and trial by mid-test BW075 as random effects. G:F was strongly correlated with ADG (0.56) and weakly correlated with initial age and BW (-0.15; -0.18) and DMI (-0.21). RFI was not correlated with ADG, initial age or BW, but was correlated ($P < 0.01$) with DMI (0.67), G:F (-0.68) and BF (0.21). Initial SC (0.19), gain in SC (-0.31), and percent normal sperm (-0.19) were weakly correlated ($P < 0.05$) with G:F, but these traits were not correlated with RFI. Across all studies, bulls with low RFI phenotypes (< 0.5 SD below the mean) consumed 20% less DMI and had 35% less BF, but had similar ADG, SC and semen-quality traits compared to high-RFI bulls (> 0.5 SD above the mean). These data suggest that RFI is not phenotypically associated with SC or semen-quality traits in growing bulls.

Key Words: Residual feed intake, Growing bulls, Semen-quality

43   Vegetation types to protect the soil when gestating sows have access for grazing. S. Ireland*[1], B. Pope[1], T. Barrios[1], S.-H. Oh[1], and J. Green[2], [1]*North Carolina A&T State University*, *Greensboro*, [2]*North Carolina State University*, *Raleigh*.

The use of outdoor pig raising systems, though benefitting many, is a source of scrutiny due to the natural rooting behavior of swine. Throughout the course of this study six sows were be assigned to a pasture grazing system at the swine unit of North Carolina A & T State University. Each sow is assigned a Real Time Location System unit which notified sow position at all times. The attained data was then used to determine how often she frequents different areas of the pasture. The pasture consisted of four different grass varieties; the wild type, infected Kentucky 31 Tall Fescue, the novel type, infected Max Q Fescue, a multispecies comprised of Redtop, Kentucky bluegrass, and Kentucky 31 Fescue, as well as a common Bermuda grass as a control group. Current data demonstrates that the sows frequently migrate towards the common area associated with Bermuda grass and the multispecies variety.

Key Words: Outdoor pig, Gestating sows, Vegetation type

44   Effects of cool- and warm season forages on instrumental color characteristics, Warner-Bratzler shear force and cooking loss of beef steers. C. W. Rowe*[1], C. R. Kerth[1], R. B. Muntifering[1], K. R. Willian[2], and C. L. Bratcher[1], [1]*Auburn University*, *Auburn, AL*, [2]*Tuskegee University*, *Tuskegee, AL*.

Fall born steers were used to examine effects of cool- and warm-season forages on instrumental color characteristics, Warner-Bratzler shear force (WBS) and cooking loss. Steers were placed on fescue in late fall and allowed to graze until the beginning of the trial (Dec. 9, 2008). On the trial start date, the first group of steers (Group 1, about 12 mo of age) were harvested to serve as a baseline for the remaining harvest

groups (HG; n=5) and the remaining groups were placed on ryegrass. After HG 4 (June 23, 2009), steers were moved to a bermudagrass and fescue pasture for 28 d. Steers were then moved to a crabgrass pasture for the duration of the grazing period. Steers were allowed to graze in the same pasture to eliminate variation among forages in differing pastures. Steers were humanely harvested at a small commercial processing plant. Strip loins were removed from the left side of each carcass 24 h postmortem, vacuum packaged and aged for 13 d in dark storage at 2o C. Upon completion of aging, strip loins were removed from their vacuum packages and cut into steaks. The steaks were designated to one of three treatments: 0 d aging (14d), 7 d aging (21d) or display (DIS) for seven d in a retail coffin case. The DIS steaks were overwrapped using PVC film on a foam tray. Color measurements taken were L*, a*, b*, hue angle, saturation index, and 630/580 nm absorbance ratio and were taken on days 0, 2, 4, and 6. Data were analyzed using a mixed model procedures of SAS for a completely randomized design with day as a repeated measure and HG as a fixed effect for instrumental color and HG and treatment as fixed effects for WBS and cooking loss. Day by HG interactions were significant ($P < 0.05$) due to changes in differences between HG among days. Treatment by HG interaction was significant ($P < 0.05$) for cooking loss. Harvest group 2 had a higher ($P < 0.05$) shear value than HG 1, 4, 5, and 6, but did not differ ($P < 0.05$) from HG 3.

Key Words: Instrumental color, Beef, Forage-fed

45   Effects of including Micro-Aid® in a protein supplement on in situ ruminal degradation of low quality prairie hay. C. P. McMurphy*[1], A. J. Sexten[1], G. L. Mourer[1], E. D. Sharman[1], M. J. Rincker[2], and D. L. Lalman[1], [1]*Oklahoma State University*, *Stillwater*, [2]*DPI Global*, *Porterville, CA*.

Sixteen ruminally cannulated crossbred steers (BW = 529 ± 45 kg) were used to evaluate in situ DM and NDF degradation characteristics of low quality prairie hay in steers provided a protein supplement with or without Micro-Aid® (MA; plant derived saponin). Steers were allowed ad libitum access to chopped prairie hay (4.9% CP and 73.8% NDF) and randomly assigned to one of four treatments. Treatments included 1) no supplement (C), 2) cottonseed meal/wheat midds supplement with no MA (PC; 36% CP); 3) MA added to PC to supply 1 g·steer^{-1}·d^{-1} (MA1); 4) MA added to PC to supply 2 ·steer^{-1}·d^{-1}(MA2). Steers were individually supplemented once daily at 0800 with 1.02 kg of supplement and 2 oz of mineral supplement to ensure mineral requirements were met or exceeded. Steers were adapted to diets for ten d prior to incubation of prairie hay. Duplicate forage samples were incubated for 0, 2, 4, 6, 8, 12, 16, 24, 36, 48, 72, and 96 h in steers consuming the same forage. Following forage incubation and a subsequent 5 d adaptation, dry matter intake (DMI) was measured for 5 d. On d 10-14 (1 steer·trt^{-1}·d^{-1}) ruminal evacuations were conducted at 0 and 4 h post feeding. Acid detergent insoluble ash (ADIA) was used as an internal marker to estimate particulate passage rate (Kp). Orthogonal contrasts were used to determine the effects of protein supplementation, addition of MA and level of MA inclusion. Protein supplementation increased DMI, Kp, and ruminal digestibility of DM and NDF ($P < 0.01$). DMI was not affected by the inclusion of MA. The addition of MA decreased Kp compared to PC (2.79 and 2.28 %/h respectively; $P = 0.02$). Accordingly, MA1 and MA2 increased DM and NDF digestibility compared to PC (44 and 49 g/kg respectively; $P = 0.04$). Inclusion of MA in protein supplements may enhance utilization of low quality forage by increasing DM and NDF digestibility. Increased forage digestibility appears to be the result of decreased passage rate and increased rumen retention time.

Key Words: Micro Aid, In situ degradation, Protein supplementation

Meats

46   Effects of On Farm Electrolyte Supplementation on the Hydration and Meat Quality of Cull Dairy Cows. T. S. Arp*, C. C. Carr, D. D. Johnson, and T. M. Warnock, *University of Florida, Gainesville*.

Transportation and handling of cattle prior to slaughter are stressors which can impact weight change and post mortem muscle quality. Electrolyte supplementation has been evaluated extensively with growing and finishing cattle, but little to no work has been reported with cull cows. The objective of this study was to determine the effects of electrolyte supplementation on the hydration and meat quality in cull dairy cows. Sixty cull dairy cows (644.3 ± 121.9 kg) were stratified by body weight, days of lactation, and farm of origin into two treatment groups (n=30). At 0500 cows were drenched with a solution of 2.4 g of dry electrolyte comprised of dextrose, sodium bicarbonate, magnesium sulfate and potassium chloride diluted in 1.5 L of water. Control group was given a placebo volume (1.5 L) of water. At 1700 cows were transported 2.5 h to a non-fed beef processor, unloaded and allowed 8 h of lairage time with access to water prior to slaughter. Body weight and blood were collected from cows prior to treatment and slaughter. Treated cows remained more hydrated than control cows from dosage till slaughter as per a greater decrease in packed cell volume (PCV; $P = 0.047$; -0.74 vs. 0.56), and percent PCV change ($P = 0.049$; -1.79 vs. 1.68). Also, LM samples from treated cows exhibited greater drip loss ($P = .035$; 1.26 vs. 0.60) and lower pH ($P = 0.058$; 5.81 vs. 5.91) than samples from control cows. These results show potential for electrolyte supplementation in cull cows to mitigate transport and handling stress to improve animal hydration and meat quality.

Key Words: Cull dairy cows, Electrolyte, Stress

47   There is no difference in the color and tenderness of commodity and natural beef. C. A. Keys*, J. K. Apple, J. W. S. Yancey, R. J. Stackhouse, T. M. Johnson, and L. N. Mehall, *University of Arkansas, Division of Agriculture, Fayetteville*.

Beef ribeye rolls (IMPS#112A) (n=10 per treatment) were purchased to compare the fresh color and cooked tenderness of steaks from natural-fed beef to that of commodity beef. Ribeye rolls were shipped under refrigeration to the University of Arkansas Red Meat Abattoir, where they were aged at 2° C for 10 d from fabrication. Then, pH of each ribeye roll was recorded before being cut into 2.54-cm-thick steaks, and 3 steaks from each ribeye roll were allowed to bloom for 30 min at 4° C before measuring instrumental color. Three additional steaks from each ribeye roll were weighed, cooked to 3 internal endpoint temperatures (66, 71, or 77° C), and reweighed to calculated cooking loss percentages. Then, at least six 1.27-cm-diameter cores were removed from each steak parallel to the muscle fiber orientation and sheared once through the center with a Warner-Bratzler shear force (WBSF) device attached to an Instron Universal Testing machine. Muscle pH did not ($P = 0.19$) differ among the beef programs. Steaks from conventionally-fed, commodity ribeye rolls were darker (lower L* values, $P < 0.05$) than steaks from natural beef programs, but neither a* nor b* values were different ($P \geq 0.88$) among steaks from conventional and natural beef programs. Steaks cooked to 66°C had the lowest ($P < 0.05$), and those cooked to 77°C had the highest ($P < 0.05$), but cooking losses were similar ($P = 0.12$) among the beef programs. Moreover, WBSF values were not affected by internal endpoint temperature ($P = 0.20$) or whether they were marketed as commodity or natural beef ($P = 0.77$). With the exception of price,

there are little to no difference in fresh color and cooked tenderness between commodity beef and natural beef programs.

Key Words: Commodity beef, Natural beef, Tenderness

48   Effects of two systems for pasture grazing pigs on meat quality and sensory evaluation. C. L. Bratcher*, D. L. Kuhlers, K. Nadarajah, C. R. Kerth, and W. F. Owsley, *Auburn University, Auburn, AL*.

Consumers are now more aware of how their food is produced. There is the perception that confinement conditions are not humane and does not allow for expression of natural tendencies for pigs like rooting and playfulness. These perceptions and increased farmer interest has brought an influx of alternative farming strategies and names like natural, free range, organic and hormone or antibiotic free for production and marketing claims. The objective of this project was to compare carcass characteristics, meat quality, sensory evaluation and shear force (WBSF) of pigs in confinement with those on pasture, either rotated or not, over two different years. Animals were placed in confinement (CONF) conditions to simulate commercial production. A rotational grazing (ROTGZ) system was constructed by creating 1/2 acre paddocks where pigs were rotated every week as a group. The continuous grazing (CONTGZ) paddock was 1/2 acre and pigs remained for the entire study. Data were analyzed using the PROC GLM procedure in SAS. The linear model used to analyze the carcass traits included the fixed effects of system, trial, block and sex of pigs as well as two- and three-way interactions, and random residual error. Carcass traits were adjusted for hot carcass weight to account for endpoint differences. There were no differences in grazing treatment for first rib fat (FRF), last lumbar fat (LLF) or tenth rib fat (TRF). Pigs in CONF had more last rib fat (LRF) and a larger loin eye area (LEA) than pigs in CONTGZ. The pigs in ROTGZ were not different that CONF or CONTGZ for LRF or LEA. Barrows had more TRF than gilts. There were no differences in treatment for L*, a* and b* color, color score or marbling taken from the loin at 24 hours postmortem. The CONF pigs had higher firmness scores than CONTGZ, and the firmness score from ROTGZ was not different than CONF or CONTGZ. There were no sex differences for any of these characteristics. For WBSF, the loin chops from CONTGZ were more tender than either ROTGZ or CONF, which were not different. Sensory panel scores did not reflect this difference. There were also no differences in cook loss or sex.

Key Words: Pasture pork, Pork quality, Sensory

49   Effects of serial harvest of fall-born steers grazing warm- and cool-season forages on carcass characteristics. C. R. Kerth*[1], C. W. Rowe[1], R. B. Muntifering[1], K. R. Willian[2], and C. L. Bratcher[1], [1]*Auburn University, Auburn, AL*, [2]*Tuskegee University, Tuskegee, AL*.

Fall-born steers (n=60, 316.75 kg + 29.2) were serial harvested to examine the effects age on carcass characteristics of steers grazing cool- and warm-season forages. Steers were placed on fescue in late fall and allowed to graze until the beginning of the trial (Dec. 9, 2008). On the trial start date, steers were stratified by weight and the first group of steers (Age Group 1, about 12 mo of age) were harvested to serve as a baseline for the remaining age groups (n=5; 2, 3, 4, 5, 6) and the remaining groups were placed on ryegrass. Groups of steers then were serial harvested every 56 d for a total of 6 harvest groups. After harvest

group 4 (June 23, 2009), steers were moved to a bermudagrass and fescue pasture for 28 d. Steers were then moved to a crabgrass pasture for the duration of the grazing period. Steers were allowed to graze in the same pasture to eliminate variation among forages in differing pastures. Steers were humanely harvested at a small commercial processing plant in Bluffton, GA. Twenty-four hours postmortem, hot carcass weight (HCW), backfat at the twelfth rib, marbling, ribeye area, kidney, pelvic and heart fat (KPH), pH, lean a*, b*, and L*, fat a*, b*, and L* at the twelfth rib, and yield grade were measured on each carcass. Data were analyzed using PROC GLM of SAS for a completely randomized design with age group as a fixed effect. There were no differences (P > 0.05) for lean L* and fat a* among age groups. Age group 6 had the greatest (P < 0.05) HCW, amount of marbling, backfat thickness and yield grade compared to other groups. Age group 1 had the smallest (P < 0.05) ribeye area, highest (P < 0.05) pH and the lowest (P < 0.05) HCW among age groups. Age groups 6, 5, and 3 had similar (P > 0.05) higher fat b* values at the twelfth rib whereas age groups 2 and 4 had similar (P > 0.05) lower fat b* values. Age group 6 had the highest (P < 0.05) lean a* value among harvest groups except age group 2. Results indicate that increased days on forage physiological age for age group 6 allowed for increased HCW, marbling and backfat thickness compared to other age groups.

Key Words: Carcass characteristics, Beef, Forage-fed

50   The impact of citric acid marination pH on visual and instrumental color characteristics of dark-cutting beef. R.J. Stackhouse*, J. K. Apple, J. W. S. Yancey, C.A. Keys, T. M. Johnson, and L.N. Mehall, *University of Arkansas, Division of Agriculture, Fayetteville.*

Beef strip loin (IMPS #180) sections (n=9/treatment) were used to test the effects of citric acid-marination pH on visual and instrumental color characteristics during a 5-d, simulated retail display period. Treatments included a low Choice(CH; mean pH = 5.48) control, a Dark-Cutting (DC; mean pH=6.57) non-injected control and DC sections injected to 111% of raw product weight with pH 3.5, 4.0, 4.5 or 5.0 solutions made by mixing citric acid (CA) in either a 0.5% phosphate and tap water solution (PO_4) or tap water (H_2O). After injection, strip loin sections were vacuum-tumbled, and cut into 2.5-cm-thick steaks that were placed on foam trays, overwrapped with an O_2 -permeable film, and placed in simulated retail display (4°C and 1,600 lux lighting). Packaged steaks were evaluated for visual color by a 5-person panel, and instrumental color using a Hunter MiniScan. Post-enhancement pH of DC steaks enhanced with the pH 3.5/PO_4 solution was lower (P < 0.05) than DC steaks (6.32 vs. 6.65), but was still higher (P < 0.05) than CH steaks (5.48). DC sections enhanced with the pH 4.0/H_2O solution had greater (P < 0.05) expressible moisture than DC steaks or steaks from DC sections enhanced with PO_4, regardless of solution pH; however, enhancement did not produce expressible moisture levels comparable to CH steaks. On d 0, 1, and 2 of display, CH steaks received the high-

est (P < 0.05) color scores and a* values, whereas DC steaks had the lowest (P < 0.05) a* values and pH 3.5/PO_4 -enhanced steaks received the lowest (P < 0.05) color scores (treatment × day, P < 0.001). Yet, CH steaks had the lowest (P < 0.05) a* values and color scores, as well as the greatest (P < 0.05) discoloration scores, on d 4 and 5 of display. Results from this study indicate that the pH values of citric acid enhancement solutions, regardless of base solution, were insufficient to improve the color of DC beef to that comparable to CH beef.

Key Words: Beef, Dark-cutters, Citric acid enhancement

51   Effect of treating beef trim with lactic acid bacterial and Herbalox® or SYNTRx 3300™ on ground beef color during retail display. C. C. Carr*[1], D. D. Johnson[1], L. E. Eubanks[1], R. P. Garrett[2], L. R. Malechek[3], and R Allen[4], [1]*University of Florida, Gainesville,* [2]*FPL Food, LLC, Augusta, GA,* [3]*Agri-West International, Inc, San Antonio, TX,* [4]*Synergy Technologies, Inc, Shreveport, LA.*

The objective of this study was to determine the effects of treating beef trim with lactic acid bacteria, a nutrient competitor, and Herbalox®, an antioxidant, (LAH) or SYNTRx 3300™ (SY), an antimicrobial, on objective lean color of ground beef. The study evaluated trim of two fat percentages, lean (LN; 7%) and fat (FT; 27%), a control group (CON) and two treatments incorporating SY (SYNTRx 3300™, Synergy Tech., Towson, MD) buffered to a pH of 1.2 and applied at 1 L /45.4 kg of trim, or LAH with 2.25 g of culture (Meat Cultures, Nutrition Physiology Corp., Amarillo, TX) dissolved in 236.6 ml of distilled water and applied to 45.4 kg of trim. The LAH treatment also incorporated 45.4 g Herbalox® (HT 50; Kalsec®, Inc. Kalamazoo, MI) diluted in 454 g of canola oil. Samples were placed on Styrofoam trays, overwrapped with polyvinylchloride film and allotted to aerobic dark storage for 5, 7, or 9d or vacuum packaged for 12d, then placed at retail display for 5d for daily evaluation. Data were analyzed using treatment, fat percentage, storage day, and display day as main effects. All two-way interactions were included in the model. Retail package was the experimental unit for all analysis and was nested within display day for the repeated measures analysis of all variables. Samples from LAH treated trim were lighter (greater l* value; P < 0.005) than CON or SY treated samples across display. Ground beef from SY treated LN trim had the lowest numerical metmyoglobin percentage (MET) of all treatments and had a lower MET (P < 0.012) than samples from all LAH treated trim, regardless of fat level throughout display. Samples from LAH treated trim were more vivid (greater chroma values; P < 0.029) than samples from SY treated trim across display. However, samples from SY treated LN trim were more vivid (P < 0.004) than CON samples from LN trim across display days. These data show ground beef from LAH and SY treated trim displayed advantages for objective lean color compared with CON samples.

Key Words: Ground beef, Lactic acid bacteria, Antimicrobial

Pastures and Forages

52   Productivity, nutritive quality and beef cattle production from dallisgrass (*Paspalum dilatatum*) under continuous or rotational grazing. E. J. Bungenstab*, A. C. Pereira, J. C. Lin, J. L. Holliman, and R. B. Muntifering, *Auburn University, Auburn, AL*.

Dallisgrass (*Paspalum dilatatum*) is well adapted to the southeastern US, and information on its productivity and quality as influenced by grazing management is needed in order to more fully develop its potential as a forage resource for the region. For this reason, we conducted a 2-yr grazing experiment in which replicate 0.40-ha paddocks in a dallisgrass pasture were continuously grazed (CG), or replicate 0.40-ha paddocks were subdivided into two 0.20-ha, three 0.13-ha or four 0.10-ha cells and rotationally grazed (RG) for 84 d from mid-July to early October. Within RG treatments, 0.20-, 0.13- and 0.10-ha cells were grazed for 7 d followed by 7, 14 or 21 d rest, respectively. Three crossbred steers (initial BW, 354 ± 6 kg in 2007 and 310 ± 6 kg in 2008) were assigned randomly to each paddock and weighed at 28-d intervals. Post-grazing residual forage DM and pre-grazing forage DM availability and quality were determined weekly in RG cells, concurrently with determination of forage DM availability and quality in CG paddocks. One steer was removed from each paddock after 28 d because of persistent drought in 2007, and grazing was discontinued on one of the CG paddocks after 56 d in both years. Data were analyzed as a completely randomized design with 4 treatments (2 replicates/treatment) using the PROC MIXED procedures of SAS and standard least-squares model fit. In 2007, there was no effect ($P = 0.25$) of grazing treatment on ADG. Steers grazing 0.10-ha, 0.20-ha and CG paddocks had 106 ($P = 0.01$), 86 ($P = 0.03$) and 83 ($P = 0.03$) kg greater total gain/ha, respectively, than steers grazing 0.13-ha paddocks. In 2008, there were no differences among treatments in ADG ($P = 0.43$) or total gain/ha ($P = 0.90$). Correlation and regression analyses revealed positive statistical associations between steer performance and forage concentration of CP, available forage mass (kg DM/ha) and mass of forage CP (kg/ha). Results indicate that productivity and quality of dallisgrass for stocker cattle production were comparable between continuous and rotational-grazing systems.

Key Words: Dallisgrass, Rotational grazing, Continuous grazing

53   Effect of cow-size and stocking rate during summer grazing on calf growth and cow herd efficiency. P. Beck*[1], B. Stewart[1], H. Gray[1], J. Smith[1], and S. Gadberry[2], [1]*University of Arkansas SWREC, Hope*, [2]*University of Arkansas Coop. Ext. Ser., Little Rock*.

In early May, 2009, 4 ha bermudagrass/dallisgrass pastures (n= 8) were stocked with 56 mature beef cows (BW = 496 ± 67.3 kg, age = 7.6 ± 2.6 yr, 75 to 87% Angus ancestry) with spring-born calves (BW = 97 ± 18.9 kg) to characterize the impacts of cow size and stocking rate (SR) on cow and calf production and efficiency. Cows were segregated into large (BW range = 500 to 615 kg; average BW = 555 ± 41.9 kg) and small (BW range = 397 to 470; average BW = 440 ± 24.8 kg) BW groups. Cows of each BW group were placed on pasture at SR of 1, 1.5, 2, or 2.5 cow calf pairs per ha. Each pasture received 112 kg N/ha as ammonium nitrate in split applications in May and July. A single bull was placed with each group of cows in early May for a 60-d breeding period. Pregnancy status was determined at weaning via rectal palpation. Forage mass was estimated monthly by rising plate meter. At time of rising plate data collection, forage grab samples were collected for estimation of forage nutritive value. Data were analyzed by regression to determine the effects of cow size and stocking rate on calf performance,

cow BW change, and calf gain per ha. Predicted calf weaning weights increased by 0.12 kg for each kg increase in cow BW ($R^2 = 0.20$, $P < 0.01$), but SR had no effect ($P = 0.79$). There was however a quadratic effect ($P = 0.11$) of SR on predicted calf BW gain = 144.1 + 0.05 Cow BW - 55.3 SR +14.1 SR^2 ($R^2 = 0.20$, $P = 0.02$). Cow BW decreased linearly ($P < 0.01$) with increasing SR and decreased ($P < 0.05$) with increasing cow size (Cow BW change = 84.3 - 0.09 cow BW - 17.4SR; $R^2 = 0.23$, $P < 0.01$). Weaning efficiency (kg of calf weaning weight per 100 kg of cow BW at weaning) decreased by 0.06 per kg of cow BW ($P < 0.01$). There were linear increases ($P < 0.01$) in calf weaning weight per ha and total calf gain per ha with increasing SR, but cow size had no effect ($P \geq 0.47$) on those variables. These data indicate that increasing cow size can increase weaning BW of calves, but does not affect total production per ha and reduces weaning weight efficiency ratios. Increasing SR reduces individual calf BW gain but increases total calf gain per ha.

Key Words: Cow size, Stocking rate, Weaning efficiency

54   Performance of growing beef heifers strip-grazing stockpiled KY-31 tall fescue with or without byproduct supplements. J. M. Scruggs*, M. E. Drewnoski, A. D. Shaeffer, and M. H. Poore, *North Carolina State University, Raleigh*.

Producers often feed supplements to increase performance of heifers grazing stockpiled fescue (SF) during the winter. Soybean hulls (SH) and corn gluten feed (CGF) are common supplements (SUPS), but they have not been widely compared for cattle grazing SF. The objective of this study was to evaluate the performance of beef heifers grazing SF (start: 14.5% CP, 29.8% ADF and end: 13.1% CP, 36.2% ADF), either unsupplemented (US) or supplemented (SUP) with 0.5% BW/d of CGF (24.3% CP, 11.2% ADF), SH (17.7% CP, 36.5% ADF), or a 50:50 mix (Mix). Nitrogen was applied at 84 kg/ha in early Sept, and forage accumulated until early Nov. Forage mass at the start of the trial was 4,670 kg/ha DM and endophyte infection rate was <25%. Angus and Angus cross heifers (initial BW = 293 ± 11 kg) grazed SF from November 12 to January 7. A randomized complete block design with 4 land replicates and 16 individual pastures (0.85 ha) was used. Heifers were blocked by weight and breed into 16 groups of 4 and randomly assigned to treatments (TRT). Average daily gains were greater for SUP heifers ($P<0.01$) than US heifers (0.33, 0.73, 0.64, and 0.68 kg/d for US, CGF, SH, and Mix, respectively). Forage DMI, estimated by determining forage mass before and after grazing, did not differ ($P=0.21$) between TRT (5.29, 4.95, 5.26, and 4.56 kg/d for US, CGF, SH, and Mix, respectively). Total DMI was greater for SUP heifers ($P<0.05$) as compared to US heifers (5.29, 6.32, 6.64, and 5.90 kg/d for US, SH, and Mix, respectively). Gain to feed was greater for SUP heifers ($P<0.01$) compared to US heifers (62, 117, 96, and 115 g/kg for US, CGF, SH, and Mix, respectively). Gain/ha was greater for SUP heifers ($P<0.01$) as compared to US heifers (182, 412, 335, and 398 kg/ha for US, CGF, SH, and Mix, respectively). Grazing d/ha (566, 570, 534, and 588 d/ha for US, CGF, SH, and Mix, respectively) and serum urea nitrogen (9.9, 10.4, 10.5, and 10.4 mg/dL for US, CGF, SH, and Mix, respectively) did not differ ($P=0.58$, $P=0.84$, respectively) between TRT. These results show performance was improved by SUPS, but that there was no difference between SUPS.

Key Words: Beef cattle, Supplements, Stockpiled fescue

55   Distance to water effect on forage mass pattern for cattle grazing toxic and non-toxic fescue. M. S. Gadberry*[1], P. A. Beck[2], K. Simon[1], and D. Hubbell, III[3], [1]*Cooperative Extension Service, Little Rock, AR*, [2]*Southwest Research and Extension Center, Hope, AR*, [3]*Livestock and Forestry Branch Station, Batesville, AR*.

A 3–yr project was conducted to examine the impact of forage utilization by cattle grazing toxic (TF, Kentucky 31) and non-toxic (NTF, MaxQ, Pennington Seed, Madison, GA) fescue in relation to distance from the water source. The hypothesis was forage mass (FM) would accumulate more for TF as distance from water increased compared to NTF. The six TF and four NTF study fields each measured 0.81 ha with a mean length to width ratio of 8.3:1 m. Water was located along the southern boundary. Paddocks were stocked at 3.7 and 7.4 calves/ha in the fall and spring, respectively. Initial BW among years averaged 239 ± 7.3 kg. Within paddock, FM was measured by calibrated disk meter on a systematic point grid with 24 points per paddock. Systematic points had a longitudinal distance of 9.5 m and latitudinal distance of 20.5 m. Forage mass was determined at three periods: in the fall, prior to grazing; winter, at the conclusion of fall grazing; and late-spring, at the conclusion of spring grazing. Local Moran I for each point within paddock and sampling date was determined to identify clustered, dispersed or random patterns of FM. Of the 2,142 observations on FM, 89%, 8%, and 3% were associated with random, clustered, and dispersed patterns, respectively. Clustering occurred more often (X^2, $P < 0.02$) with NTF (9.8%) versus TF (6.8%). The median number of clusters within paddock among sampling dates was 3 with a minimum of 1 and maximum of 8. Forage mass was examined for clusters occurring at < 72 m, 72 to 145 m, 146 to 211 m, and > 211 m. A split plot analysis of FM clusters indicated FM occurring at < 72 m and > 211 m was similar ($P = 0.69$) for TF; however, NTF had 2052 kg more ($P < 0.01$) FM at > 211 m compared to < 72 from water. The overall low occurrence of clustering and comparison of FM at < 72 and > 211 m suggest that grazing TF was not affecting the forage utilization pattern, as originally hypothesized, within the scope of the paddock size and seasonality of grazing during the study.

Key Words: Fescue, Grazing pattern, Distance

56   Effect of simultaneous exposure of ergot alkaloids on cytochrome P450 system. A. S. Moubarak*[1], Z. B. Johnson[1], M. L. Looper[2], D. Holtz[1], and C. F. Rosenkrans, Jr.[1], [1]*University of Arkansas, Fayetteville*, [2]*USDA-ARS, Booneville, AR*.

One of the pharmacologically most important groups of indole alkaloids is the ergot alkaloids. These alkaloids are found in rye, wheat, other grains, and in endophyte-infected tall fescue which is used as the base diet for nearly all beef cattle in southern United States and has been linked to the incidence of fescue toxicoses syndrome. This report was designed to study the possible additive, synergistic, or antagonistic effects of simultaneous exposure of pairs of selected ergot alkaloids ergonovine (EN), ergocryptine (EC), and ergocornine (ER) on cytochrome P450 (CYP3A4) using a Promega P450-Glo Assay kit. Cytochrome P450 enzyme systems have been good models for studying the potency of the ergot alkaloids. Luminescence was measured in triplicate on 4 separate days using concentrations varying from 0 to 344 nM of EN, ER, and EC. Analysis of variance was used to determine differences among concentrations. Individually, concentrations up to 344

nM induced ($P < 0.05$) a dose dependent inhibition of CYP3A4 enzyme activity, with EC being most potent (64 %), followed by ER (40%), and then EN (30%). Simultaneous exposure effects were tested at a fixed molar concentration of 344 nM of each combination of the ergot alkaloid pairs as follows: 344+0, 258+86, 172+172, 86+258, and 0+344 nM (EN + ER, EN + EC, and EC + ER). The effects of concurrent exposure of CYP3A4 to EN +EC, EN+ER and EC+ER resulted in lower ($P < 0.05$) levels of inhibition at most of the concentration combinations when compared to the mathematical sum of single effects of each alkaloid. These antagonistic effects were higher when EC was combined with ER (33, 31 and 33% at 258+86, 172+172, and 86+258 nM, respectively) compared to EN+EC (12, 8 and 3%) or EN+ER (11, 7 and -3%). These interactions suggest that in studies of the effects of any ergot alkaloids on animal performance, effects of other ergot alkaloids may also be present and should be considered when evaluating fescue toxicity based on the concentration of only one of these ergot alkaloids.

Key Words: CYP3A4, Ergot alkaloids, Fescue toxicity

57   Nutritive value and fermentation characteristics of ensiled tropical legumes and bahiagrass. J. L. Foster*[1], A. T. Adesogan[2], J. N. Carter[3], L. E. Sollenberger[4], A. R. Blount[2], and R. O. Myer[2], [1]*Texas AgriLife Research, Beeville, TX*, [2]*University of Florida, Gainesville*, [3]*University of Florida, Marianna*, [4]*University of Florida, Gainesville*.

This experiment determined the nutritive value, and ensiling and ruminal degradation characteristics of bahiagrass (BG; *Paspalum notatum* 'Tifton 9'), perennial peanut (PER; *Arachis glabrata* 'Florigraze'), annual peanut (AP; *A. hypogaea* 'FL MDR 98'), cowpea (CWP; *Vigna unguiculata* 'Iron clay'), and pigeonpea (PGN; *Cajanus cajan* 'GA-2'). It was completely randomized design with species as the treatment. Forages were wilted to 45% DM, and four bales of each legume and eight bales of BG were wrapped and ensiled for 180 d. Among haylages, the CP concentration (%, DM basis; SEM = 0.8) of legumes (AP, 18.9; PER, 18.5; CWP, 16.6; PGN, 13.9) was greater ($P < 0.01$) than that of BG (10.9). In contrast, NDF concentration (%, DM basis; SEM = 2.3) was greater ($P < 0.02$) in BG (70.9) than legumes (AP, 42.8; PER, 40.8; CWP, 45.5; PGN, 65.2). Among legume haylages, CP concentrations of AP and PER were greater ($P < 0.01$) than that in PGN, which had the greatest ($P < 0.01$) NDF concentration and lowest ($P < 0.01$) in vitro true digestibility. Undegradable intake protein (UIP) was greater ($P = 0.03$) in fresh-cut BG, PER, and AP than in CWP or PGN; whereas, it was greater ($P = 0.02$) in ensiled PER, CWP, and PGN than in BG or AP. Wilting and ensiling decreased the UIP, WSC, CP, and IVTD of the forages and increased their NDF concentrations. Rate of DM degradation and lag time in situ was more rapid ($P < 0.03$) for fresh-cut legumes than for BG. Rate and lag were not different ($P > 0.48$) among haylages. There was a greater ($P < 0.04$) amount of potentially degradable DM for fresh and ensiled BG and PER than other forages. Ammonia-N concentrations tended to be greater ($P = 0.06$) in legume haylages than in BG haylage. Butyrate concentration was greater ($P < 0.01$) in AP and PER haylages. Yeast and mold counts and aerobic stability were not different ($P > 0.10$). Ensiling BG and legumes produced aerobically stable haylages (at least 84 h) with lower nutritive value than fresh forage. Annual and perennial peanut and CWP haylages had better nutritive value than BG haylage; therefore, they can be used to supplement BG basal diets.

Key Words: Tropical legumes, Silage, Ruminal degradation

58 Effect of treatment of selected mature forages with sodium hydroxide on in vitro dry matter degradability. E. Hatungimana*[1], D. W. Kellogg, K. S. Anschutz, and A. H. Brown, Jr., *University of Arkansas, Fayetteville.*

Low digestibility of roughage limits ruminant performance. The objective of this experiment was to evaluate in vitro degradability of forages when treated with sodium hydroxide (NaOH). Mature forages were harvested in 2008, and dry matter (DM) yield was calculated from 12 field replicates. Subsamples were ground and analyzed in duplicate for DM, ash, neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), and crude protein (CP). Samples were pretreated with 0, 2, 4, and 6% levels of NaOH for 24 h. In vitro organic matter disappearance (IVOMD) and in vitro dry matter disappearance (IVDMD) were determined in triplicate by using ruminal fluid from an Angus heifer that was fed alfalfa hay and a corn-based supplement. The experiment was a $7 \times 4 \times 7$ factorial arrangement of forages, NaOH levels and in vitro incubation times. The concentrations of NDF, ADF and CP varied ($P < 0.05$) among forages as follows: NDF was 77.6 ± 1.1% for Eastern gamagrass (EGG), 77.2 ± 2.4% for switchgrass (SG), 74.9 ± 1.1% for Bermudagrass (BG), 72.9 ± 1.1% for Johnsongrass (JG), 72.4 ± 1.1% for crabgrass (CB), 70.4 ± 1.1% for tall fescue (TF) and 47.2 ± 1.1% for sweet sorghum (SS); ADF was 42.9 ± 1.5% for SG, 41.8 ± 0.7% for JG, 40.6 ± 0.7% for TF, 40.6 ± 0.7% for EGG, 39.3 ± 0.7% for CG, 34.0 ± 0.7% for BG and 26.08 ± 0.7% for SS; and CP was 13.5 ± 0.12% for BG, 8.87 0.12% for TF, 8.56 ± 0.12% for EGG, 8.06 ± 0.12% for JG , 5.68 ± 0.12% for SS and 5.31 ± 0.2% for SG. The ADL did not differ ($P > 0.05$). The IVDMD and the IVOMD differed ($P < 0.05$) among forages according to NaOH treatment and periods of incubation. The IVOMD was greater with 6% NaOH treatment for all forage species: 68.5% for SS, 64.2% for CG, 57.7% for BG, 57.5% for EGG, 56.2% for JG, 53.3% for TF and 47.5% for SG. The NaOH treatment had a significant effect on IVDMD and IVOMD of different forages species. Treatment with NaOH was more effective in forages with greater fiber concentration.

Key Words: Mature forages, Nutritive content, NaOH

Physiology

59 Oral administration of *Saccharomyces cerevisiae boulardii* reduces *Escherichia coli* endotoxin associated mortality in weaned pigs. C. T. Collier*[1], J. A. Carroll[1], J. D. Starkey[2], and J. C. Sparks[3], [1]*Livestock Issues Research Unit, ARS-USDA, Lubbock, TX*, [2]*Texas Tech University, Lubbock*, [3]*Lallemand, Inc., Rexdale, Ontario, Canada.*

The effects of active dry yeast, *Saccharomyces cerevisiae boulardii* (Scb), on the immune/neuroendocrine response and subsequent mortality to *E. coli* lipopolysaccharide (LPS) administration were evaluated in newly weaned pigs (26.1 ± 3.4 d of age). Barrows were assigned to 1 of 2 treatment groups; with (Scb; n = 15) and without (Control; n = 15) the in-feed inclusion of Scb (200g/ton) for 16 d. On d 16, all pigs were dosed via indwelling jugular catheters with LPS (25 μg/kg BW) at 0 h. Serial blood samples were collected at 30-min intervals from -1 to 6 h and then 24 h. Differential blood cell populations were enumerated hourly from 0 to 6 h and at 24 h. Serum cortisol, interleukin-1 beta (IL-1β), IL-6, tumor necrosis factor-alpha (TNF-α) and interferon-gamma (IFN-γ) concentrations were determined via porcine-specific ELISAs at all time points. In Scb-treated pigs, ADG increased ($P < 0.05$) by 39.9% and LPS-induced pig mortality was reduced 20% compared to Control pigs. White blood cells, lymphocytes and neutrophils were increased ($P < 0.05$) in Scb-treated animals prior to LPS dosing compared to Controls before being equally suppressed ($P < 0.05$) from baseline after LPS dosing with a return to baseline by 24 h. Cortisol suppression ($P < 0.05$) was observed in Scb-treated piglets from -1 to 1 h relative to LPS dosing compared to Controls before both peaked equally and then returned to baseline. Peak production ($P < 0.05$) of IL-1β and IL-6 was lower in Scb-treated pigs after LPS administration compared to Controls before equally returning to baseline. Peak TNF-α production in Scb-treated animals was accelerated 0.5 h and was greater ($P < 0.05$) than peak production in Controls after which both equally returned to baseline. The peak production of IFN-γ was greater and had increased ($P < 0.05$) amplitude persistent for 3 h in Scb-treated animals compared to Controls before equally returning to baseline. These results highlight previously unidentified Scb effects on the immune/neuroendocrine response and the subsequent impact on growth and endotoxin-induced mortality.

Key Words: Lipopolysaccharide, Porcine, Saccharomyces cervisiae boulardii

60 Oral administration of citrus pulp reduces gastrointestinal recovery of orally dosed *Escherichia coli* F18 in weaned pigs. J. A. Carroll[1], C. T. Collier*[1], T. R. Callaway[2], and J. D. Arthington[3], [1]*Livestock Issues Research Unit, ARS-USDA, Lubbock, TX*, [2]*Food and Feed Safety Research Unit, ARS-USDA, College Station, TX*, [3]*University of Florida, Ona.*

The effects of citrus pulp (CTP), on the immune and cortisol responses to *E. coli* F18 inoculation and subsequent *E. coli* recovery were evaluated in newly weaned pigs (23.3 ± 1.8 d of age). Barrows were assigned to 1 of 2 treatment groups; with (CTP; n = 15) and without (Control; n = 15) the in-feed inclusion of CTP (10% rate as fed) for 13 d. On d 13, all pigs were orally dosed with novobiocin (Nov) and nalidixic acid (Nal) resistant *E. coli* F18 (10 mL $7x10^8$ CFU) at 0 h. Serial blood samples were collected via an indwelling jugular catheter inserted on d 12 at 30-min intervals from -1 to 8 h and then at 12, 24, 36 and 48 h. Differential blood cell populations were enumerated hourly from -1 to 8 h, and at 12, 24, 36 and 48 h. Serum cortisol, interleukin-1 beta (IL-1β, IL-6, tumor necrosis factor-alpha (TNF-α) and interferon-gamma (IFN-γ) concentrations were determined via porcine-specific ELISAs at all time points. After 48 h, all pigs were euthanized and samples collected from ileal, cecal and rectal contents for selective *E. coli* F18 standard plate counts on Nov- and Nal-treated media. White blood cells, lymphocytes, neutrophils and macrophages were decreased ($P < 0.05$) from baseline equally in both treatments by 48 h. Equal cortisol suppression ($P < 0.05$) was observed in both treatments after inoculation with a subsequent return to baseline. The production of IL-1β, IL-6, TNF-α and IFN-γ were unaffected by treatment or inoculation. However, the inclusion of CTP suppressed ($P < 0.05$) ileal and cecal *E. coli* F18 recovery compared to Controls and completely eliminated rectal recovery of the pathogen. These results demonstrate that the potentially therapeutic effects of CTP are the result of direct microbial modulation independent of an immune response. Therefore, supplementation of CTP could potentially be used to enhance growth in weaned pigs by suppressing chronic and acute pathogenic challenges; consequently preventing the diversion of energy towards maintaining innate and adaptive immune responses and liberating it for growth related processes.

Key Words: Citrus pulp, *Escherichia coli*, Pig

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

Cortisol suppresses many aspects of immune function. However, recent publications suggest acute cortisol exposure may actually enhance immune function (Dhabhar, Neuroimmunomod 2009;16:300). The objective of this study was to determine the influence of acute increases in endogenous cortisol on expression of cytokines and the glucocorticoid receptor (GR) in isolated peripheral blood mononuclear cells (PBMCs). Brahman heifers (n=12; 334±12 kg BW) had jugular catheters inserted prior to a challenge with 0.1 IU/kg BW ACTH. Blood samples were collected into EDTA vacutainers at -3, 0, 1, 2, and 4 hr relative to the challenge. Plasma cortisol was determined by RIA. The PBMCs were isolated via density gradient centrifugation and frozen at -80ºC until RNA isolation. Extracted RNA was amplified by real-time RT-PCR to determine expression of GR, tumor necrosis factor-alpha (TNF-α), interferon-gamma (IFN-γ), interleukin-4 (IL-4), and IL-10. Cytokine expression data are expressed as the fold change in gene expression relative to samples collected at cannulation or time 0. All data were analyzed using the Mixed procedure of SAS, with time and animal as class and random variables, respectively. There was a tendency for cortisol concentrations to decrease between cannulation (-3 hr) and initiation of the ACTH challenge (time 0 hr; 26.2±4.4 and 16.1±4.4 ng/mL, respectively; P=0.07). Expression of most genes only tended to increase (P=0.06 to 0.14), with the exception of IFN-γ (P=0.05), which increased 16-fold relative to expression at cannulation. In response to ACTH, cortisol concentrations peaked at 1 hr (52.4±2.77 ng/mL; P≤0.001) before decreasing to pre-challenge values. Expression of IL-10 followed a similar pattern, with the greatest fold increase in expression at 1 hr (3.9±0.7 fold; P=0.02). Expression of GR, IL-4, and TNF-α increased through 4 hr post-challenge (9 to 92 fold; P=0.01 to 0.04). Expression of IFN-γ tended to increase in response to ACTH challenge (28-fold; P=0.06). This suggests that stimuli that increase endogenous cortisol concentrations may influence the expression of cytokines, and therefore modulate the immune system.

Key Words: Cattle, Cortisol, Cytokines

62   Effects of supplemental progesterone during culture on the development, metabolism, and blastocyst cell number of bovine embryos produced by in vitro maturation, fertilization, and culture.   J. E. Larson*[1], R. L. Krisher[2], and G. C. Lamb[3], [1]*Mississippi State University, Mississippi State*, [2]*University of Illinois, Urbana*, [3]*University of Florida, Marianna.*

We determined whether the supplementation of progesterone (P4) during either the first (culture–1, d 1 to 3) or second (culture–2, d 4 to 7) phase of culture of in vitro-produced embryos alters embryo development, embryo metabolism, or blastocyst (BL) cell number. Embryos were randomly assigned to droplets in a dish; each dish contained 6 droplets which received the same treatment (114 total droplets in experiment).

Treatments were: 1) control, no supplemental P4 (CON); 2) 1 ng/mL P4 in culture–1 medium, no P4 in culture–2 medium (LONO); 3) 100 ng/mL P4 in culture–1 medium, none in culture–2 (HINO); 4) no P4 in culture–1, 1 ng/mL P4 in culture–2 medium (NOLO); and, 5) no P4 in culture–1, 100 ng/mL P4 in culture–2 medium (NOHI). The percentage of oocytes that cleaved, the percentage of cleaved embryos that developed to the morula stage or greater, the BL stage or greater, or the hatched BL stage were similar among treatments. The NOLO treatment metabolized more glucose (P=0.03; 84.8 ± 7.6 fmols/cell per h) compared to all other treatments (61.3 ± 7.7 fmols/cell per h, 59.7 ± 6.7 fmols/cell per h, 66.4 ± 8.0 fmols/cell per h, 52.1 ± 8.3 fmols/cell per h in CON, LONO, HINO, and NOHI, respectively). Embryos receiving LO P4 tended to have greater (P=0.085) metabolism of glucose compared to embryos receiving HI P4. Exposure of BL to P4 during culture–1 tended to have increased oxidation of pyruvate per embryo (P=0.089) and per cell (P=0.091) compared to BL exposed to P4 in culture–2. The number of cells per BL was similar among treatments; however, BL in the CON group (101.8 ± 5.6) had more (P=0.039) cells than embryos in the P4 groups (89.2 ± 2.7). We conclude that supplementation of P4 during in vitro embryo culture does not directly enhance embryonic cleavage, development to BL, BL viability or metabolic characteristics.

Key Words: Bovine, Embryo development, Progesterone

63   Examination of relaxin gene expression in the porcine oocyte during *in vitro* maturation.   J. M. Feugang*, S. T. Willard, and P. L. Ryan, *Mississippi State University, Mississippi State.*

In human and rodent, relaxin and its receptors have been detected in the oocyte and granulosa cells, thus leading scientists to suggest a potential role for relaxin as a oocyte-secreted factor controlling growth and early embryonic development. To this end, we investigated whether the developing porcine oocyte expresses relaxin mRNA as a potential factor involved in early embryonic development. Sow ovaries were collected at a local abattoir and the cumulus-oocyte complexes (COCs) were aspirated from follicles (3-8 mm diameter). Selected COCs were matured *in vitro* in basic medium (TCM199+FSH/EGF/PVA) supplemented with or without 10% porcine follicular fluid or 40 ng/mL porcine relaxin. Porcine relaxin or follicular fluid was added to maturation medium in order to assess the paracrine role of relaxin on its own gene expression by oocytes. The COCs were matured for 44 h at 39ºC under 5% CO₂. Pools of 20 immature and mature denuded oocytes were snap-frozen for total RNA isolation. Isolated RNA samples were reversed-transcribed to complementary DNA which was submitted for PCR amplification of relaxin transcripts. The β-actin was used as the internal control and the PCR products were resolved on an agarose gel. The results revealed that immature and mature pig oocytes do not express relaxin mRNA compared to the corpora luteum from pregnant pig ovaries (positive control). The presence of relaxin or the replacement of PVA with porcine follicular fluid during *in vitro* maturation did not induce a further expression of relaxin mRNA by the oocytes. We conclude that the porcine oocyte does not express relaxin mRNA itself, therefore suggesting that relaxin may not play an autocrine role during porcine oocyte maturation. Further studies are needed to determine whether the porcine oocyte accumulates relaxin protein via the granulosa cells as a maternal factor to influence early embryonic development.

Key Words: Gene expression, Oocyte maturation, Relaxin

64 Hair coat traits and body temperature of Senepol cows that are heterozygous or homozygous for the slick hair gene. A. L. MacAuley, A. J. Weis, and R. W. Godfrey*, *University of the Virgin Islands, St Croix, VI.*

A single gene has been identified that is responsible for expression of a phenotype in cattle characterized by a short, sleek hair coat and increased heat tolerance as measured by lower rectal temperatures and respiration rates. All cows in the UVI research herd have been identified as either homozygous (HH) or heterozygous (NH) for the slick hair gene by testing for a closely linked marker. The NH genotype was detected in 19% of the cows and a subsample of NH (n = 5) and HH (n = 6) cows were used in this study. Cows were loosely restrained in a shaded squeeze chute between 1030 and 1230 hr for sample collection. Hair samples were collected from the shoulder, over the ribs and rump in a 40.6 cm^2 area using electric clippers. Surface temperature (ST) of a non-clipped area over the ribs was measured using an infrared thermometer. Rectal temperature (RT) was collected using a digital veterinary thermometer. Respiration rate (RR) was measured by counting breaths for 15 s and adjusting to breaths per minute (bpm). Hair samples were weighed and individual hairs were counted to determine hair weight and density. Individual hair weight was estimated by dividing the sample weight by number of hairs. There was no difference among locations on hair density or weight (P > 0.10) so data were pooled. There was no difference (P > 0.10) in RT or ST between NH and HH cows (38.6 ± 0.06 vs 38.6 ± 0.06 °C and 34.8 ± 0.2 vs 34.4 ± 0.2 °C, respectively). The NH cows had a higher (P < 0.0004) RR than HH cows (52.0 ± 1.5 vs 43.2 ± 1.5 bpm, respectively). There was no difference (P > 0.10) in hair density between NH and HH cows (484.6 ± 41.9 vs 420.5 ± 41.9 hairs/cm^2 and 8.0 ± 0.8 vs 6.0 ± 0.8 g/cm^2 , respectively). Individual hair weight was higher (P < 0.02) for NH cows than for HH cows (16.3 ± 0.8 vs 13.4 ± 0.8 μg, respectively). The higher RR in NH cows may have contributed to RT and ST being the same as in HH cows. Based on phenotype and hair density the higher hair weight of NH cows may be due to hair length.

Key Words: Body temperature, Cattle, Hair coat

65 Adult reproductive performance in high- and low-birth weight boars. M. J. Estienne* and A. F. Harper, *Virginia Polytechnic Institute and State University, Blacksburg.*

Selection for swine prolificacy has resulted in larger litter sizes but also an increase in the proportion of low birth weight pigs. Almeida et al. (2009; J. Anim. Sci. 87[E-Suppl. 2]:195) reported that on d 7 post-partum, the number of Sertoli cells was lower in low-birth weight (LW) compared to high-birth weight (HW) boars. Because the number of Sertoli cells established before puberty determines adult sperm production, LW boars may have poorer adult reproductive performance. The objective was to assess reproductive characteristics in Yorkshire x Landrace LW and HW boars. Birth weights of boars successfully trained for semen collection (1.67 ± 0.06 kg; n = 29) were greater (P < 0.01) than birth weights of un-trainable boars (1.29 ± 0.11 kg; n = 8), although BW at training was similar (P = 0.16) between groups. Semen was collected from trained boars weekly for 8 wk and analyzed using a computer-assisted sperm analysis system (Integrated Visual Optical System, Version 12; Hamilton Thorne Research, Beverly, MA). Sperm concentration (R = 0.42; P = 0.02), total sperm/ejaculate (R = 0.38; P = 0.04), and the amplitude of lateral head displacement corresponding to the mean width of the head oscillation as sperm swam (ALH; R = 0.39; P = 0.03) were positively correlated with birth weight. The frequency

with which the sperm head crossed the sperm average path in either direction (BCF) was negatively associated with birth weight (R = -0.51; P < 0.01). Boars classified as LW (< 1.36 kg; n = 7) or HW (> 1.86 kg; n = 9) had birth weights of 1.26 ± 0.06 kg and 2.03 ± 0.05 kg, respectively (P < 0.01). Sperm concentration (387.6 ± 23.3 x 10^6 /mL vs. 285.1 ± 26.4 x 10^6 /mL) was greater (P = 0.01) and total sperm/ejaculate (94.1 ± 5.8 x 10^9 vs. 76.2 ± 6.6 x 10^9) tended to be greater (P = 0.06) for HW compared to LW boars. The BCF tended to be greater (P = 0.07) for LW (37.8 ± 0.8 Hz) compared to HW (35.9 ± 0.7 Hz) boars. Results are consistent with the concept that birth weight is a predetermining factor impacting reproductive potential in adult boars.

Key Words: Birth weight, Boar, Semen

66 Effect of selection for residual feed intake on pubertal characteristics and conception rates of Bonsmara heifers. A. N. Loyd*[1,2], A. W. Lewis[1], D. A. Neuendorff[1], K. J. Matheney[1,2], T. D. A. Forbes[3], J. W. Holloway[3], T. H. Welsh, Jr.[2], and R. D. Randel[1], [1]*Texas AgriLife Research, Overton, TX,* [2]*Texas AgriLife Research, College Station, TX,* [3]*Texas AgriLife Research, Uvalde, TX.*

Residual feed intake (RFI) is a measure of feed efficiency used to identify cattle that require less feed to support the same level of performance as their cohorts. While the selection of efficient cattle using RFI may reduce feed expenses, other economically important traits may be impacted. This study investigated the pubertal characteristics and conception rates of Bonsmara heifers (n = 38) divergently selected for RFI. Beginning when the heifers were 10.5 ± 0.7 mo of age and continuing for 7 mo, weekly serum samples were collected and analyzed by radioimmunoassay for progesterone concentrations. A heifer was determined to be pubertal when she had elevated blood progesterone concentrations above 1 ng/mL for 2 consecutive wk (Day et al., 1984). During this time, heifers were individually fed a high roughage diet at 2.65% BW using a Calan gate system. Individual RFI was calculated from weekly BW and FI data collected over a 70-d period. After the feeding trial, heifers grazed ryegrass and hay grazer pasture and were exposed to Bonsmara bulls for natural mating for 90 d. Heifers were examined by rectal palpation to determine pregnancy 45 d after bull removal. Estimates for the number of days pregnant were used to determine conception dates. Based on the sign of their RFI values, heifers were assigned to an RFI group where a negative RFI = efficient and a positive RFI = inefficient. No significant differences (P > 0.05) were observed between efficient and inefficient heifers for age at puberty (12.4 ± 0.5 vs 12.2 ± 0.3 mo), age at conception (15.4 ± 0.3 vs 15.6 ± 0.2 mo), achievement of puberty (100 vs 85%) or conception rate (92 vs 96%). This suggests that selection for RFI in Bonsmara cattle should not impact pubertal age or conception rates of heifers during a discrete breeding season.

Key Words: Heifer, Puberty, Residual feed intake

67 Residual feed intake selection and its effects upon postpartum interval in Brahman cows. A. K. Poovey*[1,2], A. N. Loyd[1,2], A. W. Lewis[1], D. A. Neuendorff[1], T. D. A. Forbes[3], T. H. Welsh, Jr.[2], and R. D. Randel[1], [1]*Texas AgriLife Research, Overton, TX,* [2]*Texas AgriLife Research, College Station, TX,* [3]*Texas AgriLife Research, Uvalde, TX.*

Feedstuffs constitute a major expense in cow-calf production. Therefore, it is beneficial to identify cattle which require less feed in order to maintain production equal to their cohorts. Residual feed intake (RFI) is a

method of identifying efficient animals based upon predicted individual feed intake minus actual feed intake. The objective was to examine the relationship between RFI status and postpartum reproductive performance in cows. Based upon prior post-weaning RFI evaluations, multiparous Brahman cows (year 1, n=38; year 2, n= 42) were classified as having either negative RFI (efficient) or positive RFI (inefficient). Body condition score, body weight, and serum samples were collected 24 hr post-calving and weekly thereafter. Following calving, females were exposed to vasectomized bulls wearing chin-ball markers and observed twice daily for estrus. Blood samples were collected to determine corpus luteum (CL) function and ultrasonography was performed on d 8 through d 10 after estrus. Data were collected until standing estrus coincided with presence of a CL, as confirmed via ultrasonography. No difference in postpartum interval (PPI) to standing estrus with a functional CL existed between negative (55 ± 5 d) and positive (57 ± 4 d; P=0.75) cows in the combined data. Postpartum interval for positive RFI cows for year 1 and 2 were not different (57.8 ± 6 d vs. 56.7 ± 5.7 d, respectively; P>0.10). However, PPI for negative RFI cows for year 2, a drought year, was greater than negative RFI cows for year 1, a normal rainfall year (68.5 ± 6.6 d vs. 41.9 ± 6.6 d, respectively; P<0.01). Pregnancy rate across years was 82.8% in negative and 77.8% in positive cows (P>0.10). These data suggest that selection for efficient RFI cattle may prove beneficial in shortening the length of PPI during favorable environmental situations but may not be in unfavorable conditions such as drought.

Key Words: Cow, Feed efficiency, Reproduction

68   The effect of temperament on circulating concentrations of insulin-like growth factor I (IGF-I) in Brahman calves. L. C. Caldwell*[1], K. J. Matheney[1], R. C. Vann[3], T. H. Welsh, Jr.[1], and R. D. Randel[2], [1]*Texas AgriLife Research*, *College Station, TX*, [2]*Texas AgriLife Research*, *Overton, TX*, [3]*Mississippi State University*, *Raymond*.

Serum concentrations of insulin-like growth factor I (IGF-I) have been positively linked to economically important traits in beef cattle, while serum cortisol and temperament have been reported to negatively impact such traits. Preliminary work from our lab suggested that temperament may affect IGF-I in Brahman bulls, with calmer bulls having higher concentrations (Matheney, 2009). The purpose of this study was to assess whether temperament is associated with circulating concentrations of IGF-I in Brahman calves. Spring born Brahman calves from the years 2005, 2006, 2007 and 2008 were utilized. Samples from 10 calm, 10 intermediate and 10 temperamental calves of both sexes (n = 60) were chosen from each year. Temperament, determined by the average of exit velocity and pen score of each calf, was evaluated at weaning. Concentrations of IGF-I were determined by RIA from serum samples that were collected 28 d pre-weaning, at weaning, and on d 28 and 56 post-weaning (n = 240) during each year. Repeated measures ANOVA was conducted using the MIXED model procedure of SAS (2002) for analysis of year and temperament effects on concentrations of IGF-I. Least squares means for the calm, intermediate and temperamental groups were 134.9 ± 3.4, 139.8 ± 3.3 and 130.1 ± 3.4 ng/mL, respectively. Temperament had no significant effect on circulating concentrations of IGF-I, although year was a source of variation (P< 0.0001). Least squares means from the 2005, 2006, 2007 and 2008 calf crops were 131.9 ± 3.6, 151.9 ± 4.7, 124.4 ± 3.3 and 131.6 ± 4 ng/mL, respectively. Although IGF-I has been positively linked to growth traits in beef cattle, no relationship was observed between temperament and circulating concentrations of IGF-I among Brahman calves.

Key Words: Brahman, IGF-I, Temperament

69   Relationships between blood parameters at 24 hours of age and subsequent growth traits in beef calves. K. R. Parker[1], A. N. Musselwhite[2], S. T. Willard[2], J. T. Green[1], T. H. Welsh, Jr.[3], R. D. Randel[4], and R. C. Vann*[1], [1]*MAFES-Brown Loam Experiment Station*, *Raymond, MS*, [2]*Mississippi State University*, *Starkville*, [3]*Texas AgriLife Research*, *College Station, TX*, [4]*Texas AgriLife Research*, *Overton, TX*.

The objective of this study was to evaluate the utility of various blood parameters obtained approximately 24 h after birth to predict future performance of beef calves. Over two spring calving seasons plasma and serum samples were collected from 385 calves (n=116 bulls, n=184 heifers and n=85 steers) and analyzed for plasma and serum protein, IgA, IgM and IgG concentrations. Temperament assessment consisted of pen score (PS) and exit velocity (EV: m/s) and was conducted at 28 d pre-weaning, weaning, 28 and 56 d post-weaning, and yearling. Calves were assigned to temperament groups (TPG=EV+PS/2) at weaning as follows: calves 1 SD below the mean were considered calm (C), calves 1 SD above the mean were considered temperamental, all others were considered intermediate (I). In addition, calves were classified by total protein classification and IgG classification 24 h after birth as follows: calves 1 SD below the mean were considered low (L), calves 1 SD above the mean were considered high (H), all others were considered moderate (M). The statistical model included the blood parameter being tested, calf sex, calf temperament class, protein class, IgG class and breed of calf. Calf BW was influenced by sex of calf (P ≤ 0.001) with bulls and steers heavier than heifers and calf BW was influenced by year of birth (P ≤0.06). Calves classified as H had the greatest concentrations of IgA, IgG and IgM (P ≤ 0.001) and cortisol (P = 0.044) and calves classified as L had the lowest concentrations of IgA, IgG and IgM (P ≤ 0.001) and cortisol (P = 0.044). However, total protein classification did not influence calf BW at time points measured in this study. Weaning temperament classification (P ≥ 0.10) did not significantly influence 24 h concentrations of IgA, IgG, IgM or calf BW at pre-weaning, weaning, and post weaning in this study. Total protein was not influenced by temperament, but was positively correlated to immunoglobulin concentrations shortly after birth. [USDA-NRI: 2005-35204-15737]

Key Words: Beef calves, Immunoglobulins, Total Protein

70   Effects of anthelmintic type on fecal egg counts in yearling quarter horses. M. L. McMillan*, K. R. Hall, and L. A. Rakowitz, *Sam Houston State University*, *Huntsville, TX*.

Previous research has suggested that internal parasites in horses have become more resistant to benzimidazoles than avermectin due to the overuse of benzimidazoles. The objective of this research was to determine if anthelmintic resistance was present when horses received fenbendazole without any prior exposure to fenbendazole. Further, anthelmintic resistance was compared between fenbendazole and ivermectin. Twelve yearling Quarter Horses approximately 17 mo of age were used to determine fecal egg populations when administered fenbendazole or ivermectin. Before arrival to facility, horses were previously dewormed with Equimax (ivermectin praziquantel) at approximately 6 mo of age and 12 mo of age. Upon arrival, horses were randomly assigned to stalls. A 2 x 2 Latin Square Design was used as the experimental design. On d 0, horses were dewormed with fenbendazole. On d 35, horses were dewormed again with ivermectin. Fecal samples were collected weekly for 10 wk via rectal fecal grab. Fresh samples were mailed and analyzed by MidAmerica Agricultural Reasearch Company in Verona, Wisconsin. Fecal egg counts were similar (P=0.876) on d 0 and 35 for fenbendazole and ivermectin. Fecal egg counts were higher

(P< 0.0001) when dewormed with fenbendazole versus ivermectin throughout the trial. Fecal eggs were present seven d post deworming when treated with fenbendazole. Fecal eggs did not reappear until d 28 post deworming when treated with ivermectin. While fecal eggs were present from d 28 to 35 with the ivermectin group, the fenbendazole

Key Words: Anthelmintics, Horse, Parasites

Ruminant Animal Production

71   Influence of sire breed and crude glycerin level in the growing diet on growth and carcass characteristics in steer calves. M. H. Poore*, J. P. Cassady, M. A. Alley, and K. A. Gray, *North Carolina State University*, *Raleigh*.

This study compared Angus (A) and Braunvieh (B) as sire breeds for use on A-based commercial cows, and evaluated crude glycerin (CG) from biodiesel production as an ingredient in a corn silage-based growing diet. Cows at the Center for Environmental Farming Systems in Goldsboro, NC were randomly assigned within age to A or B bulls, with 8 A and 7 B bulls used for AI followed by 2 clean up bulls of each breed. Resulting A-sired (n=23) and B-sired (n=15) steer calves were weaned, backgrounded, and then moved to Butner, NC where they were fed using Calan gates during a 71-d growing phase and an 83-d finishing phase. During the growing phase calves were assigned within breed to receive 1 of 4 diets. The control diet DM contained 68% corn silage, 15% ground corn, 15% soybean meal (SBM) and 2% minerals (with 20 g/ton monensin). Crude glycerin was substituted for corn at 4, 8, or 12% of diet DM, and diets were maintained at 14% CP by substituting SBM for corn. During the finishing phase, all calves were fed the same corn-based diet with DM composed of 10% corn silage, 76% corn, 12% SBM, and 2% minerals (13.5% CP with 30 g/ton monensin). There were no CG level by breed interactions (*P*>0.20). Angus-sired calves had higher (*P*<0.05) starting BW (360 vs. 343 kg), final BW (600 vs. 564 kg), overall ADG (1.55 vs. 1.46 kg/d), overall DMI (10.69 vs. 9.97 kg/d), carcass weight (376 vs. 354 kg), back fat (1.32 vs. 1.03 cm), and marbling score (6.21 vs. 5.10), and tended to have higher yield grade (*P*=0.07; 3.03 vs. 2.65) compared to B-sired steers. Gain:feed and ribeye area did not differ between sire-breeds. Inclusion of CG in the growing diet resulted in a linear increase (*P*<0.05) in ADG (1.86, 1.97, 2.04, and 2.12 kg/d for 0. 4, 8, and 12% CG, respectively), and gain:feed (0.204, 0.203, 0.213, 0.227 for 0. 4, 8, and 12% CG, respectively), and tended to have a quadratic effect (P=0.06) on DMI (9.05, 9.74, 9.58, and 9.38 kg/d for 0. 4, 8, and 12% CG, respectively) during the growing period. There was no significant effect of CG on overall ADG, DMI, or carcass characteristics. These results showed that A-sired steers had higher DMI and gained faster than B-sired steers, and that CG is a viable feed ingredient for corn silage-based growing diets.

Key Words: Angus, Braunvieh, Crude glycerin

72   Performance and carcass quality of steers finished with silages and corn-soybean meal or corn-distillers dried grain supplements. G. M. Hill*[1], A. J. Nichols[1], D. J. Renney[1], and V. A. Corriher[2], [1]*University of Georgia*, *Tifton,*, [2]*Texas A & M University*, *Overton*.

Steers were finished on silages supplemented with corn/soybean meal or corn with dried distillers grain (DDG). Steers (Initial BW 408.0±29.71 kg, Brangus and Angus-sired steers) were assigned by BW and breed to six groups before random assignment to supplement (SUP) treatments. Steers were not implanted, but monensin sodium (Rumensin®) was fed at 200 mg/steer daily. The SUP treatments were corn with soybean meal (CSB, n=21, 3 pens; 84% ground corn, 13.75% soybean meal; DM, CP, TDN, % : 89.0, 16.1 84.0), or corn with dried distiller grain (CDG, n=24, 3 pens; 75.6% ground corn, 22.5% DDG; DM, CP, TDN, %: 88.6, 16.2, 82.5). During the first 37 d, corn silage (CS; DM, CP (%): 39.9, 7.6) was fed with CS:SUP at 50:50, and for 76 d sorghum silage (SS) was fed with SS:SUP at 55:45 on an as-fed basis adjusted daily for pen TMR intake. Analyses for TMR using silage with CSB or CDG supplements were: [DM, CP, TDN, (%): CSB = 52.2, 15.3, 75.5; and CDG = 46.2, 13.25; 73.5]. Steer initial BW, 113-d ADG, 113-d DMI (kg), and gain/feed DM, respectively, were: CSB = 403.1, 1.74, 11.32, 0.15; CDG = 409.8, 1.62, 10.02, 0.17; SE 6.27, 0.06, 0.65, 0.02; P < 0.45, 0.14, 0.26, 0.58. Steer carcass wt (kg), dressing %, internal fat %, ribeye area (cm[2]), yield grade, and quality grade (12=U.S Choice-), respectively, were: CSB =349.5, 60.59, 3.83, 79.85, 2.46, 12.06; CDG =350.2, 60.39, 3.18, 79.04, 2.74, 12.12; SE 6.01, 1.46, 0.21, 1.4, 0.11, 0.35; P < 0.94, 0.92, 0.04, 0.69, 0.10, 0.91. Inclusion of DGS with corn in silage-based finishing diets resulted in similar ADG, DMI, and carcass quality compared with feeding a traditional corn-soybean meal supplement to forage produced steers.

Key Words: Steer, Distiller grain, Corn

73   Effects of roughage and protein source in receiving diets containing 25% wet corn gluten feed on performance and morbidity of newly received calves. J. C. MacDonald*[1,2] and F. T. McCollum III[3], [1]*Texas AgriLife Research*, *Amarillo*, [2]*West Texas A&M University*, *Canyon*, [3]*Texas AgriLife Extension Service*, *Amarillo*.

Two 35-d receiving studies were conducted to determine effects of roughage and protein source in diets containing 25% wet corn gluten feed on performance and morbidity of newly received calves. In Exp. 1, one hundred twenty crossbred male calves (167 ± 2 kg) were allocated to one of two diets containing either 30% alfalfa hay (ALF) or 30% cottonseed hulls (CSH). In Exp. 2, two hundred crossbred male calves (211 ± 2 kg) were allocated to one of two diets in which the supplemental protein came from heated canola meal (CAN) or urea (UREA). All diets contained 25% wet corn gluten feed and 25% to 33.1% steam-flaked corn. Upon arrival, all calves were weighed, vaccinated with a modified live virus vaccine and a clostridial bacterin-toxoid with Haemophilus somnus, and treated with a combination of ivermectin and clorsulon. Horns were tipped as needed and all intact males were castrated. Calves were randomly assigned to pen based on the order they were processed. Calves requiring antibiotic therapy were initially treated with ceftiofur, and subsequently treated with florfenicol and enrofloxacin, as required. In Exp. 1, steers on ALF consumed less DM (4.48 and 5.07 kg/d for ALF and CSH, respectively; *P* < 0.01), gained similarly (1.18 and 1.10 kg/d for ALF and CSH, respectively; *P* = 0.50) and had improved feed efficiency (0.261 and 0.217 kg DM/kg for ALF and CSH, respectively; *P* < 0.01) compared to steers consuming CSH. However, ALF resulted in a higher percentage steers treated with antibiotic (62.1 and 43.9%

of steers treated for ALF and CSH, respectively; $P = 0.06$). In Exp. 2, dietary treatment had no effect on ADG (0.95 and 0.86 kg for CAN and UREA, respectively; $P = 0.22$), DMI (5.47 and 5.29 kg for CAN and UREA, respectively; $P = 0.32$), or feed efficiency (0.194 and 0.181 kg DM/kg for CAN and UREA, respectively; $P = 0.31$). While there was no difference in initial therapeutic treatments ($P = 1.00$), CAN tended to result in a higher percentage of steers requiring a second antibiotic treatment (60.8 and 45.1% of steers requiring a second antibiotic therapy for CAN and UREA, respectively; $P = 0.13$). In steam-flaked corn-based receiving diets containing 25% wet corn gluten feed, roughage source impacted performance and morbidity whereas the impact of protein source appeared minimal. When steers are gaining similarly, strategies which increase DMI appear to reduce morbidity and feed efficiency.

Key Words: Newly received calves, Roughage source, Protein source

74   Use of soyhulls and peanut skins for growing beef cattle. D. Rankins, Jr.*[1], J. Palmer[1], B. Gamble[1], N. Gurung[2], and G. Abdrahim[3], [1]*Auburn University, Auburn, AL*, [2]*Tuskegee University, Tuskegee, AL*, [3]*Alabma A&M University, Normal*.

Peanut skins are a year-round by-product in the Southeastern US. Soyhulls are widely used to grow beef cattle in this same region. The objective of this research was to assess the complimentarity of soyhulls and peanut skins for growing beef cattle. The trial was repeated in consecutive years. Year 1. Twenty-seven Brangus x continental steers (initial BW 261 kg) were fed one of three diets for 84 d. (three steers/pen; three pens/diet). On a dry-matter basis, diets were as follows: 1) 100% soyhulls, 2) 80% soyhulls and 20% peanut skins and 3) 60% soyhulls and 40% peanut skins. All diets were fed free-choice and bahiagrass hay also was offered free-choice. Year 2. Everything was the same as year 1 except initial BW of the steers was 264 kg. The peanut skins contained 4.13% condensed tannins. Skins used in year 1 were 18.1% CP and year 2 were18.6% CP. Soyhulls contained 11.2% and 11.7%, respectively. Daily gains decreased linearly (P<.05) in both years with increasing amounts of peanut skins. In year 1, ADG was 1.79, 1.56 and 1.46 kg/d, respectively and year 2 was 1.82, 1.45 and 0.98 kg/d, respectively. Changes in ADG were related to changes in DMI which decreased (P<.01) linearly as well. In year 1, DMI was 9.3, 8.1 and 7.5 kg/d, respectively and year 2 was 10.1, 8.8 and 6.1 kg/d, respectively. Gain:feed was not different (P>.10) among diets for year 1 but decreased linearly (P<.05) for year 2. In year 1, one steer on the 100% soyhulls diet exhibited bloat and in year 2 no steers bloated. Even though addition of peanut skins to the diet decreased DMI and ADG, cost of gain can be substantially reduced by inclusion of moderate amounts of peanut skins in growing cattle diets.

Key Words: Beef cattle, Peanut skins, Soyhulls

75   Effects of dried distillers' grains on performance of stocker cattle grazing bermudagrass. J. Hawley*, E. B. Kegley, K. P. Coffey, T. E. Davis, and J. A. Hornsby, *University of Arkansas, Fayetteville*.

Multiple studies have examined supplementing dried distillers' grains (DDG) for cattle grazing low- and moderate-quality forages, but research on cattle grazing bermudagrass (*Cynodon dactylon* [L]) and offered DDG is limited. The objectives of two separate experiments were to study the performance of stocker cattle grazing bermudagrass supplemented with DDG: 1) as a substitute to corn or soybean hulls (SH) and 2) without or with limestone (4.3% of supplement) to result in a dietary Ca:P ratio of 2:1. In the first experiment (replicated over 2 yr), stocker calves (n = 144) were stratified by BW (n = 66, yr 1; n = 78, yr 2; initial BW = 304 ± 23 kg) and assigned randomly to corn, DDG, or SH at 0.5% (as fed) of BW while grazing bermudagrass in a completely randomized design with two replications per treatment. Animals remained on pasture for 107-d in yr 1 and 84-d in yr 2. Treatments supported similar daily gains ($P = 0.39$); however, daily gains averaged 1.00 kg for yr 1 and 0.57 kg for yr 2 ($P < 0.01$). Serum Cu concentrations measured in yr 2 did not differ ($P = 0.28$) between treatments and were numerically lowest on d 84. In the second experiment (replicated over 2 yr), stocker calves (n=162) were stratified by BW (n = 78, yr 1; n = 84, yr 2; initial BW = 216 ± 24 kg) and assigned randomly to DDG without added limestone at 0.75% (as fed) of BW or with added limestone at 0.78% (as fed) of BW while grazing bermudagrass in a completely randomized design with three replications per treatment. Animals remained on pasture for 140-d in yr 1 and 98-d in yr 2. Treatments supported similar daily gains ($P = 0.99$); however, daily gains averaged 0.71 kg for yr 1 and 0.96 kg for yr 2 ($P < 0.01$). Hip heights measured in yr 1 did not differ ($P = 0.66$) between treatments. Serum Cu concentrations measured in yr 1 did not differ ($P = 0.96$) between treatments and were numerically lowest on d 140. Due to similar performance, the choice to use DDG in a diet for cattle grazing bermudagrass can be based on cost and availability.

Key Words: Bermudagrass, Dried distillers' grains, Stocker cattle

76   Utilization of wet brewers grains (WBG) or dried distillers grains with soluble (DDGS) as supplements to round bale silage (RBS) or dry hay for young beef cows. M. V. Thomas*, M. J. Hersom, and J. V. Yelich, *University of Florida, Gainesville*.

The objective of this study was to determine the effects of different forage and supplementation combinations on young beef cow performance. Seventy-two, 2-yr-old cows (487 kg; n = 48, Angus; n = 24, Brangus) were stratified by BW and breed to one of 12 pens. Pens were randomly assigned one of four treatments: 1) hay + WBG; 2) hay + DDGS; 3) RBS + WBG; and 4) RBS + DDGS. Tifton 85 bermudagrass hay or RBS was fed free-choice in hay rings. Cows received WBG and DDGS supplements 3 d/wk once-daily at 0.5% of pen mean BW (DM-basis). BW and BCS were collected on d 0, 34, 69, and 97 of the experiment. Forage and supplement offered data were divided into 3 periods (d 0-34; d 35-69; and d 70-97). Data were analyzed using the MIXED procedure of SAS. There was a treatment x day interaction for cow BW. On d 34, BW were similar (mean BW = 509 kg). However, on d 69 and 97, cow BW were 33 and 36 kg greater, respectively, ($P < 0.05$) for RBS + DDG and RBS + WBG than hay + DDG and hay + WBG. There was a day effect for cow BCS. Mean BCS on d 0 and 97 (BCS = 5.63 and 5.59) were greater ($P < 0.0001$) than BCS for d 34 and 69 (BCS = 5.35 and 5.09). Total BW and BCS change were greater ($P = 0.005$ and 0.07) for RBS + DDG (BW = 25.4 kg; BCS = -0.11) and RBS + WBG (BW = 27.4 kg; BCS = -0.04) compared with hay + DDG (BW = -1.5 kg; BCS = -0.57) and hay + WBG (BW = -4.1 kg; BCS = -0.43). Total forage DM amount offered (mean = 1,593 kg) and calculated daily forage DM offered (mean = 49 kg/d) did not differ ($P = 0.62$ and 0.84, respectively) between hay or RBS. A period x supplement type interaction (P <0.0001) was observed for both total period supplement and calculated daily supplement offered. Cows consumed more ($P < 0.0001$) WBG (526 kg) than DDGS (475 kg), and supple-

ment consumption was greater ($P < 0.0001$) in period 2 (548 kg) than period 1 (524 kg) or 3 (430 kg). Although cows offered RBS had slightly greater BW and BCS, cows offered any of the four treatments maintained acceptable levels of performance.

Key Words: Beef cows, Forage, Supplementation

77   The effect of wet brewers grains (WBG) or dried distillers grains with soluble (DDGS) as supplements for round bale silage (RBS) or dry hay on intake and digestibility in steers. M. V. Thomas*, M. J. Hersom, and J. V. Yelich, *University of Florida*, *Gainesville*.

Different forage-supplement combinations can affect ruminal metabolism in beef cattle, which is important to understand the associative effects of feeds. The objective of this study was to measure voluntary DMI, digestion kinetics, and fermentation parameters in steers assigned to one of four treatments: 1) hay + WBG; 2) hay + DDGS; 3) RBS + WBG; and 4) RBS + DDGS. Tifton 85 bermudagrass (1st cutting) was utilized for hay and RBS. Ruminally cannulated Brangus steers were used in an incomplete 6x4 Latin Square with four periods (n = 6 for each treatment). Hay and RBS were offered at 110% of the previous day's intake in two feedings. Supplements were offered once daily in the morning at 0.5% BW of each steer. Steer BW was obtained at the start of each 23-d period. Diet adaptation occurred during d 1-14. Steer adaptation to fecal bags for total fecal collection was d 10-14. Total fecal output and DMI was measured on d 15-19. Ruminal pH was measured hourly on d 20 at -2 through 12 h after feeding. Data were analyzed using the MIXED procedure of SAS. Steers consuming DDGS tended ($P = 0.10$) to have greater forage DMI (7.5 kg/d) than steers offered WBG (6.8 kg/d). Steers offered hay tended ($P = 0.08$) to have greater supplement intake (2.25 kg/d) than steers offered RBS (2.10 kg/d). Total DMI was greater ($P = 0.05$) for steers offered DDGS than steers offered WBG (9.7 vs. 8.9 kg/d, respectively). Total fecal output was not affected by forage ($P = 0.41$) or supplement ($P = 0.75$) type. Total tract apparent digestibility was greater ($P < 0.01$) for steers supplemented with DDGS (58.3%) than WBG (55.10%). Total tract apparent digestibility was not affected by forage type ($P = 0.30$). Steers consuming RBS had a greater ($P = 0.05$) daily mean rumen pH (pH = 6.39) than steers consuming hay (pH = 6.25), and rumen pH was not different ($P = 0.50$, mean = 6.32) between supplement types. The DDGS supplement appeared to compliment forage DMI and digestion to a greater extent than WBG supplement.

Key Words: Cattle, Forage, Supplement

78   Performance and behavior of weaned beef cattle that were fed tall fescue dry hay or haylage. J. A. Black[1], J. G. Carter*[1], A. K. Johnson[2], and W. W. Gill[1], [1]*Middle Tennessee State University*, *Murfreesboro*, [2]*Iowa State University*, *Ames*.

The objective of this experiment was to determine if there were any differences in performance and behavior of feeder calves fed tall fescue dry hay or haylage. Sixty weaned calves (heifers [n = 30] and steers [n = 30]) were placed into four pens (n = 15/pen, 2 pens/treatment). Breed type (Angus, Hereford, and Charolais crosses) and sex were evenly distributed across treatments. Haylage was wrapped at higher moisture content (50%) and stored outside. Dry hay (13% moisture) was stored under cover. Hay and haylage were harvested from the same field during the first cutting of tall fescue. Calves were fed either hay or haylage

and no supplementation was provided. CP, ADF, and NDF percentages (dry mater basis) were 12.9 vs. 12.1, 41.1 vs. 36.0, and 69.4 vs. 59.6 for the hay and haylage, respectively. Forage met TDN requirements for approximately 0.45 kg/d ADG. The project began on October 20, 2008, after the calves were weaned and preconditioned and concluded on December 4, 2008. ADG was monitored for a 45-d feeding period. Animals were weighed on d 0, 21, and 45. Behavioral observations were made every 5 min over 4 consecutive hours on three separate days (at the beginning [d 2], midpoint [d 22], and end of the project [d 41]). Behaviors were categorized as active, inactive, eating, drinking, or licking mineral. Performance measures were analyzed as a completely randomized design. Behavioral results were analyzed using a mixed model with repeated measures. Pen was the experimental unit for both performance and behavioral measures. The overall ADG for calves fed dry hay was 0.23 kg/d and fed haylage -0.11 kg/d ($P = 0.03$). There were no ($P > 0.05$) differences observed in the cattle behavioral repertoire for treatment or for the day by treatment interactions. In conclusion, although there were no alterations in the behavioral repertoire of calves, reductions in calf performance were detected when fed fescue haylage compared to dry fescue hay.

Key Words: Beef calves, Fescue haylage

79   Effects of supplementation with dried distillers grain (DDG) in yearling Brangus (BN) and Angus (AN) heifers fed round bale silage (RBS). I. Growth performance and body composition. A. M. Monari*, E. M. McKinniss, M. J. Hersom, and J. V. Yelich, *University of Florida*, *Gainesville*.

The experimental objective was to evaluate the effect of feeding Coastal bermudagrass RBS (CP=15 %, TDN=62%) for 70 d followed by 70 d of RBS + DDG compared to RBS + DDG for 140 d on growth performance and body composition. The AN (275 kg; n = 30) and BN (279 kg; n=30) heifers were stratified by BW, breed, and age to one of 12 pens (6 pens of AN and BN). On d 0, heifers were assigned to one of two treatments 1) RBS + DDG (mean 1.63 kg/d) d 0 to 140 with heifers fed to gain 0.84 kg/d (CON); 2) RBS d 0 to 140 and DDG (mean 2.33 kg/d) d 70 to 140 with heifers fed to gain 1.4 kg/d (LH). Heifers were fed DDG 3d/wk. BW, BCS, and hip height (HH) were obtained at d 0, 70, and 140. Ultrasound measures of intramuscular fat (IMF), rump fat (RUF), LM area (REA), and 13th rib backfat thickness (BF) were obtained on d 0, 70, and 140. On d 70, BW (315; 286 kg), and BCS (5.3; 4.8) were greater ($P < 0.01$) for CON than LH, respectively. On d 140, BW (369; 343 kg), and BCS (5.6; 5.2) continued to be greater ($P < 0.01$) for CON than LH, respectively. HH were greater ($P < 0.01$) for BN than AN on d 70 (121; 118 cm) and d140 (123; 120 cm), respectively. Furthermore, CON (122.5 cm) had a greater HH ($P < 0.01$) on d 140 than LH (121 cm). There was a treatment x time effect ($P < 0.01$) for REA, BF, and RUF. On d 70, REA (47.61, 43.35 cm[2]), BF (0.47, 0.37 cm), and RUF (0.47, 0.41 cm) were greater ($P < 0.01$) for CON than LH, respectively. Additionally on d 140, REA (51.3; 48.2 cm[2]), BF (0.47; 0.42 cm), and RUF (0.54; 0.45 cm) continued to be greater ($P < 0.01$) for CON than LH, respectively. There were no ($P > 0.10$) breed effects on REA, RUF, and BF. However, IMF was greater ($P < 0.01$) for AN (4.05 %) than BN (3.40%) on d 140 but there was no treatment effect ($P > 0.10$). Feeding RBS only for the first 70 d altered growth and body composition of LH heifers, which were unable to compensate and be similar to body composition of CON by d 140.

Key Words: Beef heifers, Supplementation, Growth

80 Effects of supplementation with dried distillers grain (DDG) in yearling Brangus (BN) and Angus (AN) heifers fed round bale silage (RBS). II. Puberty and Reproductive Performance. A. M. Monari*, E. M. McKinniss, M. J. Hersom, and J. V. Yelich, *University of Florida, Gainesville.*

The experimental objective was to evaluate the effect of feeding Coastal bermudagrass RBS (CP=15 %, TDN=62%) for 70 d followed by 70 d of RBS + DDG compared to RBS + DDG for 140 d on heifer reproductive performance. The AN (275 kg; n = 30) and BN (279 kg; n=30) heifers were stratified by BW, breed, and age to one of 12 pens (5 heifers per pen; 6 AN pens and 6 BN pens). On d 0, heifers were assigned to one of two treatments 1) RBS + DDG d 0 to 140 with heifers fed to gain 0.84 kg/d (CON); 2) RBS d 0 to 140 and DDG d 70 to 140 with heifers fed to gain 1.4 kg/d (LH). Blood samples were collected on d -7, 0, 63, 70, 133, and 140 to determine puberty by plasma progesterone. On d 140 heifers received a CIDR + GnRH (100 µg; im) with CIDR removal + $PGF_{2\alpha}$ (25 mg) 7d later. Estrus was detected for 72 h and heifers were AI after detected estrus. Non-responding heifers by 72 h post CIDR removal were timed-AI + GnRH. AI continued for 32 d after timed-AI. Heifers were sorted by breed and exposed to a bull of similar breeding for 28 d. Pregnancy was diagnosed by ultrasonography on d 182, 210, and 240. Of prepubertal heifers on d 0 (AN=26; BN=30), a similar ($P > 0.10$) percentage of AN (11.5 %) and BN (3.0 %) were pubertal on d 70. And, a similar ($P > 0.10$) cumulative percentage of AN (23.0 %) and BN (23.0 %) were pubertal on d 140. Treatment did not affect ($P > 0.10$) attainment of puberty on d 70 and 140. Estrous, conception, and timed-AI pregnancy rates were similar ($P > 0.10$) between breed and treatment. However, CON heifers tended ($P < 0.06$) to have a greater AI pregnancy rate than LH (73.3 % vs. 53.3%; respectively). Breeding season pregnancy rates were similar ($P > 0.10$) between CON (80%) and LH (86.7%). In conclusion, altering the growth pattern of prepubertal AN and BN heifers did not alter percentage pubertal at breeding but tended to reduce AI pregnancy rate for LH heifers. Treatment had no effect on breeding season pregnancy rates.

Key Words: Beef heifers, Puberty, Synchronization

81 SS-ASAS Emerging Scholar Award: Distribution and role of glucagon-like peptide-2 in cattle. C. C. Taylor-Edwards*[1], D. G. Burrin[2], K. R. McLeod[1], J. J. Holst[3], J. C. Matthews[1], and D. L. Harmon[1], [1]*University of Kentucky, Lexington*, [2]*USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine, Houston, TX*, [3]*Department of Biomedical Sciences, The Panum Institute, University of Copenhagen, Copenhagen, Denmark.*

Glucagon-like peptide-2 (GLP-2) is a nutrient-responsive hormone that increases small intestinal growth and intestinal blood flow in non-ruminants, but its role in ruminants was unknown. In Exp. 1, 4 ruminally, duodenally, and ileally cannulated steers were limited to $0.75 \times NE_M$ for 21 d and then increased (d 0) to $1.75 \times NE_M$ for another 29 d. On d –6, –3, 1, 3, 7, and 29, blood samples for GLP-2 analysis and biopsies (via cannulae) were collected. Total RNA from biopsies was used to quantify proglucagon (GCG) and GLP-2 receptor (GLP2R) mRNA (relative to 18S rRNA) by quantitative real-time PCR (qRT PCR). Ileal GCG mRNA expression and plasma GLP-2 were increased ($P = 0.07$ and $P = 0.07$, respectively) within 3 d after the increase in feed intake. In Exp. 2, 18 Angus steers were killed to obtain epithelium from the forestomachs and intestines for qRT PCR for GCG and GLP2R mRNA. Intestinal expression of GCG and GLP2R mRNA was 5000-fold ($P < 0.0001$) and 49-fold ($P < 0.0001$) greater than forestomach expression, respectively. In Exp. 3, 8 Holstein calves with a blood flow probe around the superior mesenteric artery were randomly assigned to either Control (0.5% BSA) or GLP-2 (50 µg/kg BW GLP-2) injected subcutaneously every 12 h for 10 d. Blood flow was measured on d 0 and d 10 in response to infusion of BSA or 1000 pmol·kg-1·h-1 GLP-2. Calves were killed on d 11. Infusion of GLP-2 increased blood flow to 175% of baseline on d 0 but only to 137% of baseline on d 10 ($P=0.0002$). Small intestinal mass was 24% greater ($P=0.04$) after GLP-2 treatment. These novel results show that ruminants possess a functional GLP-2 signaling system that is responsive to nutrient ingestion and exogenous GLP-2. This response is characterized by increases in small intestinal epithelial growth and intestinal blood flow.

Key Words: Glucagon-like peptide-2, Ruminant, Blood flow

82 Evaluation of an experimental sodium chlorate product, with and without nitroethane, on *Salmonella* in cull dairy cattle. N. A. Krueger*[1], T. S. Edrington[1], R. L. Farrow[1], R. C. Anderson[1], G. R. Hagevoort[3], G. Loneragan[2], T. R. Callaway[1], and D. J. Nisbet[1], [1]*USDA, ARS, Southern Plains Agriculture Research Center, Food and Feed Safety Research Unit*, *College Station, TX*, [2]*West Texas A&M University*, *Canyon*, [3]*New Mexico State University*, *Clovis.*

An experimental product containing sodium chlorate has been investigated as a pre-harvest food safety strategy to reduce *Salmonella* in vitro and in food producing animals. The addition of short chained nitro compounds, like nitroethane, has been shown to enhance the effectiveness of sodium chlorate as well. The objective of the current research was to determine if feeding an experimental chlorate product, with and without nitroethane, is effective in reducing populations of *Salmonella*, in naturally infected cull dairy cattle on commercial dairy prior to slaughter. Cull dairy cows were prescreened for *Salmonella* and animals culture positive for *Salmonella* were enrolled in the study. Subsequently, 12 cull dairy cows were randomly assigned to one of two treatment groups and dosed for two consecutive days with either 140 mg of an experimental product containing 30% sodium chlorate / kg BW/d or with 70 mg of the experimental chlorate product plus 160 mg nitroethane/kg BW/d. Fecal samples were collected just prior to dosing to allow each animal to serve as its own control and then at 12 h intervals for *Salmonella* culture. At 48 h post initial dose, animals were necropsied and gastrointestinal tissue and luminal content samples taken for bacterial enumeration. *Salmonella* is reported in log10 cfu/g (quantifiable populations) and as prevalence [culture positive samples following enrichment (qualitative data)]. Data were analyzed using an analysis of variance utilizing a repeated measures statement for samples taken over time. Results demonstrate that sodium chlorate effectively reduced natural *Salmonella* populations by up to 5 log10 cfu/g feces in shedding animals. Additionally, animal prevalence, regardless of treatment, was reduced by 58%. There was no observable benefit of co-treating with nitroethane. The use of the experimental sodium chlorate product as a pre-harvest strategy for reducing *Salmonella* in cull dairy cows prior to entering the food chain can serve as an effective means of reducing these bacteria and potentially foodborne illnesses.

Key Words: Sodium chlorate, *Salmonella*, dairy cattle

83   Effect of rumen undegradable intake protein on *Campylobacter* in fed cattle. R. C. Anderson*[1], M. Brown[2], W. E. Pinchak[3], J. Osterstock[4], J. MacDonald[2,4], W. Coufal[2], N. A. Krueger[1], T. R. Callaway[1], T. S. Edrington[1], R. B. Harvey[1], and D. J. Nisbet[1], [1]*USDA/ARS, Southern Plains Agricultural Research Center, Food & Feed Safety Research Unit, College Station, TX*, [2]*Feedlot Research Group, West Texas A&M University, Canyon, TX*, [3]*Texas AgriLife Research, Vernon, TX*, [4]*Texas AgriLife Research, Amarillo, TX*.

Campylobacter spp. are a leading bacterial cause of human foodborne illness in the United States, causing >1 million illnesses at a cost exceeding $1 billion annually. *Campylobacter* can colonize the gut of food animals as evidenced by their high prevalence in poultry, swine and sometimes cattle. Physiologically, *Campylobacter* differ from most other gut bacteria in that they lack 6-phosphofructokinase and thus do not ferment sugars. Rather, these bacteria respire anaerobically or use amino acids as carbon and energy substrates. Because cattle diets supplemented with undegradable intake protein (UIP) may increase the intestinal availability of amino acids, this study was conducted to assess the effects of rumen UIP on intestinal carriage of *Campylobacter* in fed steers. Crossbred steers, 401 ± 29.1 kg live weight, were randomly allocated (8 steers/diet) to one of 3 diets formulated to achieve 0, 30 or 60% wet corn distiller's grains with solubles (WDGS; DM basis) after adaptation. Steers received 0% WDGS before the study began. The WDGS replaced steam-flaked corn, supplemental fat and cottonseed meal. Steers receiving WDGS were adapted via incremental increases (every 3 d) to diets containing 15, 30, 45 or 60% WDGS. Fecal samples collected during and following adaptation were enumerated for *Campylobacter* spp. via traditional bacteriology. Mean *Campylobacter* counts after 6 d of adaptation to the 30% WDGS ration did not differ ($P > 0.05$) from those measured in steers fed the control diet (1.49 versus 1.51 $\log_{10}$ CFU/ml, respectfully; SEM = 0.2). Likewise, mean *Campylobacter* counts measured in samples from steers adapted to and maintained 4 d on the 60% WDGS ration did not differ ($P > 0.05$) from counts in non-adapted steers (2.04 versus 2.09 $\log_{10}$ CFU/ml, respectfully; SEM = 0.7). When measured in samples collected from steers maintained on their respective diets for more than 2 wk, *Campylobacter* counts again did not differ ($P > 0.05$) between control, 30% or 60% WDGS (2.00, 1.95 and 2.39 $\log_{10}$ CFU/ml, respectively; SEM = 0.6). Results refute the hypothesis that diets high in rumen UIP enhance intestinal carriage of *Campylobacter* spp. in fed cattle.

Key Words: *Campylobacter*, Distiller's grains, Pathogen

84   Evaluation of nose-clip designs for weaning beef calves. H. T. Boland*[1], J. A. Parish[2], G. Scaglia[3], T. F. Best[1], W. Epperson[2], S. T. Willard[2], and M. Howell[4], [1]*Mississippi State University, Prairie*, [2]*Mississippi State University, Mississippi State*, [3]*Iberia Research Station, LSU AgCenter, Jeanerette, LA*, [4]*North Mississippi R & E Center, Verona, MS*.

The use of anti-suckling nose-clips (**NC**) is a method to gradually wean calves and potentially reduce stress at weaning. The NC allows the calf to maintain physical contact with its dam while suckling is prevented. Results from previous studies using NC have varied and may be due to differences in the designs of commercially available NC. A study was conducted in which 24 calves (BW=242±6 kg) were randomly assigned to be weaned by one of three methods: with an adjustable size NC (**ADJ**), a one-size fits all NC (**ONE)**, or weaned conventionally by abrupt remote separation (**CTRL**). Calves wore NC for 5 d prior to separation from dams on d 0. Calves were weighed and blood collected via jugular venipuncture on d -5, 0, 5, and 19, with final body weight on d 61. Blood serum was analyzed for cortisol, urea nitrogen (SUN), CK, albumin, and total protein. Each calf wore an IceTag pedometer to monitor its physical activity. Data were analyzed using PROC MIXED. The ONE and ADJ calves spent less time ($P \leq 0.0005$) pacing along fence-lines than CRTL calves 24 h after separation (ADJ=5,031; ONE=6,563; and CTRL=13,303 steps on d 1). There was no effect of treatment on overall time spent standing (P=0.91) or lying (P=0.89). Overall ADG did not differ (P=0.66) among treatments (ADJ=0.64, ONE=0.63, and CTRL=0.54 kg). Cortisol level was not affected by treatment (P=0.35; ADJ=17.6, ONE=18.5 and CTRL=23.7 ng/mL) or d (P=0.52). There was no effect of treatment (P=0.99), but an effect of d on SUN ($P<0.0001$) with lowest concentrations occurring on d 5 (4.5 mg/dL). No differences within sampling date were observed for CK, albumin, or total protein ($P \geq 0.15$). Overall CK level tended (P=0.06) to be greater in ONE than CTRL calves (309 and 207 IU/L, respectively). Overall albumin level of CTRL calves was greater (P=0.02) than ADJ (31.9 and 30.0 g/L, respectively). Overall total protein was lower ($P \leq 0.05$) in ADJ calves than ONE or CTRL calves (62.2, 65.8 and 65.3 g/L, respectively). Calf behavior was impacted by the use of NC. However additional studies with greater replication are needed to determine if performance is affected or if there is an advantage to using one NC type over another.

Key Words: Behavior, Nose-clip weaning, Stress

85   Efficacy of two metaphylactic antimicrobials in lightweight, high-risk stocker calves. R. R. Reuter* and D. O. Alkire, *The Noble Foundation, Agricultural Division, Ardmore, OK*.

An investigation was undertaken on a commercial operation to determine the clinical efficacy of two metaphylactic antibiotics in lightweight calves at high risk for bovine respiratory disease (BRD). Mixed male and female calves (n = 311, BW = 110 ± 0.77 kg) were purchased from sale barns in Georgia and transported in two loads to a ranch in Oklahoma. At arrival, bulls were surgically castrated and all calves were individually identified, weighed, vaccinated, administered anthelmintic, implanted, and randomly assigned to receive either tulathromycin or tilmicosin phosphate injections according to label indications. Calves were housed in a common pen for approximately 60 d and offered ad-libitum bermudagrass hay (9% CP, 58% TDN). Daily, calves were also fed a ration at 2.25% BW (as-fed; 20% CP, 79% TDN) containing 45% soybean hulls, 35% corn gluten feed, and 20% linseed meal. Body weight at the end of the 60-d period was not collected. Calves were observed daily and those exhibiting clinical symptoms of BRD were administered florfenicol if rectal temperature exceeded 40°C. Calves requiring second and third treatments for BRD were administered enrofloxacin and oxytetracycline, respectively. In a logistic regression analysis, tulathromycin reduced the odds of BRD morbidity and mortality by 35% and 152%, respectively ($P < 0.003$), as compared to tilmicosin. Metaphylactic drug did not ($P > 0.24$) influence average number of days, nor ADG, from processing until calves were first identified as morbid. Numerically, more tilmicosin-treated calves required treatment for BRD than tulathromycin-treated calves (52% vs. 35%, respectively). However, numerically fewer morbid calves from the tilmicosin-treated group required second or third treatments as compared to those that received tulathromycin (41% vs. 60%, respectively). Therefore, total treatment cost on a herd basis was not different (P = 0.55) between the two metaphylactic antibiotics. Tulathromycin cost $4.20 per animal more than tilmicosin, but decreased mortality cost by $35 per animal ($P < 0.001$).

Key Words: Stocker, Tulathromycin, Tilmicosin

86 Characterization of feed efficiency traits and relationships with feeding behavior in growing steers. E. D. M. Mendes*, G. E. Carstens, L. O. Tedeschi, and Z. Paddock, *Texas A&M University, College Station*.

Objectives of this study were to characterize feed efficiency traits and to examine phenotypic correlations with performance and feeding behavior traits in growing steers. Individual DMI and feeding behavior traits were measured in 168 crossbreed steers (initial BW = 274 ± 26 kg) fed a high-grain diet (ME = 3.08 Mcal/kg DM) for 70 d using a GrowSafe feed intake system. Residual feed intake (RFI) was calculated as the difference between actual and expected DMI from linear regression of DMI on ADG and mid-test $BW^{0.75}$ base model. Overall (mean ± SD) ADG, DMI and RFI during the study were 1.76 ± 0.22, 9.82 ± 1.03 and 0.00 ± 0.80 kg/d, respectively. Feeding event (FE) and meal (> 5 min between FE) frequencies (events/d) and durations (min/d) were computed using Process Feed Intakes software (GrowSafe systems; version 7.26). Overall (mean ± SD) FE frequency, meal frequency, FE duration, and meal duration were 53.6 ± 9.9, 9.5 ± 1.6 events/d, and 57.1 ± 12.7, 110 ± 17 min/d, respectively. The magnitude of the correlations between RFI and FE frequency (0.27), FE duration (0.61), and meal duration (0.50) were stronger than the correlations between these feeding behavior traits and FCR (0.19, 0.28, 0.22, respectively). The inclusion of FE frequency and duration traits in the base model used to compute RFI increased the R^2 from 0.40 to 0.68. The additional variation in DMI explained by these feed intake activity traits as a proportion of the variation in DMI not explained by ADG and mid-test $BW^{0.75}$ (base model) was 47%. These results indicate that the interanimal variation in feeding activity is more closely associated with phenotypic variation in RFI than FCR, suggesting that these behavioral traits may be useful indicator traits for RFI in beef cattle.

Key Words: Residual feed intake, Feeding event frequency, Meal duration

87 Prediction of partial efficiency of use of metabolizable energy to net energy for gain. M. I. Marcondes*[1,2], L. O. Tedeschi[1], and S.C. Valadares Filho[2], [1]*Texas A&M University, College Station*, [2]*Universidade Federal de Viçosa, Viçosa, MG, Brazil*.

The study was conducted to predict the partial efficiency of use of ME to NEg (**kg**). Twenty five comparative slaughter studies were gathered (N=728 animals) and coded by sex (407 bulls, 204 steers, and 117 heifers) and breed (423 Nellore and 305 crossbreds). The RE was regressed on MEI for gain within each experiment to obtain the kg using orthogonal regression. Four experiments failed to provide reliable estimates of kg, therefore, only 21 studies were used. The computed kg was regressed on retained energy as protein (**REp**) according to the model: a/(b + REp). The PROC NLIN (SAS Inst. Inc., Cary, NC) was used to fit the model. Sex and breed effects were not tested because of the small number of experiments. The data was also used to develop an equation to predict REp as a function of RE in the empty body gain (**REc**). A random coefficients model, including sex and breed as fixed effects and studies as random effects, was used to fit the model: REp = a × REc^b. The PROC NLMIXED (SAS Inst. Inc., Cary, NC) was used to fit the REp equation and only animals with REc greater than 1 Mcal/kg were used (N=550 animals). The overall equation to predict kg was: 0.326±0.143/(0.531±0.316 + REp), with an r^2 of 0.963. The meta-analysis of REp indicated no breed effect on the parameters a ($P = 0.558$) and b ($P = 0.422$), and also no sex effect on parameters a ($P = 0.705$) and b ($P = 0.347$). The Akaike Information Criteria was -1668 and the r^2 was 0.972. Therefore, one overall equation was developed for REp: 1.095±0.033×$REc^{-1.103±0.037}$. These results clearly indicated that neither sex nor breed affected the retention of energy as protein. Only *Bos indicus* and crossbreds were present in the database, thus it is still necessary to further evaluate differences between *Bos taurus* and *Bos indicius*. We concluded that REc is a good predictor of REp and that REp may estimate kg satisfactorily.

Key Words: Nellore, Crossbreds, Gender

88 Prediction of chemical composition of carcass and empty body weight of cattle using the 9-11th rib section composition. M. I. Marcondes*[1,2], L. O. Tedeschi[1], S. C. Valadares Filho[2], and M. L. Chizzotti[3], [1]*Texas A&M University, College Station*, [2]*Universidade Federal de Viçosa, Viçosa, MG, Brazil*, [3]*Universidade Federal do Vale do São Francisco, Petrolina, PB, Brazil*.

The objective of this study was to develop equations to estimate chemical composition of carcass and body from the 9-11th rib section cut (**Rib9-11**). A database (N = 329) from 10 studies in which 246 animals were on feedlot and 83 were on pasture was used. There were 120 bulls (BU), 115 steers (ST), and 94 heifers (HF), being 215 Nellore, 76 Nellore x Angus, and 38 Nellore x Simmental. The right half carcass and the Rib9-11 from the left half carcass were analyzed for ether extract (EE), and CP. The remaining components were chemically analyzed to determine the composition of the empty BW (**EBW**). A stepwise procedure was conducted to determine the variables to be included in the models. The variables included EE in Rib9-11 (**EER**), CP in Rib9-11 (**CPR**), visceral fat (which includes pelvic, kidney, heart, and mesenteric fats, **VF**), organs plus viscera (**OV**), and carcass dressing (**CD**), all expressed as percentage of EBW. We also included carcass (**CW**, kg) and EBW (kg). Breed and sex were tested as fixed effects, while the variables determined by the stepwise and study were assumed as random effects. A bootstrap (a procedure consisting in to build a sampling distribution by resampling the database) was used to evaluate the robustness of the equations developed using the ordinary least-square means regression. There were no breed effects (P > 0.05) on all equations. The selected equations to predict carcass composition were: EE (%) = 4.31 + 0.31×EER + 1.37 ×VF (feedlot; r^2=0.833; root of mean square error (**RMSE**)=2.13%); EE (%) = 1.68 + 0.73 ×EER (pasture; r^2=0.497; RMSE=2.34%); CP (%) = 13.62 + 0.28 ×CPR (feedlot; r^2=0.497; RMSE=1.25%); CP (%) = 13.62 + 0.28 ×CPR (pasture; r^2=0.102; RMSE=0.96%); The selected equations to predict EBW composition were: EE (%) = 2.75 + 0.33 ×EER + 1.80 ×VF, EE (%) = 1.84 + 0.33 ×EER + 1.91 ×VF , EE (%) = 4.77 + 0.33 ×EER + 1.28 ×VF for BU, ST, HF, respectively (feedlot; r^2=0.886; RMSE=1.97%); EE (%) = 2.86 + 0.30 ×EER + 1.34 ×VF (pasture; r^2=0.555; RMSE=1.39%); CP (%) = 10.78 + 0.47 ×CPR – 0.21 ×VF (feedlot; r^2=0.589; RMSE=1.03%); CP (%) = 14.38 + 0.24 ×CPR (pasture; r^2=0.09; RMSE=0.88%). We concluded that body and carcass composition can be estimated with Rib9-11 and variables easy to be measured.

Key Words: Crude protein, Ether extract, Estimation

Small Ruminant Production

89   Effect of feeding system and breed on ω-3 polyunsaturated fatty acid content of lamb muscles. G. Davila El Rassi*[1], V. Banskalieva[1], and M. Brown[2], [1]*R. M. Kerr Food and Agricultural Products Center, Oklahoma State University, Stillwater, OK*, [2]*USDA-ARS, Grazinglands Research laboratory, El Reno, OK.*

Katahdin (KK, n=6), Katahdin × Suffolk (KS, n=6), Suffolk × Katahdin (SK, n=6) and Suffolk (SS, n=6) wethers were used to evaluate ω-3 and ω-6 polyunsaturated fatty acid content, and the ratio of ω-6 to ω-3 in muscles of lambs of different breeds, raised on concentrate or forage diets. Lambs were born spring 2007, weaned in late May and grazed on Bermuda grass pasture until late August. Concentrate lambs were moved to drylot and 3 lambs of each breed group were fed on a mixed grain ration (12% CP, 76%TDN) for 88 d while a contemporary group of forage-fed lambs remained on Bermuda grass until late September and then was moved to drylot and fed wheat silage for 69 d. Lambs were harvested at the Food and Agricultural Products Center, Oklahoma State University and samples of m. *Longissimus lumborum* (LL) and m. *Semimembranosus* (SM) were taken for fatty acid analyses. Data were analyzed by mixed model least squares procedures with a linear model that included fixed effects of treatment (concentrate vs. forage finished), sire breed, dam breed, muscle type (subunit effect), and all possible interactions. There was little evidence of interactions among fixed effects for ω-6, ω-3, or ω-6/ ω-3 in these data. There was a trend (P < 0.10) for ω-6 to be greater in LL of forage-fed lambs than concentrate-fed lambs and ω-3 concentrations of forage-fed lambs were greater than concentrate-fed lambs in both LL and SM (P < 0.05). The ratio ω-6/ ω-3 was greater in SS lambs than KK lambs in both muscles (P < 0.05) and there was evidence of a direct breed effect in favor of KK (P < 0.05) in both muscles where Katahdin-sired lambs were lesser in this ratio than Suffolk-sired lambs. In addition, forage-fed lambs were lesser than concentrate-fed lambs in ω-6/ ω-3 in both LL and SM (P < 0.05). Averaged over muscle, ω-6/ω-3 in concentrate-fed lambs averaged 4.54, 3.69, 3.34, and 3.74 in SS, SK, KS, and KK whereas in forage-fed lambs these averages were 3.58, 3.12, 2.87, and 2.01, respectively. Results suggest that forage-fed lambs have a more favorable ratio of ω-6/ω-3 as do Katahdin-sired lambs in LL and SM muscles.

Key Words: Lamb, Diet, ω-3 fatty acids

90   Effects of feeding sesame hulls on performance and carcass characteristics of Awassi lambs. B. S. Obeidat* and B. H. Aloqaily, *Jordan University of Science and Technology, Irbid, Jordan.*

Twenty-four weaned Awassi ram lambs (age of 70 ± 4.53 days) and (initial body weight 18.6 ± 0.53 kg) were divided randomly into three dietary groups. Group one served as a control and received no sesame hulls (SH) (CON), group two (LSH) and three (HSH) received 12.5 and 25% SH, respectively. Lambs were housed in individual pens and fed ad libitum isonitrogenous diets. At the end of the study (63 days), all lambs were slaughtered. Lambs fed SH registered greater (P<0.05) intake of dry matter (DM) and organic matter (OM) than CON group and averaged 936 and 809, 1047 and 966, and 1059 and 941 g/kg DM and OM intake for the CON, LSH and HSH diets, respectively. Intakes of neutral detergent fiber (NDF), acid detergent fiber (ADF) and ether extract (EE)

were the highest (P<0.05) for lambs fed the HSH diet when compared to CON fed lambs and LSH group. Digestibility of DM, OM and crude protein were similar among all diets. Digestibility of NDF tended to be greater (P=0.09) for lambs fed on HSH than the CON and the LSH diets. Digestibility of ADF and EE was greater (P<0.05) for lambs fed on HSH diet compared with CON diet while the LSH diet was intermediate. Final body weight, total gain, ADG, and feed conversion ratio were comparable among all dietary groups. Cost of gain was lower (P<0.05) in lambs fed the SH diets than in those fed the CON diet. Fasting live weight, hot and cold carcass weights, and dressing percentage were not influenced by SH. No differences were observed for dissected loins and legs except for the longissimus weight which was greater (P<0.05) for lambs fed on LSH than in lambs fed on the CON diet while the HSH was intermediate. Loin eye muscle area was greater (P<0.05) in lambs fed the LSH diet than the CON diet. No differences were observed among treatment diets in pH, cooking loss, water holding capacity and shear force. Results of this study demonstrated the possibility of including sesame hulls up to 25% in finishing diets of Awassi lambs.

Key Words: Awassi lambs, Sesame hulls, Carcass characteristics

91   Effects of high levels of zinc supplementation on growth performance, carcass characteristics, and blood metabolites of Boer-cross goat kids. S. Solaiman, J. Bleach*, B. Min, N. Gurung, and C. Okere, *Tuskegee University, Tuskegee, AL.*

Twenty one Boer-cross male goat kids (21.1 ± 1.43 kg BW) were stratified by BW and randomly assigned to three experimental treatments to determine effects of high zinc (Zn) supplementation on growth performance, blood metabolites and carcass characteristics. Treatments consisted of daily drenching of animals (n = 7) with 5 mL water containing either 0, 100, or 200 mg Zn as Zn sulfate, hepta hydrate (Zn SO4, 7 H2O). Animals were offered a complete grain mix (CP = 16%, Zn = 119 ppm, Copper = 25.7 ppm, and Manganese = 124.6 ppm) once a day and bermudagrass hay (BGH) separately, at 80:20 ratio, respectively. Feed offered and refusals were monitored daily and adjusted weekly to allow between 5 to 10% refusals. Body weight was recorded every 2 wk and blood collection was performed every 4 wk. After 76 days, animals were slaughtered and carcass characteristics were determined. Initial BW, final BW, ADG, DM intake and G:F were similar (*P* > 0.10) for different treatment groups. There were no differences (*P* > 0.10) in carcass measurements including dressing percentage, cold carcass weight, HCW, and carcass fat between treatment groups with additional Zn in the diet. Blood glucose increased linearly (*P* = 0.02) with no changes (*P* > 0.10) in serum triglycerides. There were no differences (*P* > 0.10) in blood serum manganese and zinc; however, blood serum copper tended to decrease (linear, *P* = 0.07) as the level of supplemental Zn increased. Liver manganese and copper increased linearly (*P* = 0.01 and *P* = 0.04, respectively) with no changes in liver Zn, as Zn supplementation increased in the diet. Additional Zn fed to young growing goats did not change animal performance or carcass characteristics; however, it increased liver trace mineral deposition.

Key Words: Goat, Growth performance, Zinc

92   Influence of dietary phosphorus content and the ratio of calcium to phosphorus on the formation of urolithogenic compounds in Boer–cross goats.   S. R. Freeman*, M. H. Poore, G. A. Young, and K. L. Anderson, *North Carolina State University, Raleigh*.

Recent increases in the US meat goat population have led to an increase in cases of urolithiasis. Since uroliths are often associated with dietary Ca and P imbalance, we evaluated 4 diets [0.3% P, Ca:P = 2:1 (**D1**); 0.6% P, Ca:P = 1:1 (**D2**); 0.6% P, Ca:P = 2:1 (**D3**); and 0.6% P, Ca:P = 2:1 + 2.5% NaCl (**D4**)] in 8 Boer-cross, wether goats (replicated 4 × 4 Latin squares; concentrate offered at 3.5% BW). Diet 4 was included to determine if increasing salt intake might reduce the tendency to form uroliths. Analyzed mineral contents (% Ca, % P; D1 to D4; respectively) were 0.59, 0.36; 0.55, 0.68; 1.32, 0.67; and 1.29, 0.69. All treatment groups had similar DMI (838 to 887 g/d, SEM = 22.8) and N retention (6.2 to 7.0 g/d, SEM = 0.65). Serum parameters remained within normal ranges throughout the trial. Water intake was lower when D1 or D3 were consumed than D2 or D4 (Table 1). Fecal DM was lower with D2 than with other diets, possibly the result of changes in Na and water absorption in the intestinal tract caused by high P and Ca:P imbalance. Goats eating D1 had similar urinary crystal density scores to goats eating D2 (scale: 0, no crystals to 3, high density of crystals). Diets 3 and 4 also yielded similar scores. Scores for D3 and D4 were lower than those for D1 and D2. Results suggested that P level can interact with Ca:P imbalance to alter intestinal absorption. Development of urolithic precursors was the result of a more complex relationship between dietary Ca and P than anticipated. Crystal density scores <2 may be optimum.

Impact of dietary P and Ca:P ratio on water intake and urine and fecal qualities in Boer–cross goats

	0.3% P 2:1[1]	0.6% P 1:1	0.6% P 2:1	0.6% P 2:1 + 2.5% salt	SEM	*P*
Water intake (g/g DMI)	1.9[a]	2.5[b]	2.1[a]	2.8[c]	0.12	<0.01
Fecal DM (%)	41[a]	32[b]	43[a]	42[a]	1.1	<0.01
Urine (g/d)	644[a]	839[b]	737[ab]	1444[c]	55	<0.01
Urine pH	8.7	8.6	8.7	8.7	0.02	0.08
Crystal density score	2.3[a]	2.3[a]	1.5[b]	1.1[b]	0.26	<0.01
Na digestibility (%)	53[a]	20[b]	50[a]	91[c]	3.3	<0.01

[1]Ca:P ratio [a,b,c]Values in a row without common superscripts differ (*P*<0.05)

Key Words: Dietary P, Meat goats, Uroliths

93   Effect of level of supplementation in late gestation on performance of meat goat does and kids.   T. K. Hutchens*[1], M. K. Neary[2], and K. Andries[3], [1]*University of Kentucky, Lexington*, [2]*Purdue University, W. Lafayette, IN*, [3]*Kentucky State University, Frankfort*.

The objective of this study was to evaluate if productivity of Boer × Kiko does was influenced by supplementation strategy in the last trimester of gestation. Twenty four does gestating twin feti consuming a fescue and alfalfa mix hay (15.6% CP, 56.9% NDF, DM basis) 6 each were fed one of four supplement levels of soy hulls for the last 56 d of gestation. Amount of supplement was based on percent of initial body weight (48.2 ± 3.3 kg) of does and were: 1.) 1% soy hulls (0.45 kg) for first 28 d, 2% soy hulls (0.9 kg) for last 28 d (MH), 2.) 0% soy hulls for first 28 d, 2% soy hulls for last 28 d (LH), 3.) 2% soy hulls for first 28

d, 2% for last 28 d (HH) and 4.) 1% soy hulls for first 28 d, and 1% for last 28 d (MM). Does were weighed and body condition scored at 14 d intervals through gestation, 24 h after kidding, and at 30 d intervals during lactation. Kid BW was recorded at birth, 30, 60 and 90 d and ADG was calculated. Initial BW (P = 0.96) and BCS (P = 0.66) was similar for does on the four treatments. The HH does were heavier (P < 0.05) than LH does at 14 d but not (P > 0.05) MM or MH does. At 28 d of gestation, HH does were heavier (P < 0.05) than MH and LH does and tended (P = 0.06) to be heavier than MM does. The 42 d weights for HH does were higher (P < 0.05) than MH, LH, and MM does. By 56 d of gestation and 24 h after kidding, BW of all does were similar (P > 0.05). Body weights of does were not different (P > 0.05) at 30, 60 or 90 d of lactation. The BCS of does was not different (P > 0.05) at any stage of gestation or lactation. The daily hay intake of does was similar (P > 0.05) regardless of level of soy hulls fed. Intact male kids were heavier (P < 0.05) at birth (3.57 vs. 3.22 ± 0.09 kg), 30 d (8.54 vs. 7.46 ± 0.25 kg), 60 d (13.37 vs. 11.38 ± 0.39 kg) and at 90 d (16.63 vs. 14.1 ± 0.43 kg) than female kids. The ADG of buck kids was higher (P < 0.05) than doelings at 30 (0.165 vs. 0.142 ± 0.007), 60 (0.163 vs. 0.140 ± 0.006), and 90 (0.144 vs. 0.121 ± 0.005) d of the lactation period. Late gestation supplement level used in this trial did not affect growth and performance of meat goat does or kids.

Key Words: Goat, Late gestation, Supplementation

94   Consumption of free gossypol from whole cottonseed reduces antler weight but not other growth traits in red deer stags.   S. L. Morgan*[1,2], D. A. Neuendorff[1], A. L. Lewis[1], and R. D. Randel[1], [1]*Texas AgriLife Research, Overton, TX*, [2]*Texas AgriLife Research, College Station, TX*.

Whole cottonseed, extruded cottonseed and cottonseed meal are gossypol (G) containing feedstuffs which are routinely used in supplemental feed for deer. Pressure from the extrusion process reduces concentrations of free G. The purpose of this experiment was to compare supplements based on whole cottonseed, extruded cottonseed product and corn-soybean meal. Thirty mature red deer stags *Cervus elephus* were randomly allotted by weight, body condition score, and age into three treatment groups (n=10): control (C; 5:6 soybean:corn), extruded cottonseed pellet (P; 0.04% FG, 0.36% Total G) and whole cottonseed-soybean meal (WCS; 5:3 cottonseed:soybean meal, 0.96% FG & Total G). The supplements were designed to deliver equal amounts of energy (TDN) (1661g/d) and protein (620-637g CP/d). Stags were fed daily (C: 2.09kg, P: 2.36kg, WCS: 1.95kg per stag) for 155 days from antler casting 2/26/2009 until hard antler had been reached 7/31/2009. Stags were maintained on 0.809 ha Coastal bermuda grass pastures with free access to mineral, salt and water. Body weights were recorded on days 0, 28, 56, and to avoid damaging of velvet antler not again until day 155. Antlers were measured using the Safari Club International (SCI) scoring method once hard antler was achieved. Hard antlers were removed just above the burr and allowed to dry for a minimum of 60d before weighing. Average daily gain (155d) did not differ (P>0.10) between dietary treatment groups; C (1.028 ± 0.033 kg/d), P (1.046 ± 0.033 kg/d) and WCS (1.048 ± 0.033 kg/d). However, average antler weights from C (1.130 ± 0.068 kg) and P (1.297 ± 0.068 kg) were greater (P<0.04) than from WCS (1.041 ± 0.068 kg). Although SCI measurements were numerically greater for C (186.22 ± 7.35 inches) and P (198.66 ± 7.6 inches) than WCS (183.73 ± 7.35 inches) differences were not significant (P>0.10). While the consumption of 18.72g FG from whole cottonseed had no negative effect on weight gain or SCI score, it reduced antler weight in red deer stags.

Key Words: Gossypol, Cervid, Antlers

95   Carcass characteristics of sheep fed peanut skins. G. Abdel-rahim*[1], J. Khatiwada[1], D. Rankins[2], N. Gurung[3], and J. Vizcarra[1], [1]*Alabama A & M University*, *Normal*, [2]*Auburn University*, *Auburn, AL*, [3]*Tuskegee University*, *Tuskegee, AL*.

The overall objective of the proposed project was to gain a thorough understanding of the feeding value of Peanut skins (PS) for meat sheep. The specific objectives were to investigate the effects of varying levels of dietary PS inclusion on dry matter intake, growth, and carcass characteristics of meat sheep. Twelve Gulf Coast ewe lambs (26.3±5.4 kg initial BW and 12 to 14 months of age) were randomly assigned to one of the three experiment diets (4 ewes/diet) containing 50% fescue/bermudagrass mix hay plus 50% concentrate mix with 0%, 20%, and 40% of PS on as-is basis. Feed offered and refusals were collected daily. Body weights were recorded every 2-wk. After 90-d, ewes were slaughtered and carcass characteristics were measured. The feed intake, growth, and carcass quality data were analyzed as a completely randomized design. Hot and cold carcass weight, body wall thickness, the 12th rib fat, and kidney, pelvic and heart fat were all similar in lambs fed the three treatments. However, the rib eye area (REA) was greater (P<0.05) in lambs fed 20% PS than the REA in lambs fed 0% and 40% PS. Similarly, REA was greater (P<0.05) in lambs fed 40% than in lambs fed 0% PS. These results demonstrate that feeding increasing level of PS to meat sheep significantly impacted the REA. Because there were no detrimental effects, then PS needs to be considered as a potential low-cost feedstuff for ruminants.

Key Words: Carcass, Peanut skins, Sheep

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

A comprehensive trial was conducted to evaluate the effect of sericea lespedeza (*Lespedeza cuneata*, SL) as a summer forage on natural gastrointestinal nematode (GIN) infections in young goats. Forty-five recently weaned Boer cross kids (BW 17.6 kg) were dewormed, grazed on SL for 16 d, and then stratified by fecal egg counts (FEC) and sorted into 9 equal groups in a randomized complete block design with 3 replications. Goats were strip-grazed on either SL, pearlmillet (*Pennisetum americanum*, PM) or a combination (CMB0) of SL and PM plots. CMB0 goats started on PM, switched to SL on d 18 and back to PM on d 35. Fecal samples for FEC, blood samples for packed cell volume (PCV) and FAMACHA scores were taken at d 0 (start of treatment grazing), d 11 and then every 7 d for a total of 67 d. Weekly larval cultures from pooled fecal samples were used to determine treatment effects on GIN species composition. From d 46 to d 67, kids were housed together off pasture, given *ad libitum* access to fescue hay and fed concentrate at 1.5% BW. FEC of kids grazing SL decreased within 11 d and stayed lower than for PM kids from d 11 through 46 (avg: 194 vs 2040, resp.; P < 0.001). FEC of CMBO kids decreased from 2855 to 568 (P < 0.001) within 7 d of grazing SL and then increased from 59 to 1065 (P < 0.001) within 7 d when switched again to PM plots. When kids were grazing PM their PCV values were lower (P < 0.05) than for SL only on d 11 (PM and CMBO) and d 32 (PM). FAMACHA scores improved for SL (P < 0.001) on d 11 and for PM (P < 0.01) on d 25 compared to the other treatments. Eight of the 15 kids on the PM plots and four on the CMBO plots had to be dewormed within 11 d. Following barn feeding on d 46, FEC and FAMACHA scores increased while PCV decreased in

all treatments. Four kids in the SL treatment had to be dewormed within 7 d of being in the barn. Haemonchus contortus larvae recovered from fecal cultures decreased from 100% at d 0, to 42 and 38, 50 and 56, and 95 and 95% by d 46 and d 67 for SL, CMBO and PM, respectively. In summary, SL decreased FEC and changed larvae species composition in fecal cultures.

Key Words: Gastrointestinal nematodes, Sericea lespedeza, Goats

97   Integrated control of gastrointestinal nematodes (GIN) using sericea lespedeza (SL), FAMACHA, and copper oxide wire particles (COWP) in weaned goats in Arkansas. J. M. Burke*[1], J. E. Miller[2], J. A. Mosjidis[3], and T. H. Terrill[4], [1]*USDA, ARS, Booneville, AR*, [2]*Louisiana State University*, *Baton Rouge*, [3]*Auburn University*, *Auburn, AL*, [4]*Fort Valley State University*, *Fort Valley, GA*.

Lack of effective anthelmintics for control of GIN in goats has led to the need for an integrated management approach. FAMACHA is an effective tool for selective deworming of *Haemonchus contortus*-infected goats, while COWP and SL grazing have reduced *H. contortus* infection. The objective was to examine the effectiveness of these tools in controlling GIN. Spanish doe kids (113.8 ± 1.9 d of age; 16.9 ± 0.3 kg) were randomly assigned to graze bermudagrass (BG; n = 12), SL and grass pasture (SLG; n = 13), or continuous SL (SLC; n = 13). Does were dewormed with COWP or levamisole if FAMACHA was 4 or 5, respectively. Does were fed a commercial 16% CP ration based on NRC requirements and estimated CP of pastures so that 454, 300, and 150 g of supplement/goat was fed 5 d/wk to BG, SLG, and SLC, respectively. A pooled fecal sample was collected from all does for culture on D 0 (day introduced to forage) and from forage groups on D 14, 56, and 70. *Trichostrongylus spp.* was the predominant nematode in May and June and *H. contortus* in July; other nematodes were *Teladorsagia*, *Oesophagostomum*, and *Cooperia*. Fecal egg counts (FEC) and blood packed cell volume (PCV) were determined every 14 d between D 0 and 84, and BW every 28 d. Data were analyzed using the mixed models procedure of SAS with a repeated statement for date and forage treatment as the main effect. FEC were log transformed. The mean number of dewormings was 2.1, 1.0, and 1.7 ± 0.3 for BG, SLG, and SLC groups, respectively (*P* < 0.03). FEC were lower in both SL groups compared with does that grazed BG (*P* < 0.007). PCV tended to be lower in BG does before D 28, but higher after D 42 (forage × day, *P* < 0.07). The BG does were lighter than both SL groups of does on D 28 and 56, but groups were similar by D 84 (forage × day, *P* < 0.002). COWP was not effective in reducing FEC in these does. Because *H. contortus* was not the predominant nematode, the integrated approaches were only partially effective in controlling GIN in doe kids. Fewer inputs (feed, deworming) were necessary for goats grazing SL than BG.

Key Words: Goats, Management, Parasites

98   Integrated control of gastrointestinal nematodes (GIN) using sericea lespedeza (SL), FAMACHA, and copper oxide wire particles (COWP) in weaned lambs in Arkansas. J. M. Burke*[1], J. E. Miller[2], J. A. Mosjidis[3], and T. H. Terrill[4], [1]*USDA, ARS, Booneville, AR*, [2]*Louisiana State University*, *Baton Rouge*, [3]*Auburn University*, *Auburn, AL,*, [4]*Fort Valley State University*, *Fort Valley, GA*.

Alternatives to chemical dewormers are needed to counter anthelmintic resistance and improve organic management systems. The objective was to examine the effectiveness of grazing SL and selective use of COWP

based on FAMACHA for control of GIN. Katahdin lambs (145.6 ± 2.1 d of age; 30.1 ± 0.7 kg) were randomly assigned to graze bermudagrass (BG; n = 14), SL plus grass pasture (SLG; n = 14), or continuous SL (SLC; n = 15) for 56 d. Lambs were dewormed with COWP if FAMACHA was >3. Lambs were supplemented corn/SBM (16% CP) based on NRC requirements and estimated CP of pastures so that 454, 389, and 200 g/lamb was fed to BG, SLG, and SLC, respectively. A pooled fecal sample was collected from all lambs for culture on D 0 (day introduced to forage) and from forage groups on D 56. Initially, *Haemonchus contortus* was the predominant nematode, but the population shifted to other species in the SL groups by the end of the study. Fecal egg counts (FEC) and blood packed cell volume (PCV) were determined every 14 d between D 0 and 56, and BW every 28 d. Data were analyzed using the mixed models procedure of SAS with a repeated statement for date; forage treatment was the main effect. FEC were log transformed. The mean number of dewormings/lamb was 0.71, 0.20, and 0.21 ± 0.13 for BG, SLG, and SLC groups, respectively ($P < 0.02$). FEC were reduced in SLC compared with BG lambs on all days and reduced in SLG compared with BG lambs on D 56 (forage $\times$ day, $P < 0.001$). PCV was greater for SL than BG groups on most days (forage $\times$ day, $P < 0.03$). Body weight was similar among groups. COWP may have been more effective in reducing FEC in SL compared with BG groups (BG, 35.4 ± 11.6; SLG, 53.4 ± 12.3; SLC, $93.1 \pm 17.3\%$; $P < 0.05$). There were fewer false positive and negative FAMACHA scores in the SL than BG groups (BG, 80.0 ± 3.8; SLG, 90.0 ± 3.8; SLC, $94.7 \pm 3.7\%$; $P < 0.02$). Even though weight gains were similar, more inputs (feed, dewormer) were required for BG than SLG or SLC lambs.

Key Words: Forage, Parasite, Sheep

99   The effect of forage species on growth rates and gastrointestinal nematode infection in lambs. M. C. Miller, S. K. Duckett*, and J. G. Andrae, *Clemson University, Clemson, SC.*

Gastrointestinal nematode (GIN) infections constitute a major production loss for small ruminant producers in the Southeastern U. S. Gastrointestinal nematodes are rapidly developing resistance to chemical anthelmintics increasing the need for alternative control strategies. An experiment was designed to determine the effect of forage species on growth rate and gastrointestinal nematode infection in lambs. Southdown lambs (n=22; 27 ± 4.90 kg initial BW) stratified by weight, sex and FAMACHA score were assigned to graze either bermudagrass [BG; Cynodon dactylon (L.) Pers.] or chicory [CH; Chicorum intybus L.]. Lambs grazed for 80d from July 7, 2009 to September 25, 2009. Lambs were weighed and FAMACHA scored every 14 d. Fecal samples were taken monthly for modified McMaster fecal egg counts. Ultrasound measures of subcutaneous fat thickness (FT) over the 12th and 13th rib and longissimus dorsi muscle depth (MD) were taken on d 80. Lambs grazing CH had lower ($P = 0.01$) FAMACHA scores by d 56 than lambs grazing BG (2.0 ± 0.10 and 2.5 ± 0.55 respectively). By d 80 FAMACHA scores were 2.0 ± 0.21 and 3.9 ± 0.60 ($P < 0.01$) for CH and BG respectively and fewer ($P < 0.01$) CH lambs than BG lambs required deworming (0/11 and 8/11 respectively). CH lambs also exhibited lower ($P < 0.01$) FEC by d 69 than BG lambs (445 ± 437 and 6539 ± 3120 eggs per gram respectively). Average daily gain was greater ($P < 0.01$) in lambs grazing CH than those grazing BG (0.27 ± 0.04 and 0.07 ± 0.02 kg/d respectively). At the end of 80 d, weights were 49.6 ± 8.1 and 32.2 ± 10.4 kg ($P < 0.01$) for CH and BG respectively. On d 80, FT

and MD were greater in CH lambs than those grazing BG ($P < 0.01$). Grazing CH increased lamb performance and reduced GIN infection compared to those grazing BG.

Key Words: Lamb, Chicory, Gastrointestinal nematode

100   Feeding sericea lespedeza leaf meal to goats: effect on gastrointestinal nematode infection. T. H. Terrill*[1], B. R. Joshi[1], D. S. Kommuru[1], A. Mechineni[1], S. Gujja[1], N. R. Kamisetti[1], S. L. Dzimianski[1], J. E. Miller[2], J. A. Mosjidis[3], and J. M. Burke[4], [1]*Fort Valley State University, Fort Valley, GA,* [2]*Louisiana State University, Baton Rouge,* [3]*Auburn University, Auburn, AL,* [4]*USDA/ARS/DBSFRC, Booneville, AR.*

Feeding hay of sericea lespedeza (SL, *Lespedeza cuneata*), a high-condensed tannin legume, to small ruminants has been shown to reduce gastrointestinal nematode (GIN) infection, but length of feeding time required to achieve the effect is not known. Intact male goat kids (9-mo-old, n=34) were dewormed and randomly allocated into groups of 10 and 24. Half the animals in group 1 (n=10) were fed either SL leaf meal or ground bermudagrass (BG, *Cynodon dactylon*) hay (both diets approx. 14% crude protein), all were given 5000 larvae (L_3) of *Haemonchus contortus* a week after initiation of feeding and then slaughtered on d 28 post-infection to determine effects on worm establishment. The remaining animals (n=24) were fed the BG diet and infected with 5000 larvae each. On d 35 post-infection, animals were randomly allocated to two groups based upon fecal egg count (FEC), fed either the SL or BG diet, and then groups from each treatment (n=4) were slaughtered on 7, 14 and 28 d post-feeding. Feces and blood samples were taken weekly for FEC and packed cell volume (PCV) determination, respectively, and adult GIN were recovered for counting at slaughter. FEC and adult GIN data were log-transformed prior to statistical analysis. Feeding SL reduced ($P < 0.05$) establishment of *H. contortus* and total GIN, had no effect on number of mature (established) worms, but reduced ($P < 0.05$) fecundity (number of eggs per female) of the mature GIN by d 28. The SL diet reduced ($P < 0.05$) FEC and increased ($P < 0.05$) PCV on d 7, 14, and 28 post-feeding in kids with a mature GIN infection.

Key Words: Gastrointestinal nematodes, Goats, Sericea lespedeza

101   Effect of sericea lespedeza on fecal egg counts and egg hatching in goats infected with *Haemonchus contortus*. S. B. Howell[1], B. R. Joshi[2], T. H. Terrill*[2], and R. M. Kaplan[1], [1]*University of Georgia, Athens,* [2]*Fort Valley State University, Fort Valley, GA.*

Feeding sericea lespedeza (SL; *Lespedeza cuneata*), a forage high in condensed tannins (CT), has previously demonstrated reduced fecal egg counts (FEC) in small ruminants infected with *Haemonchus contortus*. It has also been suggested that this forage may decrease the hatching rate of *Haemonchus contortus* eggs. Therefore, the goal of this study was to measure the change in FEC in goats fed SL over a four-week period, and to determine if the hatching rate of *H. contortus* eggs was reduced over this time. Sericea leaf meal was fed ad libitum for 28 days to nine-month old intact male goats. Pooled feces from the control and sericea fed groups were collected on days 1-16, 20 and 28. The samples were sent to the University of Georgia for evaluation of FEC using the 2 gm Modified McMaster's procedure, and egg hatching rates using the Egg

Hatch Assay (EHA). The FEC's were 2631 EPG (control) and 2031 EPG (SL) on Day 1, 2264 EPG (control) and 1465 EPG (SL) on Day 7, and 6194 EPG (control) and 633 EPG (SL) on Day 28. This demonstrated a reduction in egg count that was statistically significant (p = 0.0007) at 7 days and remained significant throughout the study. The rate of egg hatching was 92% (control) and 97% (SL) on Day 1, 93% (control) and 94% (SL) on Day 7, and 96% (control) and 93% (SL) on Day 28. This demonstrated no reduction in egg hatching as compared to the controls during the entire study (p = 0.626). This study corroborates previous reports demonstrating that feeding SL reduces FEC in goats infected with *Haemonchus contortus*. The lack of effect on egg hatching may indicate that the parasites need to be exposed to the CT from the plant for a longer period of time than was performed in this study, that the eggs need to remain in contact with the SL tannins throughout the entire development period, or that the eggs passed by the adult parasites that remained viable during SL feeding were unaffected by the sericea.

Key Words: Gastrointestinal nematodes, *Haemonchus contortus*, Sericea lespedeza

102 Influence of diets containing sericea lespedeza leaf meal on gastrointestinal parasite fecal egg counts in goats. N. C. Whitley*[1], T. H. Terrill[2], J. E. Miller[3], and J. M. Burke[4], [1]*North Carolina A&T State University, Greensboro*, [2]*Fort Valley State University, Fort Valley, GA*, [3]*Louisiana State University, Baton Rouge*, [4]*USDA, ARS, Booneville, AR*.

Twenty–nine naturally infected, mixed sex Boer crossbred goats were used at 141 ± 5.1 d of age and 24.9 ± 0.9 kg BW to determine the influence of sericea lespedeza leaf meal pellets (SLP) on gastrointestinal parasite fecal egg counts (FEC). Goats were placed in individual pens and fed diets mixed to be isonitrogenous and isocaloric containing 0 (CON), 50 or 73% SLP (50SLP and 73SLP) with 10, 9 and 10 goats per treatment, respectively. Blood samples for packed cell volume (PCV; packed red blood cell level/serum level x 100%) and fecal samples for FEC (using the Modified McMaster's technique) were collected on d –1, 7, 14 and 21 (d0 = first d of treatment). For 10 days after treatment ended, 3 CON and 4 each of 50SLP and 73SLP fed goats were all fed CON diets, and FEC were monitored daily to determine if or when FEC increased after SLP feeding ended. Statistical analysis was conducted using the MIXED procedure of SAS for repeated measures on log transformed data (actual means ± SEM are reported). The FEC were influenced by a treatment by d interaction (P < 0.003) in which FEC were similar for all treatments on d -1, but were greater (P < 0.02) for the CON animals on all other days. Average FEC were 2402 ± 294, 1209 ± 202, 2033 ± 439 and 4286 ± 1716 eggs/g for CON, 2305 ± 489, 279 ± 49, 305 ± 30, and 842 ± 213 eggs/g for 50SLP and 2330 ± 447, 230 ± 60, 219 ± 45 and 434 ± 76 eggs/g for 73SLP for d 0, 7, 14 and 21, respectively. There was no influence of treatment on PCV which averaged 30.7 ± 0.5 over the entire treatment period for all animals. For the few animals sampled for 10 d after treatment, FEC returned to pre-treatment levels within 2 days after treatment ended for 50SLP and 73SLP. This data indicates as little as 50% sericea lespedeza leaf meal incorporated into the diet can effectively reduce FEC in young goats.

Key Words: Parasites, Sericea lespedeza, Goat

103 The performance of Spanish kids under mixed-species grazing system. S. Gebrelul, L. Gray*, R. Marshall, Y. Ghebreiyessus, V. Bachireddy, R. Payne, M. Berhane, E. Runles, and Z. Augustine, *Southern University Ag. Center, Baton Rouge, LA*.

A total of 1710 records on BW, body condition (BCS, 1=thin,.., 5=fat) and FAMACHAC© (FS, 1=red,.., 5=white) scores were analyzed to evaluate the performance of Spanish kids born from 2005 to 2007 under a mixed-grazing system. In a 2x2 factorial, 100 Spanish does and 28 Brangus cows were randomly assigned to continuous (CON) or rotational grazing (ROT) systems at 2.5 AU/ha, and two grazing schemes, goats alone (GTA) or mixed with cattle (MXD). A land area of approximately 20 ha was divided into four pastures. Rotational pastures were divided into four paddocks, and each was grazed for 7 and allowed to rest for 21d. All pastures were enclosed with woven and electric wire consisting of perennial bermuda grass overseed with rye grass in October of each year. Data were collected every 28d and were analyzed using SAS MIXED procedure while chi-square analysis was used for BCS and FS. Except for sex of kid, all effects and interactions were significant (P<0.05) for BW. MXD kids weighed more (16.2 ± 0.3 vs. 13.3 ± 0.3 kg, P<0.05) than GTA kids. CON kids were 0.7 kg heavier than ROT kids at only P<0.10. BW changed from 8.0 ± 0.2 in April to 18.6 ± 0.3 kg in September. Within each month, MXD kids were heavier (P<0.05) than GTA kids. MXD kids in ROT (16.9 ± 0.4 kg) were heavier than MXD in CON (15.6 ± 0.4 kg) while GTA kids in CON (14.5 ± 0.4 kg) were heavier than GTA kids in ROT (12.1 ± 0.4 kg). Differences in BCS between MXD and GTA kids (2.44 ± 0.04 vs. 2.17 ± 0.04) and between CON and ROT (2.42 ± 0.04 vs. 2.19 ± 0.05) were observed. Significantly more GTA kids (31.5% vs. 18.5%) scored BCS of 1 or 2, while more MXD kids scored BCS of 3, 4, or 5 (25.5% vs. 17.7%). Although no differences in FS were observed due to treatment effects, 84% of the GTA kids scored FS score of 3 or lower as compared to 89% of the MXD kids. Results suggested that kids could graze with cattle to efficiently utilize available forage resources.

Key Words: Goat, Famacha© scores, Mixed grazing

104 Effects of cattle and goat grazing practices on soil physical properties, and forage yield and quality. Y. Ghebreiyessus*, S. Gebrelul, V. Bachireddy, M. Berhane, R. Payne, R. Marshall, E. Runles, L. Gray, and Z. Augustine, *Southern University Ag. Center, Baton Rouge, LA.*

In a 2×3 factorial, 100 Spanish goats and 28 Brangus cows were randomly assigned to continuous or rotational grazing systems at 2.5AU/ha, and three grazing schemes (goats-alone, cattle-alone and goats mixed with cattle). A forage field of 31 ha on Bermuda grass was divided into six pastures, 8 ha each for mixed-species grazing, 2 ha each for goats-alone grazing and 5.5 ha each for cattle-alone grazing. The rotational pastures were divided into four paddocks and each was grazed for 7d and allowed to rest for 21d. Samples from silt loam soil were collected in fall and spring, and forage samples were collected monthly. Significant differences in soil physical properties were found between seasons, grazing schemes and grazing system by grazing scheme interactions. Only with soil permeability, ranging from 0.13 to 0.70 cm/s, that grazing system

showed significant differences (P<0.05). Cattle alone in both rotational and continuous pastures were found to compact the soil more (P<0.05) compared with the other treatments. Mean bulk density and penetrometer reading differences among the treatments were significant (P<0.05) and the ranges were 1.36-1.49 Mg/m3 and 3.9-5.7 revolutions, respectively. Soil water content was higher (23.0 vs. 19.4%, P<0.05) in spring than in fall, indicating higher penetrometer reading in fall months. Fresh forage yield ranged from 600 to 2,359 Kg/ha (P<0.05). Yield differences between years and among months were significant (P<0.05) but there was no difference between grazing systems. Forage yields in goats alone were higher (P<0.05) when compared to cattle alone or mixed species grazing. Plant height ranged from 13.7cm to 32.4 cm and was significant (P<0.05) for months, grazing and species interaction. Crude protein, acid detergent fiber, and neutral detergent fiber ranged from 8.9 to 11.8%, 31.9% to 39.1% and 47.1 to 62.2%, respectively. Mixed grazing system reduced soil compaction and increased soil permeability.

Key Words: goats, Mixed grazing, Soil compaction

105   Fiber growth and quality in alpacas managed with or without routine anthelmintic treatment in the mid-Atlantic U.S. S. Wildeus*[1], C. J. Lupton[2], and A. M. Zajac[3], [1]*Virginia State University, Petersburg*, [2]*Texas AgriLife Research, San Angelo, TX*, [3]*VA-MD Regional College of Veterinary Medicine, Blacksburg, VA*.

Alpaca production is an expanding agricultural activity in the mid-Atlantic region, and parasites are a major concern for alpaca breeders. This experiment evaluated the effect of deworming on fiber production and quality. Sixteen mature male alpacas were allocated to 2 groups blocked on BW and mean fiber diameter to be either treated as a group with ivermectin (0.4 mg/kg BW; sc) at 6-wk intervals following industry practice for control of meningeal worm (Group A), or treated individually when strongylid fecal egg counts >200 eggs/g (Group B). Alpacas grazed pastures used previously by sheep and goats. Alpacas were initially shorn on May 10, 2008, and managed as two groups on adjacent 1 ha paddocks. In November, groups were combined in the same pasture. Alpacas received a 16% CP supplement at 0.5% of BW. Fecal and blood samples were collected at 14-d intervals. Alpacas were shorn again on May 7, 2009, and fleeces separated into 5 regions (saddle, neck, butt, long leg, and short leg) for fiber analysis. One animal was dewormed (moxidectin 0.4 mg/kg) in May 2008 in Group B. Body weight (71±2.8 kg), fecal egg count (<15 strongylid eggs/g), and packed cell volume (32.9±1.5%) were not different (P > 0.1) between groups. Clean fiber weight was 625±68 and 553±56 g for saddle, 285±32 and 251±27g for butt, 627±59 and 562±70 g for neck, 612±54 and 587±72 g for long leg, and 201±15 and 207±31g for short leg for Group A and B, respectively, and not different (P > 0.1) between groups. For the saddle, mean staple length was 87±3.7 and 83±4.9 mm, mean fiber diameter 31.8±1.4 and 31.1±1.4 microns, and staple strength 87.7±3.8 and 86.0±2.5 N/ktex for Group A and B, respectively, again not different (P > 0.1) between groups. Although the effect of routine deworming could not be fully assessed because of anthelmintic resistance to ivermectin in GI nematodes, results suggest that limiting anthelmintic treatment to individual animals with increased fecal egg counts did not appear to affect fiber production and quality. No signs of meningeal worm were observed in this herd.

Key Words: Alpacas, Fiber, Parasites

106   Sire and dam breed effects on postweaning growth of pasture-raised meat goat kids. R. Browning, Jr.*[1] and M. L. Leite-Browning[2], [1]*Tennessee State University, Nashville*, [2]*Alabama A&M University, Huntsville*.

Straightbred and reciprocal F1 kids (n = 449) from a complete diallel of Boer (**B**), Kiko (**K**), and Spanish (**S**) were managed from 3 to 6 mo of age across 3 yr to assess breed effects on postweaning performance. Kids were weaned and dewormed at 3 mo of age in June or August each year and raised on summer pasture with 0.34 kg/d of 16% CP supplement. Breed types were balanced across weaning months with month, weaning litter size class, and kid sex included in models. Growth rate was affected (P = 0.02) by dam breed but not by sire breed (P = 0.99). Kids from Boer dams had lower ADG (52.7 g/d) than from Kiko and Spanish dams (60.9, 61.4 ± 3.2 g/d). Weaning class (P = 0.03), kid sex (P < 0.01), and month (P = 0.02) influenced postweaning ADG. Singles has lower ADG than twins (55 vs. 60.9 ± 2.1 g/d; triplets were intermediate). Before correction, each weaning class differed (P < 0.01) for 180-d kid weight (singles = 23.5 ± 0.4; twins = 21.1 ± 0.3; triplets = 17.6 ± 0.8 kg). Adjusted 180-d weights were affected by sire breed (P = 0.05) and dam breed (P < 0.01). Boer- and Kiko-sired kids were heavier (22.7, 22.6) than Spanish-sired kids (21.7 ± 0.4 kg) and each dam breed differed for kid weight (Kiko = 24.1; Spanish = 22.4; Boer = 20.5 ± 0.4 kg). Similar relationships were observed for 90-d adjusted weaning weights. Kid sex and month each influenced (P < 0.01) adjusted 180-d weight. Sire and dam breeds interacted (P = 0.02) for post-weaning kid survival; rates were lowest for BB kids (79.3%) and highest for SS, SB, and BK kids (97, 98.2, 98.6 ± 3.5%). As main effects, sire breed and dam breed affected (P = 0.02) survival. Spanish-sired kids had higher survival rates than those from Boer sires (97 vs. 87.6 ± 2.2%), and kids from Kiko dams had higher rates than those from Boer dams (96 vs. 88.4 ± 2.0%). Sire and dam breeds interacted (P = 0.05) to affect 180-d fecal egg counts. The geometric mean was lower for KK kids (789 eggs/g) than for BK and KB kids (1,511, 1,557 eggs/g). In conclusion, breed significantly affected postweaning performance of meat goat kids on pasture.

Key Words: Meat goat, Breed, Growth

107   Liquid semen vaginal AI in three hair sheep breeds during transition to seasonal breeding. S. Wildeus* and E. J. Chozu, *Virginia State University, Petersburg*.

Artificial insemination (AI) with frozen-thawed semen in sheep is limited by the difficulty to readily pass the insemination pipette through the cervix. Hence liquid semen may provide an alternative means to facilitate simple AI in this species. Preliminary work in our lab using liquid semen for vaginal ('shot-in-the-dark') AI in yearling ewes in October resulted in an overall pregnancy rate of 75%. This follow-up experiment was conducted in June during the transition to seasonal estrus, using a larger group of Barbados Blackbelly (BB), Katahdin (KA) and St. Croix (SC) multiparous hair sheep ewes (n=195). Estrus was initially synchronized by feeding melengestrol acetate (MGA; 0.3 mg/head/day) for 4 d followed by an injection with prostaglandin (10 mg Lutalyse®/head; im) 12 h after the last MGA meal. Estrus was detected with sterile teaser rams on d 17 to 21 after the last MGA feeding, and ewes were bred 10-14 h after onset of estrus with either fresh extended semen (within 2 h of collection), or semen stored for 12 h at 5°C. Ewes were inseminated by deep vaginal deposition of semen without

speculum using a standard 0.5 ml AI gun. Semen for AI was collected twice daily by artificial vagina from 12 rams (4 rams/breed), diluted in a skim milk powder (11% w/v) and egg yolk (5% v/v) extender to a concentration of 350 million sperm/ml, and packaged in 0.5 ml straws for use. Pregnancy was determined 23 d after the last day of AI. Only 33% of ewes displayed estrus during the 5 d AI period, and incidence of estrus was similar (P > 0.1) between breeds (BB: 33%; KA: 29%; SC: 37%). Pregnancy rate to AI was low, and similar for BB and SC (28 and 23%, respectively), while KA failed to become pregnant (P < 0.1). In BB and SC pregnancy rate was not different (P > 0.1) for fresh and 12 h-stored semen (28 and 23%, respectively), but was higher (P < 0.05) for AM than PM inseminations (41 and 14%, respectively). Pregnancy rate in this trial was lower than was achieved previously during the breeding season, however, similar pregnancy rates for fresh and 12 h-stored semen warrant further evaluation of cold-stored semen.

Key Words: Hair sheep, Liquid semen, Artificial insemination

108   Survey of North Carolina sheep and goat producers after gastrointestinal parasite management training. N.C. Whitley*[1], J-M. Luginbuhl[2], S. Schoenian[3], and M. Worku[1], [1]*North Carolina A&T State University*, *Greensboro*, [2]*North Carolina State University*, *Raleigh*, [3]*University of Maryland Extension*, *Keedysville*.

The objective was to determine NC sheep and goat producer gastrointestinal management and control practices after training. Surveys were distributed to a random sample of producers known to have previously attended integrated parasite management training (including FAMACHA[©] eye lid color scoring). A total of 29 surveys were received to date which represents only 3.2% of FAMACHA[©] cards distributed in the state. Of producers responding to the survey, 40% had 50 animals or less, 21% had 50-75 animals, and 39% had over 75 animals. In addition, 93% of respondents felt that the training they received made a difference in their ability to control or monitor parasitism in their flock. The majority of respondents reported fewer (68%) or the same (28%) amount of parasite problems on their farm after the training. When asked if using the FAMACHA[©] eyelid color chart to make worming decisions, 86% answered yes. Of those using the chart, 88% scored their animals at least once a month. No respondents dewormed their animals more often after training, 19% dewormed the same amount and 81% dewormed less often. When asked how much money they saved in the first year after training, 52% indicated that they saved more than $80 and 30% more than $40. Respondents reported saving money primarily through fewer drug treatments (91%) and fewer animal deaths (64%). The most popular practices adopted after training included rotational grazing (79%), genetic selection (55%), peri-parturient female deworming (55%), and weighing animals before treatment (48%). Producers also increased plant grazing height (45%), began using multispecies grazing (41%), reduced stocking rate (38%), began using grain supplementation on pasture (38%) and planted a tannin-containing forage (38%). Overall, the results indicate that North Carolina producers responding to the survey changed their management practices and improved control of parasites on their sheep and goat farms.

Key Words: Parasites, FAMACHA, Impact survey

109   Impact evaluation of integrated parasite management training conducted in the Northeast US over a two–year period. M.A. Perdue*[1], N.C. Whitley[2], S. Schoenian[3], and D. J. O'Brien[4], [1]*University of Maryland Eastern Shore*, *Princess Anne*, [2]*North Carolina A&T State University*, *Greensboro*, [3]*University of Maryland Extension*, *Keedysville*, [4]*Delaware State University*, *Dover*.

The objective was to determine the impact of integrated parasite management training conducted in the Northeast US from 2006–2008 on sheep and goat producer ability to control gastrointestinal parasites on their farms. Surveys were e-mailed to 103 producers who had previously attended Integrated Parasite Management training (including FAMACHA[©]). Multiple responses were appropriate for some questions. Responding producers were from MD (n = 8), WV (n = 4), IL (n = 4), and other states (3 or less responses; n = 10), resulting in a 25% response rate. All of the respondents (100%) felt that FAMACHA[©]/ Integrated Parasite Management training made a difference in their ability to control or monitor parasitism in their flock. Of those producers responding, 77% indicated they had less of a problem with parasites after the training. When asked if they were using the FAMACHA[©] eyelid color chart to make worming decisions, 96% answered yes. Of those using the chart, 50% scored their animals once or twice a month while 25% scored their animals irregularly. No respondents dewormed their animals more often after training, 16% dewormed their animals the same amount and 84% dewormed their animals less often. The majority (66%) of producers indicated that they saved more than $80 in the first year after training due to reducing drug treatments or experiencing fewer animal deaths from gastrointestinal parasites. The most popular practices respondents adopted after the training included rotational grazing (77%), genetic selection (58%), increasing height of plants being grazed (46%), and using grain supplementation on pasture to improve nutrition (42%). Of those responding to the survey, the majority (62%) had less than 50 animals, 19% had 50-75 animals, and 19% had over 100 animals. Overall, producers in the Northeast have clearly benefited from FAMACHA[©]/Integrated Parasite Management training.

Key Words: Parasites, Impact survey, FAMACHA[©]

Teaching and Undergraduate Education

110   Impact of online course duration on student performance in animal science nutrition. K. Ange-van Heugten* and A. Renjifo McComb, *North Carolina State University*, *Raleigh*.

This study was conducted to determine whether student performance differed when the same web based course was offered over a 5 wk vs. a 10 wk semester. Principles of Animal Nutrition was taught twice during the summer of 2009. Both offerings had the same instructor and graduate teaching assistant and started with 30 students and finished with 29. Identical grading assessments were provided to both courses. The 5 wk course had 4 students that finished with an F grade. Three of these students had their F removed by means other than the instructor (1 dropped completely, 1 changed to late withdrawal and 1 changed to incomplete) in the months following final grade distribution. The fourth student never accessed the course material and was considered an anomaly. No students in the 10 wk class received an F or asked for a drop after final grades. Grades for students in the 5 wk course were statistically compared to those in the 10 wk course with and without these 4 students. Using all 29 students, grades for exam 1 were higher for 10 wk ($P<0.05$) and those for exam 2, exam 3, final exam, participation points and final grade (77.0 ± 3.97 vs. 87.6 ± 4.20 for the 5 and 10 wk course, respectively) tended to be higher ($P<0.10$) for 10 wk. Quiz average and extra credit points did not differ. There were no differences when the 5 wk course without the 4 students (n=25) was compared to the 10 wk course (n=29). The mean final grade was 87.6% for both courses. In conclusion, students actively participating in Principle of Animal Nutrition received the same final grades, regardless of course duration. Three out of 29 students in the 5 wk course retroactively dropped the course and one never accessed it, indicating that the large amounts of material taught during a shorter course length was unexpected and too challenging for some students. In addition, students in the 5 wk course only have 2 wk to drop the course (compared to 5 wk in the 10 wk course), which caused students to be unprepared to drop the course within the appropriate length of time.

Key Words: Distance education, Course length, Nutrition

111   Companion animal online instruction at Tuskegee University. O. Bolden-Tiller* and N. Gurung, *Tuskeegee University*, *Tuskeegee, AL*.

With the demand for online instruction on the increase, many universities are exploring ways to successfully incorporate high quality distance learning in many fields, including animal sciences. To date many courses in animal sciences are being offered across the country via distance learning. For years, Tuskegee University's (TU) undergraduate Animal Science program has afforded many underrepresented minorities and others with the foundation to enter and successfully complete the veterinary school. Currently, this program does not offer instruction via distance learning. With the growing demand for such courses, the following study was conducted to ascertain the feasibility of incorporating distance instruction in the area of animal sciences at TU. According to the Concentric Support model, as proposed by Osika, there are several important components involved in order to develop a high quality distance learning program, including faculty support, student support, content support, course management system support, technology support, program support, and community support, all of which TU currently possesses. In the current study, the feasibility of distance learning was assessed in the Companion Animals course. Students in the online course completed a survey consisting of 17 quantitative items on a Likert scale aimed to gauge students' likeability of online instruction. Seventeen of the 20 students who enrolled in the online course participated in the survey. Generally, students were positive about online instruction and enjoyed the course content and ease of accessing materials. Grades were no different comparing online and in person instruction. Overall, students enjoyed the service learning project and thought it beneficial. Based on this assessment, students at TU liked the format of the course and were interested in taking additional on-line courses. Because many animal science courses require lab, unlike the current course, the feasibility of teaching such courses online needs to be assessed to determine if students feel this way about courses that would otherwise have the benefit of hands-on lab instruction.

Key Words: Companion animals, Distance learning, Undergraduate education

Undergraduate Student Competition

112   Evolution of exit velocity in the suckling Brahman calf.
B. J. Agado*[1], N. C. Burdick[1], J. C. White[1], K. J. Matheney[1], D. A. Neuendorff[2], R. C. Vann[4], D. G. Riley[1], T. H. Welsh, Jr.[1,3], and R. D. Randel[2], [1]*Texas A&M University, College Station*, [2]*Texas AgriLife Research, Overton, TX*, [3]*Texas AgriLife Research, College Station, TX*, [4]*MAFES-Brown Loam Experiment Station, Raymond, MS.*

Cattle with a more excitable temperament have demonstrated decreased performance and exhibit less tender carcasses relative to their herdmates. Exit velocity (EV) is recognized as a repeatable objective measure of temperament in weaned beef calves. The purpose of this study was to assess whether exit velocity of Brahman calves changes at 28 d intervals from 21 d of age to 56 d post-weaning. Spring born Brahman calves (n=308) from three consecutive calf crop years (2006-2008) were utilized in this study. Exit velocity (m/s) was determined as the amount of time the calf took to transverse 1.83 m after being released from a squeeze chute. Temperament score was determined as the average of EV and pen score at weaning (2006: 173±2 d of age; 2007: 174±2 d of age; 2008: 163±2 d of age). The GLIMMIX procedure of SAS (SAS Institute, Inc. Cary, NC) was used to analyze EV with days of age, year of birth, sex, and temperament group included as fixed effects, and sire and calf (sire) included as random effects. Exit velocity increased as days of age increased (P<0.001). Differences in EV were observed between the 2006 (2.23±0.057 m/s) calves compared to the 2007 (1.90±0.059 m/s) or 2008(1.83±0.057 m/s) calves (P<0.001), but did not differ between the 2007 and the 2008 calves (P=0.75). Exit velocity was not affected by sex (bulls: 1.91±0.083 m/s; heifers: 2.02±0.085 m/s) (P>0.05). Linear regression of the data revealed that EV by temperament groups increased at a faster rate in temperamental (m=0.005; y–int=2.17) calves compared to intermediate (m=0.003; y–int=1.57) and calm (m=0.0007; y–int=1.15) calves (P<0.001). The random effect of sire approached significance (P=0.07) and accounted for some of the variation observed in EV. The use of EV to identify temperamental animals prior to weaning is a useful and viable indicator of temperament classification. Temperamental animals increased in EV at a faster rate as compared to the less temperamental animals as days of age increased. Exit velocity can vary between years, and sire selection may influence this trait.

Key Words: Exit velocity, Brahman cattle, Beef calves

113   *In situ* ruminal kinetics of DM and NDF disappearance for the biomass forages Amur silvergrass and big bluestem.
J. A. Robinette*[1], B. C. Williamson[2], R. Flores[3], J. B. Woolley[4], C. R. Bailey[5], L. M. Tharel[6], J. R. King[6], D. M. Burner[4], P. Carver[7], W. K. Coblentz[8], T. J. Wistuba[1], C. F. Rosenkrans, Jr.[2], and M. L. Looper[4], [1]*Morehead State University, Morehead, KY*, [2]*University of Arkansas, Fayetteville*, [3]*University of Arkansas for Medical Sciences, Little Rock, AR*, [4]*USDA-ARS, Booneville, AR*, [5]*University of Tennessee, Martin, TN*, [6]*USDA-NRCS, Booneville, AR*, [7]*Bical, Staffordshire, England*, [8]*USDA-ARS, Marshfield, WI.*

Alternative strategies, such as grazing, could minimize risk associated with biomass production. Minimal research is available that describes the nutritive value of biomass forages, specifically Amur silvergrass (AS; *Miscanthus sacchariflorus* (Maxim.) Benth., proprietary clone Msanag). The AS clone is an erect (1.7-m tall) perennial, highly rhizomatous, and flowers in mid-September. Four ruminally-cannulated steers (342 ± 18 kg) were used to determine ruminal in situ disappearance kinetics of DM and NDF for AS and Hampton big bluestem (BB; *Andropogon gerardii*

Vitman) harvested at vegetative growth stage on three dates (4 June, 8 July, and 31 July) in west-central Arkansas. Crude protein was greater (*P* < 0.01) on 4 June (13.0 ± 0.3%) than either 8 July (9.5 ± 0.3%) or 31 July (9.5 ± 0.3%) for both forages, and similar (*P* = 0.84) for forage type across sampling dates. Acid detergent fiber tended (*P* < 0.07) to be greater for AS (36.4 ± 0.9%) than for BB (33.2 ± 0.9%) across all sampling dates. The NDF also was greater (*P* = 0.03) for AS (72.8 ± 0.8%) compared to BB (69.3 ± 0.8%). Effective DM degradability tended (*P* < 0.10) to be affected by a sampling date x forage type interaction. Effective DM degradability was greatest for BB on 8 July (56.5 ± 4.2%) and 4 June (55.6 ± 4.2%) sampling dates and least for AS on all three sampling dates (mean = 39.1 ± 4.2%). Within sampling date, rate (K$_d$) of DM disappearance (/h) was slower (*P* < 0.02) for AS than BB on 4 June (0.039 vs. 0.056 ± 0.001/h) and 8 July (0.033 vs. 0.048 ± 0.001/h), but similar between forages on 31 July (0.038 vs. 0.035 ± 0.001/h). Effective NDF degradability was greater (*P* < 0.01) for BB (42.5 ± 4.7%) than AS (28.9 ± 4.7%). As observed for disappearance of DM, K$_d$ for NDF disappearance was slower (*P* < 0.02) for AS (0.041 ± 0.01/h) than BB (0.050 ± 0.01/h). Potential extent of NDF disappearance was greater (*P* < 0.04) for BB than AS on each sampling date. It appears that AS has adequate nutritive value during the early summer, and livestock grazing of AS could be an alternative to biomass production.

Key Words: Biomass, *In situ*, Silvergrass

114   Effects of pond location and watershed grazing management on water quality in Oklahoma and Texas.
C. J. Schriefer*[1], D. O. Alkire[2], and R. R. Reuter[2], [1]*North Dakota State University, Fargo*, [2]*The Noble Foundation, Agricultural Division, Ardmore, OK.*

Eighty-three private farm ponds in south-central Oklahoma and north-central Texas were sampled during the summer of 2009 to determine the effects of pond and watershed grazing management variables on pond water quality. Data collected included: latitude, longitude, surface area of the pond, grazing system used to manage the watershed (no grazing, rotational grazing, or continuous grazing) and amount of access that cattle had to the pond margin (no access, access restricted to single point, or unrestricted access). Water samples were collected in 500 mL polyethylene bottles at a depth of approximately 0.3 m in an area of the pond where livestock typically drink. Care was taken to avoid stirring up sediment from the pond margin or bottom as the sample was taken. Air was removed from the sample bottle, and samples were immediately stored on ice until they reached a commercial water testing lab. All samples were analyzed within 48 h of collection. Twenty-two parameters of water quality were reported by the lab. Ponds ranged in surface area from 0.02 to 7.2 ha (mean = 0.77 ha). Grazing system had no effect on the water quality parameters measured (P > 0.24). Ponds with unrestricted cattle access had greater suspended solids (P = 0.03) than those with no cattle access. Sodium concentration decreased, while magnesium and nitrate concentration increased, as latitude increased (P < 0.03). Sodium, calcium, magnesium, potassium, sulfur, chloride, and suspended solid concentrations increased (P < 0.02) as longitude decreased. Maximum observed values of collected samples fell within the range of published values described as acceptable for livestock drinking water (NRC, 1974; D. Alkire, 2009). Ponds sampled were representative of a wide range of pond and watershed management systems in the south-central US, and no ponds were determined to be unacceptable for use as livestock water.

Key Words: Water quality, Livestock

115 The effect of initial market grade on carcass and ultrasound characteristics of feeder goats. L. Melzer*[1], A. Raymer[1], T. Burkes[2], R. Miculinich[1], T. Platt[1], and T. Wistuba[1], [1]*Morehead State University, Morehead, KY*, [2]*Kentucky Department of Agriculture, Frankfort, KY*.

Previous studies have indicated that meat goats can be economically produced in the United States and that market demand for goat meat exceeds current supplies. However, live goat markets continue to be difficult to quantify and qualify; therefore, the purpose of this project was to determine the impact of initial market grade and time on feed on carcass ultrasound characteristics of Boer goat buck kids. Forty buck kids (20.9 ± 2.9 kg) were purchased at local auction on January 14, 2007, processed upon arrival and allowed *ad libitum* access to feed and water during a 14 d adaptation phase. Goats were then visually evaluated and classified into one of three market grades. Subsequently, at two week intervals the following ultrasound data were collected: longissimus muscle area, subcutaneous fat, rump depth and weight. Upon completion of the 45 d feeding period the goats were harvested and carcass data collected. The analysis of variance was generated utilizing PROC MIXED (SAS Inst., Inc. Cary, NC); model including market grade, date and the interaction of market grade and date. All measurements were adjusted for weight. Least-squares means were calculated and separated using pair-wise t-tests (PDIFF option). Final weights differed (P < 0.05) between the three market grades of goats (32.6, 34.8, 35.4 kg, respectively). Furthermore, longissimus muscle areas followed similar trends where market grade 1 goats had the largest (P < 0.05) longissimus muscle areas followed by market grade 2 goats and finally market grade 3 goats. Final subcutaneous fat measurements followed the same trends between market grades of goats. Market grade classification did have a significant impact (P < 0.05) on KPH, where market grade 1 goats had the smallest amount of fat compared to the other two market grades. Additionally, there were significant correlations between longissimus muscle area, weight, subcutaneous fat depth, and rump muscle depth. Results of the study indicate that initial market grade classification is an accurate estimation of carcass muscle and fat composition and thus, carcass yields.

Key Words: Goats, Carcass characteristics, Ultrasound

116 The impact of initial market grade on linear characteristics and performance of feeder goats. A. Raymer*[1], L. Melzer[1], T. Burkes[2], R. Miculinich[1], T. Platt[1], and T. Wistuba[1], [1]*Morehead State University, Morehead, KY*, [2]*Kentucky Department of Agriculture, Frankfort, KY*.

Several studies have indicated that meat goats can be economically and efficiently produced in the United States and that the apparent market demand for goat meat exceeds the current supplies. Live goat markets continue to be difficult to quantify and qualify, therefore the purpose of this project was to elucidate the impact of initial market grade on linear and carcass characteristics of Boer goat buck kids. Forty Boer goat buck kids (20.9 ± 2.9 kg) were purchased at local auction on January 14, 2009 by market grade, processed upon arrival and allowed *ad libitum* access to feed and water during a 14 day adaptation phase. Goats were then visually evaluated and classified into one of three market grades. Every two weeks the following measurements were taken: 1) horn length, 2) horn circumference, 3) horn width, 4) heart girth, 5) chest width, 6) forearm circumference, 7) cannon bone circumference, 8) cannon bone length, 9) rack length, 10) loin length, 11) rump length, 12) hip width, 13) pin width, and 14) weight by the same individuals. Upon completion of the 45 day feeding period, the goats were harvested and carcass measurements were taken. The analysis of variance was generated via PROC

MIXED (SAS Inst., Inc. Cary, NC) and the model included market grade. Least-squares means were calculated and separated using pair-wise t-tests (PDIFF option). Initial weights were not different (P>0.05) for goats in any of the market grades (23.7 and 24.5 vs. 23.3 kg). Market grade 1 goats tended (P < 0.09) to have a greater ADG during period 1 than did market grade 3 goats. Additionally, market grade 2 goats were more feed efficient throughout the trial than market grade 3 goats (P < 0.05). Market grade classification had no impact on rack or loin length. Results of the present study indicate that initial market grade classification is a relatively accurate estimation of final carcass yields.

Key Words: Goats, Carcass characteristics, Linear measurements

117 Effects of antioxidants on boar spermatozoa. S. J. Casey* and B. D. Whitaker, *Ferrum College, Ferrum, VA*.

The effects of N-acetyl-cysteine (NAC) supplementation during the incubation of frozen-thawed and fresh boar semen were studied. Frozen-thawed and fresh boar semen were supplemented with 1.0 mM NAC and incubated for 120 min to allow capacitation to occur followed by the addition of calcium ionophore 23187 to induce the acrosome reaction. The number of spermatozoa having undergone the acrosome reaction was determined using the Wells-Awa staining technique and DNA damage was detected using single-cell gel electrophoresis. Frozen-thawed semen was not different in the ability of spermatozoa to undergo the acrosome reaction, but did have significantly (P < 0.05) more DNA damage compared to fresh semen. Supplementing 1.0 mM NAC did not have an effect on the ability of spermatozoa to undergo the acrosome reaction, but did have significantly (P < 0.05) less DNA damage compared to no antioxidant supplementation. These results indicate that fresh semen does not have as much damaged DNA as that of frozen-thawed semen, and that supplementation of 1.0 mM NAC during incubation may alleviate the extent of damaged DNA.

Key Words: Sperm, Antioxidants, Acrosome reaction

118 The effects of using Noni pulp (*Morinda citrofolia*) on beef patties to enhance color stability. W. N. Tapp III*[1], J. W. S. Yancey[1], J. K. Apple[1], and R. G. Godbee[2], [1]*University of Arkansas, Fayetteville*, [2]*Tahitian Noni International, Orem, UT*.

Pulp from the Noni plant (*Morinda citrofolia*) has brought about much research due to its antioxidant and antimicrobial properties. The Noni plant is an evergreen shrub, whose fruit has a strong butyric acid smell and flavor. Noni has been used in many Polynesian cultures as a homeopathic supplement for over 2,000 years. Natural antioxidants have been shown to increase color stability and extend shelf-life of ground beef; therefore, the objective of this study was to test the effects of Noni pulp on enhancing the shelf-life of ground beef. Coarse ground beef (85% lean) from a commercial processor was mixed with Noni pulp at 0, 2, 4, or 6%, ground through a 9.5-mm plate, and formed into 113-g patties. Patties were placed on foam trays, overwrapped with an oxygen-permeable film, and placed in simulated retail display (4°C and 1,600 lux lighting) for instrumental and visual color analyses over 5 d, and 2-thiobarbituric acid reactive substances (TBARS) assayed on d 0, 3, and 5. Although total sensory color scores deteriorated with increasing display duration, color scores were improved (*P* < 0.05) in Noni-treated ground beef patties over untreated patties. Worst point color and discoloration scores increased with display duration, and, during the first 3 d of display, Noni-patties received lower (*P* < 0.05)

worst point and discoloration values than untreated patties. Redness (a*) values decreased through the first 4 d of display, and Noni-treated ground beef had higher ($P < 0.05$) a* values than untreated ground beef. Measures of oxidative rancidity (TBARS) increased with increasing display duration, but patties made with 6% Noni had the lowest ($P < 0.05$) TBARS values after 3 and 5 d of display. Information from this experiment supports the hypothesis that Noni incorporation beneficially extended the shelf-life of fresh ground beef.

Key Words: Noni pulp, Ground beef, Color stability

119   Fatty acid variations in fresh pork bellies. K. A. Trusell*, J. K. Apple, G. L. Galloway, J. W. S. Yancey, T. M. Johnson, and R. J. Stackhouse, *University of Arkansas, Fayetteville.*

Fresh pork bellies (n = 24) were cut into 15 equal-sized sections to measure the intra-belly variation in fatty acid composition. The length and width of each fresh belly was measured before the belly was divided into 3 rows (D = dorsal; C = central; and V = ventral) and five columns (labeled 1, 2, 3, 4, and 5 from anterior to posterior), resulting in 15 belly sections of equal dimensions. Each section was dissected, and the lean and fat portions were ground twice, and freeze-dried samples from each section were subjected to direct transesterification and fatty acid quantification. The greatest ($P < 0.05$) proportions of palmitic acid (16:0) and all SFA were found in V-5 (23.5 and 36.7%, respectively) and V-4 (23.3 and 36.4%, respectively), whereas the lowest ($P < 0.05$) proportions of 16:0 and all SFA were in D-1 (21.9 and 34.2%, respectively). The greatest ($P < 0.05$) proportions of stearic acid (18:0) were in the C and V rows in column 5 (11.2 and 11.2%, respectively), but the lowest ($P < 0.05$) weight percentage of 18:0, and the greatest ($P < 0.05$) percentage of oleic acid (18:1n9), was in C-4 (10.2 and 40.2%, respectively). Moreover, C-4 and V-1 had the greatest ($P < 0.05$) percentages of all MUFA (46.8 and 46.1%, respectively), whereas the lowest ($P < 0.05$) total MUFA content was in the D row, columns 1, 2, and 3 (44.1, 43.7, and 44.3%, respectively). The D row (columns 1, 2, 3, and 5) also had the greatest ($P < 0.05$) proportion of linoleic acid (18:2n6; 18.4, 18.1, 17.4, and 17.3%, respectively) and total PUFA (20.6, 20.2, 19.4, and 19.4%, respectively), whereas the lowest ($P < 0.05$) proportions of 18:2n6 and total PUFA were located in C-4 (15.4 and 17.3, respectively), V-4 (15.4 and 17.3%, respectively), and V-5 (15.4 and 17.3%, respectively). The iodine value (IV) was greatest ($P < 0.05$) in D-1 (71.9) and lowest ($P < 0.05$) in V-4 (67.4), V-5 (67.2), and C-5 (67.8). There appears to be a fatty acid composition gradient within fresh pork bellies, with the D row, as well as C-1, having the highest PUFA content and calculated IV, and the greatest SFA and IV were located in columns 3, 4, and 5 of the C and V rows.

Key Words: Pork, Fresh bellies, Fatty acid composition

120   Use of a naturally occurring source of sulfur to control gastrointestinal nematodes in small ruminants. J. C. Davis*[1], F. N. Mhlanga[1], R. H. Anderson[2], and E. Pierce[1], [1]*Abilene Christian University, Abilene, TX,* [2]*Andersons Consulting & Training Service Inc., Garden City, KS.*

Gastrointestinal nematodes (GIN) have a negative impact on small ruminant production because of anthelmintic resistance. There is a need for alternative approaches to the control of GIN. The objective of this experiment was to determine the effect of sulfur on the reduction of GIN in young goats. Twenty-four female Boer kids, three months in age, with an average initial weight of 22.5kg were used in this experiment. All animals were fed a basal diet of sudangrass hay at a rate of 680g/animal/d and a protein supplement fed at a rate of 340g/animal/d. Twelve animals received 2.4 g/anima/day of a naturally occurring source of sulfur (treatment group) while the other 12 received 0 g (control group). A completely randomized design with twelve animals per diet was used. Blood and feces were collected every 7 d for a period of 56 d to determine blood packed cell volume (PCV) and fecal egg counts (FEC). FAMACHA scores were also recorded every 7 d and for the same period. Body weights were measured at the beginning and at the end of the trial. The Generalized Linear Models procedure in SAS was used for data analysis. The models used to analyze PCV, FEC and FAMACHA scores contained fixed effects of treatment, week and treatment by week interaction. Fecal egg counts and FAMACHA scores were log transformed before statistical analysis. The added sulfur did not significantly affect FEC and PCV (P>0.05). The FEC and PCV were highest by day 14 but were similar for the two groups of animals. The FAMACHA scores were significantly lower for treatment goats than for control goats (P< 0.001). The scores were consistently higher from day 21 to day 56 for untreated animals. Average daily gain was higher (P<0.001) for the control goats (40.64g) than for the treated group (15.69g). The results showed that the naturally occurring source of sulfur was not effective in controlling GIN in young goats.

Key Words: Gastrointestinal nematodes, Fecal egg counts, Packed cell volume

121   Utilization of tropical forage legumes (*Lablab purpureus, Vigna unguiculata* and *Vigna radiata*,) to supplement a sudangrass diet fed to growing small ruminants. M. W. Shinsky*, C. D. Laws, F. N. Mhlanga, M. A. Nicodemus, and E. Pierce, *Abilene Christian University, Abilene, TX.*

Pastures commonly used for livestock production are based primarily on grasses which, even when they provide an adequate quantity of forage, do not always provide adequate crude protein or metabolizable energy to support growth of young ruminants. This study evaluated tropical forage legumes lablab (*Lablab purpureus*), cowpea (*Vigna unguiculata*) and mungbean (*Vigna radiata*) as protein supplements to a basal diet of sudangrass (*Sorghum bicolor*) hay on growth and feed performance of growing goats. Twenty-four Boer goat kids, three months old and averaging 15.6 kg live weight were used in a 28 day feeding trial. Four dietary treatments were sudangrass hay (SGH) or SGH supplemented with either lablab (SHLB), cowpea (SHCP) or mungbean (SHMB). Sudangrass and forage legume supplement were fed at a ratio of 60% (grass) to 40% (legume). A split plot design was used with diet as the main plot, three pens per diet as the experimental units and two goats per pen as samples. The Generalized Linear Models procedure in SAS was used for data analysis. Daily intakes of mungbean (533 g/pen/d) were consistently higher (P<0.01) than intakes of cowpea (470 g/pen/d) and lablab (463 g/pen/d). Voluntary daily intakes of sudangrass were highest for animal in pens fed SHCP (P<0.05). The least square means for daily intakes of sudangrass per pen were 470.9g, 538.6g, 448.7g, and 465.1g for SGH, SHCO, SHLB and SHMB, respectively. Average daily gain was not affected by diet (P>0.05). Final body weight tended (P<0.10) to be higher for legume supplemented diets than for SGH. The combined mean final body weight of animals fed experimental legumes was higher by 841g (P<0.01) compared to that of animals fed SGH. The results showed that mungbean had the highest acceptability. However, intakes of sudangrass were improved by supplementing with cowpea. Cowpea has more potential for small ruminant production in tropical regions.

Key Words: Sudangrass hay, Tropicl forage legumes, Small ruminants

2010 SOUTHERN SECTION ASAS COMMITTEES

Executive
Morrison, DG - LA (President)
Poore, MH - NC (President-Elect)
Welsh, TH - TX
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Poore, MH - NC (Chair)
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Southern, LL - LA

Graduate Student Paper Competition
Forrest, DW - TX (Chair)
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**Award - Young Animal Scientist -
    Research**
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Kim, SW - NC
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Arthington, JD - FL

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Kriese-Anderson, LA - AL
Barham, BL - AR
Elzo, MA - FL

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

Meats
Lawrence, TE - TX (Chair)
Schmidt, T - MS
Morgan, JB - OK
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Poore, MH - NC (Chair)
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Lents, C - GA

Ruminant Animal Production
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Adesogan, AT - FL
Hill, GM - GA
Muntifering, RB - AL

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

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    Education**
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Rude, BJ - MS
Miller, RK - TX
Whitaker, BD - VA

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

Southern Section
American Society of Animal Science

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1996–97	P. G. Harms	Texas A&M University	1960–61	W. Gifford	University of Arkansas
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1994–95	D. S. Buchanan	Oklahoma State University	1957–58	B. L. Southwell	University of Georgia
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1990–91	D. E. Franke	Louisiana State University	1953–54	A. E. Cullison	University of Georgia
1989–90	A. L. Eller, Jr.	VPI & SU	1952–53	C. M. Kincaid	VPI & SU
1988–89	C. R. Long	Texas A&M University	1951–52	R. S. Glasscock	University of Florida
1987–88	D. G. Spruill	University of Georgia	1950–51	H. H. Levek	Mississippi State University
1986–87	G. L. Cromwell	University of Kentucky	1949–50	J. E. Foster	University of Maryland
1985–86	B. Baker, Jr.	Mississippi State University	1948–49	H. M. Briggs	Oklahoma State University
1984–85	C. B. Ammerman	University of Florida	1947–48	E. C. Godbey	Clemson University
1983–84	W. G. Luce	Oklahoma State University	1946–47	J. C. Grimes	Auburn University
1982–83	J. R. Hill	Clemson University	1941–42	R. E. Hunt	VPI & SU
1981–82	J. W. Turner	Louisiana State University	1940–41	M. G. Snell	Louisiana State University
1980–81	A. M. Sorenson	Texas A&M University	1939–40	L. E. Richardson	University of Tennessee
1979–80	W. C. McCormick	University of Georgia	1938–39	E. W. Sheets	USDA
1978–79	E. R. Barrick	NC State University	1937–38	L. I. Case	NC State University
1977–78	R. L. McGuire	Auburn University	1936–37	M. P. Jarnigan	University of Georgia
1976–77	J. J. Guenther	Oklahoma State University	1935–36	J. B. Francioni	Louisiana State University
1975–76	C. J. Brown	University of Arkansas	1934–35	A. L. Shealy	University of Florida
1974–75	S. L. Hansard	University of Tennessee	1933–34	L. V. Starkey	Clemson University
1973–74	M. Koger	University of Florida	1932–33	W. L. Blizzard	Oklahoma State University
1972–73	J. P. Fontenot	VPI & SU			

Southern Section
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Past Award Recipients

Distinguished Service Award

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

Extension Award

Year	Name	State	Year	Name	State
2009	E. van Heugten	North Carolina	1994	David W. Freeman	Oklahoma
2008	F. T. McCollum, III	Texas	1993	J.R. Jones	North Carolina
2007	M. H. Poore	North Carolina	1992	James B. Neel	Tennessee
2006	Allen F. Harper	Virginia	1991	Keith Lusby	Oklahoma
2005	Glen Selk	Oklahoma	1990	Joe Hughes	Oklahoma
2004	Roger L. McCraw	North Carolina	1989	Henry Webster	Clemson
2003	Darrh Bullock	Kentucky	1988	Donald R. Gill	Oklahoma
2002	Warren Gill	Tennessee	1987	H. John Gerken, Jr.	Virginia
2001	Walter R. Burris	Kentucky	1986	M.K. Cook	Georgia
2000	Tom R. Troxel	Arkansas	1985	W.G. Luce	Oklahoma
1999	George V. Davis, Jr.	Arkansas	1984	Charles Cooper	Virginia
1998	G. L. Monty Chappel	Kentucky	1983	C.W. Absher	Kentucky
1997	Steven H. Umberger	Virginia	1982	C.M. Triplett	Georgia
1996	Clyde D. Lane, Jr.	Tennessee	1981	Arden N. Huff	Virginia
1995	John T. Johns	Kentucky	1980	A.L. Eller, Jr.	Virginia

Young Animal Scientist Award

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

[1]Education
[2]Research

NPB Swine Industry Award

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

Graduate Student PaperAward

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

Undergraduate Student Paper Award

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

Academic Quadrathlon Winners

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

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

NOTES

NOTES

ASAS Southern Section
Future Meeting Dates and Locations

2011	Corpus Christi, Texas	February 5 - 8
2012	Birmingham, Alabama	February 4 - 7
2013	Orlando, Florida	TBA
2014	Dallas, Texas	TBA
2015	Atlanta, Georgia	TBA