0.05) in the non-medicated control group compared to the Micotil^{TM} treated group (88.1 and 70.0%, respectively). The Micotil^{TM} treated group was slightly heavier and had greater total gain and greater average daily gains ($P < 0.05$) compared to the non-medicated control group during the pre-conditioning phase. However, there were no differences between the two treatment groups in average body weight, average total gain, or average daily gain during the grazing period. Metaphylactic treatment with Micotil^{TM} upon arrival decreased the overall pull rate of calves exhibiting signs of BRD compared to non-medicated controls in Southeastern origin stocker calves during the pre-conditioning period.

Key Words: Metaphylaxis, Stocker, Bovine Respiratory Disease

87 Incidence of Fecal Shedding of *Escherichia Coli* and *Salmonella spp.* in Beef Cattle Grazing Endophyte-Infected and Non-Infected Tall Fescue. M. L. Looper*[1], G. E. Aiken[1], T. S. Edrington[2], C. F. Rosenkrans, Jr.[3], and R.O. Elder[2], [1]*USDA-Agricultural Research Service, Dale Bumpers Small Farms Research Center, Booneville, AR,* [2]*USDA-Agricultural Research Service, Southern Plains Ag. Research Center, College Station, TX,* [3]*University of Arkansas, Fayetteville.*

Fecal samples were obtained in replicate from mature Angus x Hereford cows (n = 49) and spring-born calves (n = 45) to determine: 1) influence of grazing endophyte-infected (E+) tall fescue (*Festuca arundinacea*) or non-infected (E-) tall fescue during the summer on shedding of *Escherichia coli* O157:H7 (EHEC) and *Salmonella spp.* (SM), 2) relationship of shedding EHEC and SM between cow and calf, and 3) influence of calf sex and steroid implant on bacteria shedding. Fecal samples were collected at 0700 on each collection date (August 5 and 26), placed on ice, and shipped to our laboratory for microbiological analyses. One-half of the calves were treated with a steroid implant at 60 d prior to fecal collection. Body temperature was measured from cattle at time of fecal collection. Mean ambient temperature and humidity at time of collection were 27.0°C and 77%, respectively. There was an endophyte x age interaction ($P < 0.0001$) for body temperature with 40.9, 40.2, 40.0, and 39.9°C (pooled SE = 0.1) for E- calves, E+ calves, E+ cows, and E- cows, respectively. Overall, incidence of EHEC shedding averaged 8.4 and 7.6% for calves and cows, respectively. *Salmonella spp.* shedding was 4.8 and 0% for calves and cows, respectively. Cows grazing E+ fescue shed less ($P < 0.05$) EHEC than cows grazing E- (1.8% vs 17% for E+ and E- cows, respectively). Likewise, EHEC shedding tended ($P = 0.11$) to be reduced in E+ calves (4.3%) compared with E- calves (13.9%). In calves, type of fescue grazed (E+ or E-) did not influence ($P > 0.10$) the incidence of SM shedding. Cow shedding of either EHEC or SM did not influence ($P > 0.10$) calf shedding of bacteria. Cow and calf body temperature did not influence ($P > 0.10$) shedding of EHEC or SM. Shedding of EHEC and SM in calves was not influenced ($P > 0.10$) by sex of calf or implant status. Body temperature of cattle grazing tall fescue in the summer did not affect shedding incidence of either *E. coli* O157:H7 or *Salmonella spp.* In this study, mature cows grazing either E+ or E- tall fescue did not shed *Salmonella*. Shedding of *E. coli* O157:H7 tended to be reduced in calves and was decreased in cows grazing endophyte-infected tall fescue.

Key Words: Beef Cattle, Tall Fescue, Escherichia Coli

88 Effects of Serum Cu and Se Levels on Antibody Titers of Stocker Calves Exposed to *Leptospirosos Pomona* Vaccine . H. L. Richardson*, B. C. Housewright, and D. B. Crenshaw, *Texas A&M University-Commerce, Commerce, TX.*

The trace mineral status of calves may be related to immune system responses to a vaccine challenge. The objective of this study was to investigate the immune response of stocker calves to inoculation of *Leptospirosos pomona* vaccine in relation to their initial serum Cu and Se levels. For the immune challenge, *Leptospirosos pomona* was used as a pathogen that steers should not have had previous exposure to, and after inoculation steers could be placed into a communal pasture without cross-contamination. A total of 49 stocker calves at two locations, weighing between 204 and 272 kg, were injected with *Leptospirosos pomona* vaccine to determine the effects of basal serum Cu and Se levels on antibody titers. Blood samples were taken via jugular venipuncture and collected into vacuum tubes. After blood was drawn, they were inoculated intramuscularly with a 2-mL dose of a *Leptospirosos* vaccine (Lepto-5; Merial Incorporated, Athens, GA). Blood samples were allowed to coagulate and were centrifuged for harvesting of serum. Serum was analyzed for Cu by atomic absorption spectrophotometry and Se by atomic absorption spectrophotometry-hydride generation. Twenty-eight days post-inoculation serum samples were analyzed for antibody titer to the vaccine. Microscopic agglutination test was used to determine antibody titers for *Leptospirosos*. Data were analyzed using ANOVA in a randomized block design. There was a difference ($P < 0.05$) in titer between locations. There were no correlations between initial blood levels of Cu or Se and strength of titer to the Lepto-5 vaccine challenge. Calves used in this study had a minimum serum Se level of 20 ppb and maximum serum Se of 134 ppb, with a mean of 27.6 ± 4.0 ppb. Additionally, minimum and maximum serum Cu levels were 0.20 and 0.96 ppm, with a mean of 0.67 ± 0.02 ppm.

Key Words: Copper, Selenium, Leptospirosos Pomona

Small Ruminant Production

89 Gastrointestinal parasitism in pasture and pen-reared lambs of three hair sheep breeds in the southeastern U.S. S. Wildeus*[1], J. E. Miller[2], and J. R. Collins[1], [1]*Virginia State University, Petersburg, VA,* [2]*Louisiana State University, Baton Rouge, LA.*

December-born lambs representing the Barbados Blackbelly, Katahdin, and St. Croix hair sheep breeds (6 ewes and 6 wethers each/breed) were allocated to the experiment in May. Lambs were allocated equally to either a pasture or pen feeding group stratified by breed and sex. Pasture animals were maintained as one group on a native, fescue-based sward (1.5 ha), subdivided into 3 units for rotational grazing. Pen animals were allocated equally to 6 pens and fed chopped alfalfa hay *ad lib*. Both groups were supplemented with a corn/soybean mixture at 0.75% of BW. All animals were dewormed (moxydectin) two weeks after the onset of the trial, but were not re-treated for the remainder of the experiment. Fecal egg counts (FEC) and packed cell volume (PCV) were recorded in 14-d intervals throughout the trial. At the end of the grazing season (168 d on trial) animals were slaughtered and intestinal tracts recovered and processed for the determination of total worm burden. FEC and worm counts were analyzed after log conversion to determine effects of breed, treatment (pen vs. pasture), and sex. FECs were higher in Barbados Blackbelly on pasture than any other breed by treatment combination (478 vs.136 eggs/g; interaction $P<.05$). PCV was higher ($P<.01$) in Barbados Blackbelly (33.9%) than the other two breeds (31.6%) and higher ($P<.01$) in pen (34.5%) than on pasture (30.4%). Abomasal counts of *Haemonchus contortus* tended to be lower ($P<.1$) in St. Croix (115) than Barbados Blackbelly (451) and Katahdin (316), but were not different between pasture and pen. Worm counts in the small intestine were higher ($P<.01$) in pasture (413) than pen (154), and tended to be lower ($P<.05$) in Barbados Blackbelly (139) and St. Croix (144), than in Katahdin (568). St. Croix appeared to have a lower overall parasite load than the other breeds and no animal showed clinical signs of parasitism during the experiment.

Key Words: Hair Sheep, Parasites, Pasture

90 Direct effects of condensed tannins on gastrointestinal nematodes in grazing Angora goats. B.R. Min*, D. Miller, S.P. Hart, G. Tomita, E. Loetz, and T. Sahlu, *E. Kika (de la Garza Institute for Goat Research, Langston University, Langston, OK.*

The objective of this study was to evaluate effects of condensed tannin-containing forage, Serica lespedeza (SL; 5.2% condensed tannins (CT)) on fecal egg count (FEC; eggs/g of feces), rate of larva development (RLD; larvae/10 g of feces), adult worm burden (AWB), and immune response (IMR) compared with a control forage (CF; crabgrass/tall fescue; 0.2% CT) in grazing Angora does and kids. Fifty worm-free does were randomly allocated to three treatments. One treatment (10 does; 45 ± 1.5 kg) was grazed on SL forage from April 25 to July 15, 2002 (81 d), and second treatment (20 does; 43 ± 1.4 kg) grazed CF. A third treatment (20 does; 44 ± 1.4 kg) was introduced to a sward of SL for 2 wk and then was switched to CF for 2 wk (MIX), fellowed by repeated

change every 2 wk. The FEC was determined every 2 wk. RLD was evaluated on d 60. To gauge levels of infective larvae on pasture, three worm-free kids (12 ± 0.98 kg) were randomly selected and introduced into each treatment as tracers. Tracers grazed for 60 d and were euthanized for determination of AWB. The IMR of does was measured by skin thickness reaction after injection of 250 μg phytohemagglutinin (PHA). Mean FEC for SL and MIX were substantially lower ($P < 0.01$) than for CF in does (186, 428, and 1148, respectively) and kids (550, 2757, and 3600, respectively). Total fecal egg output (3.3, 6.0, and 26.9 x $10^5 d^{-1}$, respectively); based on FEC and fecal output) and RLD (242, 263, and 792, respectively) were markedly lower ($P < 0.05$) for SL and MIX than for CF. Tracers on SL and MIX had lower ($P < 0.01$) AWB than CF in the abomasum (100, 333, and 783, respectively) and AWB was lowest among treatments ($P = 0.06$) in the small intestine for SL (117, 433, and 350, respectively). Abomasal worms were dominated by *Haemonchus* (52%), but *Trichostrogylus* were predominant (71%) in the small intestine. The IMR of does was similar among treatments at 0 h. However, IMR was greater ($P < 0.01$) for SL (4.9 mm) and MIX (6.0 mm) than for CF (3.0 mm) at 12 and 24 h after injection of PHA. In conclusion, these results indicate that CT in forages can reduce contamination of pastures with infective larvae. Grazing CT forages reduced FEC, RLD, and AWB, and also appeared to enhance IMR.

Key Words: Gastrointestinal Parasites, Condensed Tannins, Angora Goats

91 Dietary organic chromium enhances insulin secretion after an oral propilenglycol challenge in goats. H. R. Vera-Avila*[1], C. Valdivia-Aguilar[2], E. Villagomez-Amezcua[1], and E. Ramirez-Rodriguez[1], [1]*INIFAP, Mexico,* [2]*Programa Delfin, Mexico.*

To determine the effect of dietary organic chromium on plasma glucose and insulin after a propilenglycol challenge (PGO), 28 adult female Criollo goats (29.0±1.4 kg & 2.8±.15 BCS) were randomly assigned to one of 4 groups: Control (CR0), Consumption of 30 (CR30), 60 (CR60) or 90 (CR90) $\mu g/kg^{.75}$/d of chromium given as chromium methionine. Diet was calculated for 100 % of nutrient requirements with chromium methionine included in the grain fraction. Daily average chromium ingestion from chromium methionine was estimated for each group (CHI). BW was registered on d 0, 14 and 28 and ADG calculated for each 14 d period (ADG14 & ADG28). At 29 d on treatment 5 animals/group were subjected after 18 h of food withdrawal to an oral PGO challenge (2.5 $ml/kg^{.75}$) and blood samples were collected on EDTA tubes every 10 min from -10 to 90 min. Plasma glucose (PG) and insulin (PI) were determined by standard enzimatic or RIA procedures. Data were analyzed by ANOVA for a completely randomized or repeated measures design with treatment (TR) and time of sampling (TS) as factors. CHI for CR30, CR60 and CR90 were 29.8±3.1, 60.4±6.5 & 90.3±8.1 $\mu g/kg^{.75}$. TR did not affect ADG28 (P≥.05) but ADG14 tended (P=.12) to differ between CR90 animals and animals in the other experimental groups (-.06, -.07, -.08 & -.02 ±.02 kg/d in CR0, CR30, CR60 & CR90, respectively). No TR or TR x TS effects (P≥.05) were observed on PG but TS influenced (P≤.001) this variable with a steady increase over time in all treatment groups (+10.5±1.7 mg/dl at 90 min after PGO). A TR x TS effect (P≤.05) was detected for PI with a biphasic small response after PGO in CR0 (+.61 & +.72 μUI/dl with respect to time 0) as compared to the greater response in chromium methionine treated animals (+2.7, +1.89 & +3.15 μUI/dl with respect to time 0 in CR30, CR60 & CR90). These results suggest that an enhanced sensitivity to stimuli that promote insulin secretion might represent a response after organic chromium supplementation in goats, thus the combined use of organic chromium and stimuli for endogenous insulin secretion may be advantageous in this species when insulin-mediated effects are pursued.

Key Words: Goats, Organic Chromium, Insulin Secretion

92 Effect of high dietary Cu on growth performance, rumen fermentation and immune response in goat kids. T.J. Craig,Jr.*, S.G. Solaiman, G. Reddy, and C.E. Hopkins, *Tuskegee University.*

An experiment was conducted to determine the effect of high dietary Cu on growth performance, rumen fermentation and immune response in goats. Fifteen Spanish x Boer goat kids (BW 21.3 + 0.7 kg) were randomly assigned to three treatments: 1) control (no supplemental Cu), 2) 100 mg Cu/d and 3) 200 mg Cu/d from Cu sulfate. Copper sulfate was placed in gelatin capsules and inserted in the esophagus via balling gun before AM feeding. Animals were fed ad libitum twice a day a 70:30 grain: hay. Body weight was recorded after 4 h withdrawals from water, for two consecutive days every 2 wk for 14 wk. Rumen samples were collected at beginning, midway and at the end of the experiment via stomach tube. Blood samples were collected in heparinized, non-heparinized and EDTA vacutainers via jugular vein. The cell-mediated immune response was measured by lymphocyte proliferation assay using T cell mitogens, concanavalin A (conA) and phytohemagglutinin A (PHA). On days 50 and 64, goats were injected with chicken ovalbumin (2mg/head) in Freund's incomplete adjuvant. ELISA was performed on serum samples from days 57, 72, and 98 to measure the antibody titers to the chicken ovalbumin. Average daily gain was improved (Q, $P = 0.05$) with 100 mg Cu intake. Protozoa count tended to decrease (L, $P = 0.08$) with higher Cu supplementation, however, acetate, propionate or butyrate (%) did not differ ($P > 0.05$). An increase (L, $P = 0.035$) in leukocytes count was observed, with higher neutrophils (Q, $P = 0.045$) and lower lymphocytes (Q, $P = 0.009$) associated with 100 mg Cu supplementation. There was no difference ($P > 0.05$) in con A-induced lymphocyte proliferation, however, PHA-induced lymphocyte proliferation was higher on day 72 (L, $P = 0.006$) in the Cu supplemented groups. Antibody titers to the chicken ovalbumin tended to be higher (L, $P = 0.08$) on day 72 and it was higher (L, $P = 0.02$) on day 98 in the Cu supplemented groups. These results indicated that Cu supplementation at 100 mg/d, improved gain and enhanced the immune response in goat kids.

Key Words: Copper, Immune Response, Goats

93 Goat meat quality characteristics as influenced by diet and postmortem aging time. K. M. Gadiyaram*[1], S. Galipalli[1], G. Kannan[1], A. Carmichael[1], B. Kouakou[1], T. D. Pringle[2], K. W. McMillin[3], S. Gelaye[1], and T. H. Terrill[1], [1]*Fort Valley State University, Fort Valley, GA,* [2]*The University of Georgia, Athens, GA,* [3]*Louisiana State University, Baton Rouge, LA.*

There are no data available on the time course of postmortem muscle pH and temperature decline, and meat tenderization in goats. Thus, the objective of this study was to determine the effects of different dietary treatments and postmortem aging times on meat quality characteristics in goats. Twenty castrated dairy goats (BW = 30.7 ± 6.80 kg, age 10 mo) were subjected to one of 4 dietary treatments for 82 d (Treatment): (i) low energy low protein (LELP, 2.5 Mcal/kg DM DE and 12 % CP), (ii) low energy high protein (LEHP, 2.5 Mcal/kg DM DE and 18 % CP), (iii) high energy low protein (HELP, 2.9 Mcal/kg DM DE and 12 % CP), or (iv) high energy high protein (HEHP, 2.9 Mcal/kg DM DE and 18 % CP). Animals were sacrificed at the end of the feeding trial and the *Longissimus dorsi* muscles were used to assess goat meat (chevon) quality characteristics. Muscle pH and temperature were measured at 0, 3, 6, 9, 12, 15, 18, and 24 h postmortem (Time). Data were analyzed using Repeated Measures Analysis with polynomial statement in SAS. Time affected both muscle pH and temperature decline ($P < 0.01$) although there was no effect of Treatment or Treatment × Time. Average muscle pH decreased gradually from 6.76 ± 0.053 at 15 min postmortem (0 h) to 5.58 ± 0.098 at 24 h postmortem. In contrast, muscle temperature declined rapidly and reached 14.5 ± 2.00C at 3 h postmortem, while the pH was still high (6.60 ± 0.087). Temperature and pH decline followed cubic ($P < 0.01$) and linear ($P < 0.01$) trends, respectively. Sarcomere length, total collagen, and heated calpastatin measured at 24 h postmortem were not influenced by treatment. Warner-Bratzler shear force values, collagen solubility, and cooking losses of loin/rib chops (2.5 cm thick) aged for 1, 3, or 6 d postmortem were not influenced by Treatment or aging time. Changes in energy and protein levels in the diet did not influence meat quality characteristics in dairy goats, and chevon tenderness did not improve significantly due to postmortem aging. Rapid heat dissipation from goat carcasses during chilling may predispose the muscles to cold shortening, resulting in meat that may not respond to aging.

Key Words: Chevon, Diet, Meat Quality

94 Indicators of gastrointestinal parasitism after an experimental *Haemonchus contortus* infection in young goats receiving dietary Quebracho tannin. S. Wildeus*[1], A. M. Zajac[2], K. E. Turner[3], and J. R. Collins[1], [1]*Virginia State University, Petersburg, VA,* [2]*Virginia Tech, Blacksburg, VA,* [3]*Appalachian Farming Systems Research Center, Beaver, WV.*

With an increase in resistance of trichostrongylid parasites to commercial anthelmintics, the search for alternative means of parasite control in small ruminants has intensified. Condensed tannins in certain legumes and browse plants have been associated with anthelmintic activity in different studies. Quebracho is a commercial source of condensed tannins, and this experiment evaluated the use of Quebracho to control an experimental infection of *Haemonchus contortus* in goats. Crossbred doe kids (n=32, 6 mo of age) were paired by BW and allocated to 16 indoor, cement floor pens (3 x 4 m), dewormed (leavamisole; 11.8 mg/kg BW), and offered *ad lib* a basal diet of chopped alfalfa hay (12.4% CP, 59.3% NDF, 46.1% ADF), and a corn, soybean and dried molasses supplement (16% CP) at .5% BW. After an initial 5-d adaptation period, the supplement in 8 of the 16 pens was replaced with a modified Quebracho supplement (QT) providing 2.5% condensed tannin of total dry matter intake (d 0). On d 14, half of the pens in each dietary treatment received an oral dose of 10,000 *H. contortus* third stage larvae (HC). Fecal egg counts (FEC) and packed blood cell volume (PCV) were determined at 7 d intervals for another 56 d. Data were analyzed for effects of QT and HC on FEC (after log conversion) and PCV. FEC increased in HC animals and was higher ($P<.05$) than non-HC on d 63 (1594 vs. 209 eggs/g) and d 70 (1622 vs. 289 eggs/g). However, there was no effect of QT on FEC. PCV decreased in HC animals and was lower ($P<.05$) than in non-HC starting on d 35 (27.8 vs. 31.7%) and remained lower until the end of sampling. Again there was no effect of QT on PCV. Results suggest that dietary QT provided at level 2.5% of DM intake was not effective in reducing the impact of an experimental H. contortus infections, but higher levels of QT in the diet need to be investigated.

Key Words: Goats, Parasites, Tannins

95 Effect of Tasco seaweed extract supplementation on plasma cortisol and antioxidant enzyme activities in goats subjected to transportation stress. S. Galipalli*[1], G. Kannan[1], K. E. Saker[2], T. H. Terrill[1], B. Kouakou[1], S. Gelaye[1], and K. M. Gadiyaram[1], [1]*Fort Valley State University, Fort Valley, GA,* [2]*Virginia-Maryland Regional College of Veterinary Medicine, Blacksburg, VA.*

Tasco, an *Ascophyllum nodosum* seaweed containing product, can increase antioxidant activity in various species, but its effect on goats has not been adequately examined. Mature female Spanish (S) and Boer × Spanish (BS) goats (BW=39 kg, n=20/ breed) were housed in pens (5 does/pen). Goats were fed alfalfa pellets plus a supplement at 2% of daily intake either with or without Tasco seaweed extract (Treatment) for three weeks. Animals were transported 6 h to impose stress, and then held overnight without feed to simulate preslaughter conditions. Blood samples were collected at 0, 2, and 6 h transportation, and after holding (Time) to assess cortisol, phagocytosis, antioxidant, and peroxidation status. Data were analyzed using Repeated Measures Analysis in SAS. Plasma cortisol increased due to transportation but decreased after holding ($P < 0.01$), although concentrations were not influenced by Treatment. Treatment did not influence neutrophil (N), lymphocyte (L), and monocyte counts and N/L ratio, but decreased eosinophil counts ($P < 0.05$). Lipid peroxidation (LPO) decreased rapidly after beginning of transportation and remained at a lower level during holding in the treated group. In the control group, LPO did not change during transportation and holding. There was a Treatment × Breed interaction such that the reduction in superoxide dismutase (SOD) caused by Tasco was greater in the BS goats than the S goats. Red blood cell glutathione peroxidase (RBC GPx) and white blood cell glutathione peroxidase (WBC GPx) activities were higher in treated than control animals ($P < 0.05$). Mean RBC GPx activities increased during the first 2 h of transportation and during holding. However, mean WBC GPx activities increased during the first 2 h of transport, but decreased thereafter ($P < 0.05$). Phagocytosis was greatest at 2 h compared to other sampling times ($P < 0.01$). Tasco seaweed extract supplementation may help goats by increasing antioxidant status, particularly after onset of stress, with possible beneficial effects on immune function.

Key Words: Goats, Stress, Antioxidant Activity

96 Validation of a goat simulation model using performance test information for young fast growing meat bucks. M. Villaquiran*[1], T. A Gipson[1], and H. D. Blackburn[2], [1]*E (Kika) de la Garza Institute for Goat Research, Langston University, OK,* [2]*USDA/ARS/NPA/NSSL/NAGP, Fort Collins, CO.*

As part of a regional project, a computer simulation model for goat production is being updated. However, the model was developed before the recent interest in meat goat production. The objective of this study was to test the simulation model to determine if its biological assumptions and equations are representative of a young fast growing meat goat, typified by the Boer breed. Validation data were from 180 young Boer bucks enrolled in the Langston University Meat Buck Performance Test. Numbers of bucks enrolled in the test per year were 47, 33, 50, and 50, respectively, for years 1999 through 2002. Components of the simulation model tested were BW and feed intake (air-dry) for 15-d periods. Prior to 165 d of age, simulated BW was intermediate to actual mean BW; however, later the simulation model slightly overestimated BW, with an average difference of 1.0 kg at 180 d and 2.4 kg at 195 d., Table 1. Prior to 180 d of age, simulated cumulative feed intake was intermediate to actual means, although later predicted values were greater than observed. Average overestimation at 180 d was 5.2 kg, Table 2. In summary, the existing simulation model produced accurate estimates of BW and feed intake of young fast growing meat goats; however modifications may be required to improve prediction with age greater than 180 d. Table 1. Simulated and actual mean BW (kg), Table 2. Simulated and actual cumulative feed intake (kg).

Table 1.

Age (d)	Simulation	1999	2000	2001	2002
120	30.5	31.76.7	31.56.2	28.87.6	29.66.4
135	34.0	34.26.8	34.66.3	32.98.6	33.57.3
150	37.8	37.56.9	38.06.4	37.69.2	37.87.9
165	42.1	42.37.5	42.66.0	40.89.0	41.37.9
180	46.0	44.67.3	45.37.0	44.78.9	45.48.3
195	51.0		48.56.9	49.28.9	48.08.0

Table 2.

Age (d)	Simulation	1999	2000	2001	2002
120	18.75	20.70.18	19.30.18	17.40.14	18.60.20
135	41.25	42.40.30	42.50.28	39.40.25	41.90.33
150	68.25	67.60.38	66.10.40	65.80.33	69.80.46
165	98.25	95.20.40	93.70.41	92.30.38	99.60.58
180	129.75		121.60.52	123.20.49	128.90.81

Means +/- Standard Deviations

Key Words: Simulation Models, Goat, Growth

97 Growth of Yearling Meat Goat Doelings with Changing Plane of Nutrition. R. Joemat[1,2], A. L. Goetsch*[1], G. W. Horn[2], T. Sahlu[1], R. Puchala[1], B. R. Min[1], J. Luo[1], and M. Smuts[3], [1]*E (Kika) de la Garza Institute for Goat Research, Langston University, Langston, OK,* [2]*Animal Science Department, Oklahoma State University, Stillwater, OK,* [3]*Animal Nutrition and Products Institute, Agriculture Research Council, Irene, South Africa.*

Yearling meat goat doelings, 25 Boer x Spanish (BS) and 25 Spanish (S) (27 and 21 kg initial BW, respectively; SE = 0.6), were used in a 16-wk experiment to determine effects on growth of length of nutrient restriction and level of supplementation during realimentation. Doelings consumed prairie hay (6.2% CP, 70% NDF, and 9.1% ADL) ad libitum and received daily supplementation with 0.75% BW of concentrate (30% CP; C treatment), sequential 28-day periods of no supplementation and daily supplementation with 1.50 or 0.75% of concentrate (H-28 and L-28, respectively), or 56 days without supplementation followed by supplementation for 56 days with 1.50 or 0.75% of concentrate (H-56 and L-56, respectively). Ruminal ammonia N concentrations were below 6 mg/dL when concentrate was not supplemented. Body weight of S doelings was similar among dietary treatments throughout the experiment (d 28: 24.1, 24.1, 24.2, 24.6, and 23.8 kg, SE = 0.57; d 56: 24.2, 24.4, 24.0, 23.3, and 22.7 kg, SE = 0.67; d 84: 24.9, 25.3, 24.8, 25.1, and 24.6 kg, SE = 0.79; d 112: 25.2, 25.9, 26.3, 26.9, and 26.4 kg, SE = 0.81, for C, H-28, L-28, H-56, and L-56, respectively). Body weight of BS doelings also was similar among treatments on d 28 (26.2, 24.8, 23.8, 25.0, and 23.9 kg, SE = 0.57), but was greater ($P < 0.05$) for C vs L-28, H-56, and L-56 on d 56 (26.8, 25.7, 24.9, 23.2, and 21.3 kg, SE = 0.67), greatest

among treatments (P < 0.05) for C on d 84 (29.4, 25.6, 25.2, 26.9, and 24.5 kg, SE = 0.79), and greater (P < 0.05) for C than for H-28, L-28, and L-56 on d 112 (31.3, 27.9, 27.5, 29.9, and 27.5 kg, SE = 0.81, for C, H-28, L-28, H-56, and L-56, respectively). In conclusion, maintaining an adequate plane of nutrition for steady growth and development appears more important for BS than for S yearling doelings, with the former possibly requiring longer periods of realimentation than previous nutrient restriction regardless of level of concentrate supplementation.

Key Words: Goats, Nutritional Plane, Growth

98 Prediction of Metabolizable Energy Requirements for Maintenance, Gain, and Mohair Fiber Growth by Angora Goats. J. Luo*, A. L. Goetsch, and T. Sahlu, *E (Kika) de la Garza Institute for Goat Research, Langston University, Langston, OK.*

A database was constructed for Angora goats to estimate energy requirements for maintenance, gain, and mohair fiber growth. Treatment mean observations were classified into preweaning, growing, mature (not lactating or pregnant), lactating, and pregnant goats; however, due to limited numbers of observations, data for preweaning, lactating, and pregnant goats were removed. Data set 1 (n = 144) was used to estimate ME requirements for maintenance and whole body gain using simple linear regression analysis; data set 2 (n = 89) was employed to estimate ME requirements for maintenance, tissue gain, and mohair fiber growth using multiple regression analysis. Variables, scaled by kg $BW^{0.75}$, were mean BW (kg), ME intake (MEI, kJ/d), ADG (g), ADG adjusted for grease fleece weight (adjADG, g), and clean fleece growth rate (CFGR, g/d). Because of differences between growing and mature goats in intercepts and coefficients of simple and multiple regressions of MEI (P < 0.01 and < 0.08 for simple and multiple regressions, respectively), separate regressions were conducted. Linear, quadratic, and cubic effects of ADG on MEI for growing goats were not significant. The simple linear regression equation for mature goats was MEI = 527 (SE = 19.7) + 42.8 (SE = 4.98) # ADG [n = 79; R^2 = 0.48]; after removing 11 observations with residuals greater than 1.5 times the residual standard deviation, the final equation was MEI = 496 (SE = 16.6) + 46.8 (SE = 4.06) # ADG [n = 68; R^2 = 0.66]. The coefficient for CFGR in the multiple regression model for growing goats was not significant (P = 0.42). The multiple regression equation for mature goats was MEI = 469 (SE = 52.3) + 33.6 (SE = 7.15) # adjADG + 159 (SE = 55.1) # CFGR [n = 49; R^2 = 0.45]. In conclusion, estimated ME requirements for maintenance of mature Angora goats were 469 and 496 kJ/kg $BW^{0.75}$ and ME requirements for unadjusted and adjusted ADG and clean mohair growth were 46.8, 33.6, and 159 kJ/g, respectively. This research was supported by USDA Project Number 98-38814-6214.

Key Words: Angora Goats, Energy, Mohair

99 Use of spectral reflectance measures from hyperspectral radiometry in prediction of lamb gains on bermudagrass pastures. M. A. Brown*[1], P. J. Starks[1], and L. A. Appeddu[2], [1]*USDA-ARS, Grazinglands Research Laboratory, El Reno, OK,* [2]*Southwestern Oklahoma State University, Weatherford, OK.*

Spring-born lambs (n=47) were used to evaluate the potential for predicting lamb growth directly from hyperspectral radiometer data taken on forage canopies in bermudagrass pastures stocked with lambs. Lambs were randomized to each of four 1.6 ha bermudagrass pastures. Lamb weights and spectral reflectance (R) were measured on June 3, June 11, June 25, July 9, July 22, and July 31. Animal growth data was estimated in five time periods: June 3 to June 11; June 11 to June 25 ; June 25 to July 9; July 9 to July 22; and July 22 to July 31. Spectral reflectance data were collected at 252 different wavelengths, from 368.4 nm to 1113.7 nm and converted to absorbance estimates by calculating $\log_{10}(1/R)$. Each field was sampled eight times on each date along a transect line subsecting the field. Relationships of animal gain to 252 spectral absorbance estimates were done by pairing averages of each pasture for gain and spectral absorbance at the beginning of each week or period. Stepwise regression was then performed on the twenty observations (4 pastures x 5 weeks) to identify best multiple linear regression models that would account for the largest proportion of total variance in animal gain. A linear combination of ten spectral absorbance variables ranging from absorbance at 732.3 nm to absorbance at 1025.6 nm accounted for over 94% of the total variance in animal gains. While further research is needed to verify these results, it appears that prediction of stocker performance from field-level hyperspectral radiometry of forage canopies may be feasible.

Key Words: Lambs, Stockers, Hyperspectral Radiometry

100 Comparison of circulating gossypol in two deer species consuming fuzzy whole or Easiflo^{TM} cottonseed. C.G. Brown*[1,2], D.A. Neuendorff[2], T.A. Strauch[2], A.W. Lewis[2], B.C. Baldwin[3], M.C. Calhoun[3], and R.D. Randel[2], [1]*Tarleton State University, Stephenville, TX,* [2]*Texas Agricultural Experiment Station, Overton, TX,* [3]*Texas Agricultural Experiment Station, San Angelo, TX.*

Whether consumption of Easiflo ^{TM} cottonseed (EZF) reduces circulating gossypol compared to fuzzy whole cottonseed (WCS) was evaluated in red (*Cervus elephus*) and fallow (*Dama dama*) deer. EZF was WCS coated with a gelatinized starch solution containing iron as ferrous sulfate. The iron levels in WCS and EZF were 91 ppm and 1730 ppm, respectively. Seventeen red stags (BW=103.9kg) were allotted into three treatment groups: 1)Control (C; 3:1, corn:soybean meal, n=5), 2)WCS (n=6) or 3)EZF (n=6). Fourteen fallow bucks (BW= 47kg) were also allotted into three treatment groups: 1)C (n=5), 2)WCS (n=4) or 3)EZF (n=5). Rations were formulated to be isonitrogenous (17.1% protein) and isocaloric (TDN 90.8%). Animals grazed coastal bermudagrass and alfalfa pellets were provided with treatments. Average consumption of WCS and EZF was 1.82 and 0.91 kg/hd/d for red and fallow deer, respectively. Blood samples were taken via jugular venipuncture biweekly for 211 d. Plasma gossypol was assessed from 28 d samples via high performance liquid chromatography. Total gossypol concentration (μg/ml) was reduced (P<0.001) for EZF (3.19 $\pm$ 0.15) vs WCS (4.91 $\pm$ 0.16) after 84 d. From d 0 to d 84, EZF and WCS had similar (P>0.1) gossypol concentrations. On d 211 gossypol concentration (μg/ml) for EZF was lower (P<0.001) than WCS (2.93 $\pm$ 0.18 and 6.16 $\pm$ 0.19, respectively). Concentrations of the (+) and (-) isomers of gossypol were lower (P<0.001) in EZF compared to WCS. At d 84 (+)- and (-)-gossypol concentrations (μg/ml) were 1.45 $\pm$ 0.06 and 1.73 $\pm$ 0.10, respectively, for EZF vs 2.09 $\pm$ 0.07 and 2.82 $\pm$ 0.10, respectively for WCS. On d 211, (+)- and (-)-gossypol concentrations (μg/ml) were 1.42 $\pm$ 0.08 and 1.60 $\pm$ 0.09, respectively, for EZF vs 3.11 $\pm$ 0.09 and 3.41 $\pm$ 0.10, respectively, for WCS. Easiflo ^{TM} cottonseed is capable of reducing circulating gossypol compared to fuzzy whole cottonseed after a period of time.

Key Words: Gossypol, Cottonseed, Deer

101 Winter annual grasses for meat goats. J-M. Luginbuhl*, J. P. Mueller, and A. P. Conrad, *North Carolina State University, Raleigh NC.*

A 3-year (YR) grazing study was conducted to evaluate the performance of replacement does and wethers (*Capra hircus hircus*) on cereal rye (CR - *Secale cereale*, var. Elbon), annual ryegrass (RG - *Lolium multiflorum*, var. Marshall) and triticale (TT - *Triticum secale*, var. SR 102). The experimental area was divided into 9 plots of 0.19 ha each in a randomized complete block design with 3 replications. Forage species were sod-drilled in fall and fertilized with ammonium nitrate (56 kg N/ha) in November and February. Each year, 54 yearling goats (full-blood, 3/4 and 1/2 Boer; initial BW: 29 kg) were placed into 6 groups of 9 animals with similar BW and randomly assigned to 1 of 9 plots. Goats were moved to a fresh strip of grass 3 to 4 times per wk and immediately back fenced. Additional goats (2 to 14 goats/plot) were used as put-and-take animals to control forage growth. Goats had free access to a mineral mix, water and movable shelters. In YR 3, blood and ruminal fluid samples were collected from wethers which were then harvested at a commercial facility. The CP values of forage samples hand-plucked periodically from experimental pastures averaged 21.5, 23.3 and 23.0% for RG, CR and TT, respectively. Forage species had no effect on ADG in YR 1, 2 or 3 (avg: 136, 151, 142 g/d, for RG, CR and TT, respectively), but wethers gained more weight than does (P < 0.01) in YR 2 (139 vs 94 g/d) and YR 3 (201 vs 137 g/d). Gain per ha was greater (P < 0.05) for RG than CR and TT (YR 1: 504, 235, 293 kg; YR 2: 288, 195, 234 kg; YR 3: 532, 251, 137 kg). The pH of ruminal fluid, ruminal ammonia and carcass yield from wethers grazing RG, CR and TT averaged 6.67, 25.7 mg/dL and 51.3%, respectively. Plasma urea N (16.4, 21.9, 24.1 mg/dL), ruminal acetate (62.0, 60.7, 57.7 mM/100mM), propionate (22.0, 25.2, 27.0 mM/100mM) and acetate:propionate (2.83, 2.43, 2.22) differed between forage species (P < 0.05). Results indicated that yearling goats performed well when fed only on these forages under

controlled, rotational grazing management but that RG produced the most live weight gain per hectare.

Key Words: Goat, Grazing, Performance

102 Evaluation of kudzu (*Pueraria* lobata) as a feed for goats. R. H. Davis* and R. N. Corley III, *Tuskegee University, Tuskegee AL / USA*.

A study was conducted to determine the potential of kudzu (*Pueraria* lobata) as a feed for goats. Kudzu (leaf and stem: 2:1) was harvested in Tuskegee Alabama in the fall of 2001 and 2002 and compared with coastal bermudagrass hay (CBG). Proximate analysis and measurements of NDF, ADF, Ca, K, and Mg were determined. Kudzu samples were also analyzed for amino acid profile and compared to reported values of CBG. Four non-lactating Nubian female goats fitted with permanent ruminal cannulas were used to determine the kinetics of ruminal digestion. For kudzu and CBG, respectively, values for dry matter (93.6 and 94.7%), crude protein (13.9 and 9.9%), NDF (47.0 and 71.0%), ADF (37.0 and 36.0%), Ca (1.7 and 0.3%), K (.9 and .5%), and Mg (.3 and .3%) were comparable. The amino acid profile of kudzu contained higher values than reported values for CBG. Ruminal digestion kinetics of kudzu and CBG, respectively, estimated that .36 and .30% was soluble, .41 and .37% was potentially degradable, .25 and .33% was indigestible, and that the fractional rate of digestion was 7.3 and 5.5%h^{-1}. Kudzu and CBG were similar ($P > .05$) in estimated digestibility and fractional rate of digestion, but kudzu contained a higher ($P < .05$) solubility and a lower ($P < .05$) indigestibility fraction. As a whole, chemical composition and digestibility characteristics of kudzu were comparable to CBG, which shows its potential as a feed for goats. Further study is needed to determine the effect of kudzu on ruminal fermentation and animal performance.

Key Words: Kudzu (*Pueraria* lobata), Goats, Ruminal digestion

103 Growth rates of Boer and Kiko crossbred wethers fed endophyte-infected tall fescue or orchardgrass. R. Browning, Jr.*, Y. G. Myles, M. Byars, S. H. Kebe, T. Payton, E. Lane, C. Johnson, D. A. Young, and D. Coleman, *Tennessee State University, Nashville*.

This study was conducted to begin assessing how endophyte-infected tall fescue (TF) might affect meat goat performance. A majority of Tennessee goat producers indicated in a survey that tall fescue covers the improved pastures they use to graze goats (Leite-Browning et al., 2001; J. Anim. Sci. 80[Suppl. 2]:27). Three-quarter Boer (n = 22) and 3/4 Kiko (n = 15) yearling wethers were fed in drylot over three periods. During the pretrial period (January-March), all goats were provided orchardgrass (OG) hay for ad libitum consumption and were fed 455 g/d of a concentrate supplement. In Trial 1 (April-June), wethers within each breed were paired by weight and evenly divided into groups receiving TF seed and OG seed diets. Seed (227 g/d) was carried in 682 g/d of the concentrate supplement. Both groups were provided OG hay for ad libitum consumption. No breed × diet interaction was detected in Trial 1. Pretrial growth rates did not differ between TF and OG-fed goats (75 vs 78 ± 7 g/d). The TF seed diet lowered ($P < 0.01$) ADG by 32% over 8 weeks compared to the OG seed diet (102 vs 150 ± 7 g/d). For Trial 2 (June-August), half of the wethers within each breed were switched between TF and OG diets. Experimental diets in Trial 2 were in the form of TF or OG hay supplemented with 227 g/d of concentrate without TF or OG seed. Growth rates during Trial 1 did not differ between TF and OG-fed goats as grouped for Trial 2 (123 vs 128 ± 9 g/d). There was no breed × diet interaction detected in Trial 2. The TF hay diet lowered ($P = 0.10$) growth rates by 33% over 8 weeks compared to the OG hay diet (40 vs 60 ± 9 g/d). Across the three observation periods, percentage Kiko wethers had higher ($P < 0.01$) growth rates compared to percentage Boer wethers (214 vs 156 ± 10 g/d). This pilot study demonstrated the potential of endophyte-infected tall fescue to significantly lower the performance of meat goat wethers.

Key Words: Meat Goat, Tall Fescue, Growth Rate

104 Comparison of carcass traits of extensively raised hair breed lambs. J. M. Burke*[1], J. K. Apple[2], W. J. Roberts[2], and C. B. Boger[2], [1]*USDA, Agricultural Research Service,* [2]*University of Arkansas, Department of Animal Science*.

The objective was to compare live animal performance and carcass characteristics of 7/8 Dorper (DO; n = 5), 3/4 Dorper (DX; n = 25), purebred Katahdin (KA; n = 20) and St. Croix (SC; n = 17) lambs born in February (FEB) and October (OCT) 2001, and FEB Suffolk (SU; n = 10) lambs. After weaning, lambs were fed up to 1 kg corn/SBM while grazing bermudagrass or ryegrass. From weaning to harvest, ADG was greater for DO, DX, and SU than KA and SC lambs ($P < 0.01$). Lambs (FEB: 209 ± 1.9 d of age; OCT: DX, 201.3 ± 6.9; KA, 218.8 ± 8.7; SC, 230.4 ± 7.4 d of age or 40.3, 40.6, 35.8 ± 0.84 kg) were transported to the University of Arkansas Red Meat Abattoir for harvest. At harvest, DO, DX, KA, SC, and SU lambs weighed 40.2, 38.0, 38.4, 34.1 and 45.9 kg, respectively ($P < 0.01$). Carcass quality and cutability data were collected after a 7 d aging period at 2°C. Carcasses from SU lambs were heavier than all other breed types ($P < 0.01$); whereas, fat thickness and yield grades of DO and KA were greater than DX, SC, and SU ($P < 0.01$). Longissimus muscle (LM) areas of DO, DX, and SU were greater than that of SC ($P < 0.01$). Kidney fat weights and percentage of internal fat were greatest from SC and least from SU carcasses ($P < 0.01$), resulting in a greater cooler shrinkage in SU carcasses ($P < 0.01$). Lean maturity was similar among breed types; however, skeletal and overall maturities were greatest from SU carcasses ($P < 0.01$; $P < 0.05$). Carcasses from SC lambs had lower flank streaking scores than DX and KA, with DO and SU carcasses receiving intermediate scores ($P < 0.05$). Conformation scores for DO, DX, and SU carcasses were markedly higher ($P < 0.01$), resulting in higher ($P < 0.01$) quality grades than SC carcasses, with KA receiving intermediate scores. L* values of the LM were lighter ($P < 0.05$) in KA and SC, redder ($P < 0.01$) in DO and DX than SC and SU, and more yellow ($P < 0.01$) in DO than SC. Results from this study indicate that ADG, carcass muscularity and quality was similar among Dorper and Suffolk lambs and, although fatter, carcass muscularity of Katahdin was similar to that of 3/4 Dorper lambs.

Key Words: Hair Sheep, Growth, Carcass Traits

105 Growth and carcass traits of St. Croix White and Dorper X St. Croix White lambs in the tropics. R.W. Godfrey and A.J. Weis*, *University of the Virgin Islands, Agricultural Experiment Station, St. Croix*.

St. Croix White (STX; n = 22) and Dorper X STX (DRP; n = 18) lambs were used to evaluate the growth of lambs under tropical conditions. Three wk after weaning (63 d of age) lambs were sorted into pens based on breed and sex and fed a pelleted ration at 4% BW.hd^{-1}.d^{-1} with access to guineagrass hay and water. Lambs were slaughtered at a BW of 30 kg. Carcass weight, fat thickness over the 12^{th} rib, rib eye area (REA), percentage kidney-heart-pelvic (KPH) fat and leg circumference were measured. Data were analyzed by SAS procedures. Time on feed was higher ($P < 0.002$) for STX than for DRP lambs (153.2 ± 6.8 vs 118.9 ± 7.4 d, respectively). Total weight gained was greater ($P < 0.04$) for STX than for DRP lambs (16.1 ± 0.5 vs 14.6 ± 0.5 kg, respectively). Average daily gain was higher ($P < 0.01$) for DRP than for STX lambs (125.1 ± 4.7 vs 108.1 ± 4.3 g/d, respectively). Feed efficiency was greater ($P < 0.01$) for DRP lambs than for STX lambs (134.2 ± 2.0 vs 122.8 ± 2.7 g gain/kg feed, respectively). The STX lambs had a higher ($P < 0.0003$) cost of gain and a lower net value than DRP lambs (62.73 ± 1.83 and 3.28 ± 1.83 vs 52.07 ± 1.99 and 13.94 ± 1.99 $, respectively). Cold carcass weight was not different ($P > 0.10$) between STX and DRP lambs (12.6 ± 0.2 vs 12.6 ± 0.2 kg, respectively) or between ewes and wethers (12.8 ± 0.2 vs 12.3 ± 0.2 kg, respectively). The REA of DRP lambs was greater ($P < 0.02$) than that of STX lambs (10.4 0.4 vs 9.0 ± 0.4 cm2, respectively). Fat thickness was not different ($P > 0.10$) between DRP and STX lambs (1.5 ± 0.2 vs 1.4 ± 0.2 mm, respectively) or ewes and wethers (1.6 ± 0.2 vs 1.3 ± 0.1 mm, respectively). Percentage KPH was higher ($P < 0.001$) in STX than in DRP lambs (3.6 ± 0.3 vs 2.2 ± 0.3 %, respectively). Leg circumference was greater ($P < 0.007$) in DRP than in STX lambs (37.3 ± 0.4 vs 35.7 ± 0.4 cm, respectively). The decreased days on feed and greater ADG, feed efficiency and net value of DRP lambs compared to STX lambs should result in lower costs and higher returns for the producer.

Key Words: Sheep, Crossbreeding, Growth

106 Postpartum ovarian activity in Pelibuey ewes consuming crystalline wheat protected from ruminal degradation. D. G. Pea-Avila[1], H. R. Vera-Avila*[2], E. Gonzalez-Padilla[1], G. Mendoza-Martinez[3], and J. Lopez[2], [1]*UNAM, Mexico,* [2]*INIFAP, Mexico,* [3]*Colegio de Postgraduados, Mexico.*

To determine the effect of increasing ruminal bypass starch on postpartum ovarian activity in Pelibuey ewes by protecting cereals from ruminal degradation, 36 lactating Pelibuey ewes (2.26±0.18 BCS) under grazing conditions were randomly assigned to receive 30 % of estimated energy requirements from d 0 to 60 pp as: 1) Wheat bran plus 15 % protected fat (WB; Control), 2) Rolled crystalline wheat treated with 5 % formaldehyde solution (14 ml/100 g DM) and mixed with 15 % protected fat (TW; Protected wheat) or 3) Rolled crystalline wheat plus 15 % protected fat (NTW; Non-protected wheat). BW was registered at d 0 and 60 pp for ewes and their lambs and ADG calculated. Blood samples were collected after 3 h of supplement consumption every 3 d from 30 to 60 d pp and serum glucose (SG) and progesterone (SP) determined. SG was used to calculate mean serum glucose concentration (MSG) and SP to estimate interval to first luteal activity (FL) and percentage of luteal activity at d 45 pp (L45). Estrous activity was also monitored to estimate interval to first estrous (FE). Treatment (TR) and litter size (LS) were considered as factors and ANOVA for a completely randomized design was applied. Fisher exact test was used to anlyze L45. TR and LS did not affect (P<.05) MSG or ewe ADG but influenced (P<.001) ADG in the respective lambs (0.13, 0.18 & 0.17 ±.008 kg in WB, TW & NTW; 0.19 & 0.13 ±.007 kg in singles & twins). TR tended to influence (P=.09) FE with a numerically shorter interval in TW as compared to NTW and WB (70.0, 76.8 & 84.7 ±3.2 d). FL was not affected (P<.05) by TR or LS but L45 was greater in TW as compared to NTW and WB (16.7, 0.0 & 0.0 %). No TR x LS effect was observed (P<.05) in ADG and reproductive response variables. These results suggest that consumption of starch sources protected from ruminal degradation might advance pp ovarian activity in lactating Pelibuey ewes in a manner apparently independent of their energy contribution.

Key Words: Pelibuey Ewes, Postpartum Ovarian Activity, Ruminal Bypass Starch

107 Market Price, Cost of Production, Lambing Patterns and Marketing Options in the WV Sheep Industry. D Singh*, D Smith, and M Knights, *West Virginia University, WV.*

The objective of this study was to analyze the price and lambing patterns, marketing options and cost of production environment for the WV sheep industry. Data on lamb sale transactions for WV sheep producers from 1994-2001 (WV Dept of Agriculture) were collected and analyzed. ANOVA procedures were used to determine the effects of Markets, Month and Market Lamb Class (feeder lambs: < 32, 32-39, 40-45 kgs; slaughter lambs: <39, 40-45, 46-57 kgs) on price and number of lambs sold. Twenty-two individual income and expenditure farm records each for both in-season (spring) and out-of-season (fall) sheep production systems were collected from 1999-2000 and analyzed to determine cost of production and income earning potential of both systems. Surveys of WV sheep producers conducted in 1999 and 2001, with a response rate of 73 and 37 %, were used to analyze current lambing and marketing decisions and assess alternative strategies. The average price received by producers over the 8-year period was $1.70/kg and was affected (P < 0.01) by month, market and lamb class . Producers received the highest prices (P < 0.01) in April-June, and the lowest in August-October. The highest prices ($1.89/kg) and the lowest prices ($1.55-1.60/kg; P < 0.05) were received for lambs sold as lamb category 5 (feeder lambs: 32-39 kgs) and lamb category 3 (slaughter lambs: <39 kgs), respectively. Prices varied with markets irrespective of the number of lambs available for sale. Cost per kilogram of lamb produced were $1.28 and $1.12 for fall and spring lambing systems respectively. Lower mortality rates and higher market prices (P < 0.05) were observed for fall than for spring lambing (6% and $2.00/kg, and 10% and $1.65/kg, respectively). Profits per kilogram of lamb produced were higher (P < 0.05)for fall lambing ($0.73) than for spring lambing ($0.62). Producers choose to have most lambings occur between January and April (90%), to sell more lambs in September and October than any other months, and to sell lambs at weights above 41 kgs (50%). The results indicate that there is potential for obtaining higher prices by shifting lambing season, orienting production towards months when prices are highest/supply lowest, marketing more in classes that attain higher prices and by selecting among available markets.

Key Words: Lamb, Price, Market

108 Fatty acid composition of milk and Domiati cheese from grazing Alpine goats during a whole lactation. K.A. Soryal*, S.S. Zeng, S. P. Hart, B. R. Min, and K. Tesfai, *E (Kika) de la Garza Institute for Goat Research, Langston University, Langston, OK.*

Forty-four lactating Alpine goats were randomly allocated to four treatments to investigate effects of grazing with different levels of concentrate supplementation on milk and cheese fatty acid composition during different stages of lactation. Group A does were confined and fed alfalfa hay supplemented with 0.66 kg of concentrate per kg of milk over 1.5 kg/d. Groups B, C, and D were rotationally grazed and received 0.66, 0.33, or 0 kg of concentrate per kg of milk over 1.5 kg/d, respectively. Milk from each group was collected twice monthly for processing of Domiati cheese during the 6-mo lactation period (April to September, 2001). Cheeses were sampled fresh and at 1 and 2 mo of pickling in whey. Milk and cheese fats were extracted and fatty acids were analyzed. Caproic acid represented 0.76 and 1.47% of milk and cheese total fatty acids, respectively. Concentration of palmitic acid was highest among fatty acids in both milk and cheese (30.22 and 30.17%, respectively). Oleic acid concentration was highest among unsaturated fatty acids of milk (85.74% of total unsaturated fatty acids in milk). Grazing without concentrate supplementation (group D) resulted in lower (P < 0.05) concentrations of capric and lauric acids in milk compared with group A. Concentrations of capric and lauric acids in cheese ranked (P < 0.05) group A > B and C > D (capric: 31.32, 27.16, 28.23, and 24.26 μg/g; lauric: 12.94, 10.95, 10.95, and 9.73 μg/g), and myristic acid concentration was greater (P < 0.05) for group A vs D (31.94, 31.44, 30.04, and 28.93 μg/g for group A, B, C, and D, respectively). Contents of caproic, caprilic, and palmitic acids in milk were higher (P < 0.05) in mid-lactation than in other stages. In cheese, contents of caprilic and lauric acids were higher in mid-lactation than in other stages while stearic acid concentration was lower (P < 0.05) in late than other lactation stages. In conclusion, grazing without supplemental concentrate reduced levels of some saturated fatty acids in milk and cheese, particularly capric, lauric, and myristic fatty acids, which are considered to be cholesterol-raising fatty acids in human nutrition.

Key Words: Domiati Cheese, Fatty Acid Composition, Pasture Feeding

109 Growth, intake and carcass characteristics of Boer- and Kiko-sired crossbred goat kids pen-fed a forage-based diet. S. Wildeus*[1], H. N. Zerby[2], K. E. Turner[3], S. P. Greiner[4], and J. R. Collins[1], [1]*Virginia State University, Petersburg, VA,* [2]*The Ohio State University, Columbus, OH,* [3]*Appalachian Farming Systems Research Center, USDA, ARS, Beaver, WV,* [4]*Virginia Tech, Blacksburg, VA.*

The South African Boer (B) and New Zealand Kiko (K) goats have potential to serve as sire breeds for market kid production. This experiment evaluated the growth performance of kids sired by either B or K bucks mated to Spanish (S) and Myotonic (M) does during a March mating season. At 3.5 mo of age 24 intact male kids, equally representing the four breed combinations, were allocated to 6 pens by sire breed (3 pens/sire breed), and fed a diet of moderate quality grass hay (10.6% CP, 46.9% IVOMD, 70.4% NDF, 39.5% ADF) *ad lib* and a corn/cottonseed supplement (15.5% CP) at 2% of BW. Pen intake was measured on d 28, 84, and 154 of the trial in 5 d collection periods. At 156 d ultrasonic backfat and rib eye area measurements were made and animals were graded. Animals were slaughtered after 177 d. Data were analyzed for the effects of sire and dam breed. Forage DM intake was similar between sire breeds, but decreased (P<.01) from 1.77 to 1.14% BW during the trial. Starting BW tended to be higher (P<.1) in K- than B-sired kids (15.8 vs. 14.3 kg), but final BW (34.7 kg) and ADG (105 g/d) were not different. Final BW (P<.05) and ADG (P<.01) were higher in kids from S (36.8 kg and 117 g/d) than M does (32.5 kg and 94 g/d). Dressing percentage (sire x dam breed interaction: P<.05) was higher in B x S kids (48.0%) than the other breed combinations (44-45%). Backfat was greater (P<.05) in B (.089 cm) than K-sired kids (.045 cm), however, ribeye area (8.89 cm^2) and body wall thickness (.91 cm) were not different between breeds. Ultrasonic and carcass ribeye area measurements

were correlated (r=.68; P<.001), but not backfat measurements. Live grades were higher (P<.05) in B- than K-sired kids. Results suggest similar growth performance between sire breeds, but increased deposition of backfat in B-sired kids.

Key Words: Meat Goats, Growth, Carcass

110 Performance, blood metabolites and visceral organ mass and composition in growing castrated dairy goats. A. Carmichael, B. Kouakou, S. Gelaye, G. Kannan, and T.H. Terrill, *Fort Valley State University, Fort Valley, GA*.

Growing castrated dairy goats (n = 20; BW = 30 ± 6.8 kg) were used in an 82-d experiment to assess effects of protein and energy levels on performance and splanchnic tissue mass and composition. Animals were individually housed in elevated pens (1.2 × 1.2 M), stratified by BW and randomly assigned to 4 dietary treatments. Diets were formulated to provide either 2.5 Mcal /kg DM DE and 12% CP (low energy low protein = LELP), 2.5 Mcal /kg DM DE and 18% CP (low energy high protein = LEHP), 2.9 Mcal /kg DM DE and 12% CP (high energy low protein = HELP), or 2.9 Mcal /kg DM DE and 18% CP (high energy high protein = HEHP). The low and high energy diets contain 3 and 15% poultry fat, respectively. At the end of the experiment, single blood samples were collected by jugular venipuncture, and then animals were weighed and sacrificed. After evisceration, digestive tract segments were tied at junctions, separated, and weighed with and without digesta. Weight of liver and other organs of the abdominal and thoracic cavities were also recorded. Blood samples were analyzed for glucose, NEFA and BUN. Liver samples, intestinal and reticulo-rumen mucosa samples were analyzed for DM, protein, DNA and RNA. Data were analyzed using GLM procedure of SAS. Goats fed low energy diets consumed more feed than those fed high energy diets. Body weight gains were higher for animals fed the low than the high energy diets. Blood glucose and NEFA were similar among treatments, but BUN tended to be greater ($P = 0.08$) in high than in low energy diets-fed animals. There were no differences in organ or digestive tract segment weights. Small intestine weights (full or empty), as percent of slaughter weight, were lower for animal fed low energy (1.8 and 2.0 or 1.4 and 1.5 for LELP and LEHP full or empty , respectively) as compared to high energy (2.9 and 2.5 or 1.9 and 1.9 for HELP and HEHP full or empty, respectively) diets. Liver DNA tended ($P = 0.07$) to be lower (12.5 mg/g of fresh tissue) for LEHP than for animals fed the other diets (15, 17 and 19 mg/g of fresh tissue for LELP, HEHP and HELP, respectively). Small intestinal mucosa DM contents were higher ($P < 0.05$) in animals fed low than high energy diets. Splanchnic tissue weights are not affected in growing goats when fed diets differing in the proportion of energy coming from poultry fat.

Key Words: Goats, Dietary Energy, Splanchnic

111 Growth and carcass characteristics in lambs from three hair sheep breeds raised on pasture and hay-based diets. S. Wildeus*[1], H. N. Zerby[2], K. E. Turner[3], and J. R. Collins[1], [1]*Virginia State University, Petersburg, VA,* [2]*The Ohio State University, Columbus, OH,* [3]*Appalachian Farming Systems Research Center, USDA, ARS, Beaver, WV*.

This experiment evaluated the use of forage-based diets for hair sheep lamb production. Barbados Blackbelly (BB), Katahdin (KA), and St. Croix (SC) ewe and wether lambs (n=36, 100 d of age) were allocated to a pasture or pen feeding group stratified by breed and sex in May. Pasture animals were maintained as one group on a native, predominantly tall fescue pasture (1.5 ha; 12-17% CP, 66-69% NDF, 36-38% ADF), subdivided for rotational grazing. Pen animals were allocated to 6 pens stratified by breed and separated by sex, and offered *ad lib* chopped alfalfa hay (16.6% CP, 60.3% NDF, 45.2% ADF). Both groups were supplemented with a corn/soybean mixture (16.5% CP) at .75% of BW. After168 d on trial animals were slaughtered. Data were analyzed for effects of breed, nutritional treatment, and sex. ADG was higher (P<.05) in pen (77 g/d) than on pasture (67 g/d), and higher (P<.01) in KA (84 g/d) and SC (75 g/d) than BB (56 g/d). Starting and final BW were higher (P<.01) in KA (31.4 and 45.5 kg, respectively) than SC (22.5 and 31.4 kg) and BB (24.5 and 31.0 kg). Dressing percent (overall 48.0%) was not affected (P>.1) by breed or treatment. Backfat was higher (P<.05) in pen (.45 cm) than pasture (.27 cm), and higher (P<.05) in KA (.50 cm) than BB (.23 cm) and SC (.36 cm). Ribeye area was larger (P<.01) in KA (10.9 cm^2) than BB (8.3 cm^2) and SC (7.1 cm^2), but not after adjustment for carcass weight. Body wall thickness and quality score were also higher (P<.05) in KA (1.57 cm and 10.3, respectively) than SC (1.33 cm and 9.6) and BB (1.08 cm and 9.3). Hair sheep lambs achieved moderate rates of gain on high forage diets with limited supplementation, with some differences between breeds. The carcasses produced were too small for the traditional lamb market, but acceptable for ethnic niche markets.

Key Words: Hair Sheep, Growth, Carcass Characteristics

Teaching and Undergraduate Education

112 A service learning approach to teaching companion animal management. K. M. Downs*, J. G. Gentry, and J. E. Mehlhorn, *Middle Tennessee State University*.

As a content supplement, a service learning model was incorporated into a senior-level Companion Animals course in the animal sciences at MTSU. This course was developed in response to a change in student demographics and the need for a broad based species knowledge, with enrollment (mean = 27) increasing by 39.3% from first to current offering (3 semesters). The service learning application was designed to stimulate interest in community development activities among the undergraduate student in this course by highlighting companion animal specific organizations which perform a service to the local, regional, or national community. As traditional lecture supplements, demonstrations by a therapy dog organization, law enforcement search and rescue group, drug seizure division, and K-9 attack unit are scheduled throughout the semester. Students are required (20% of final grade) to complete a team project whereby they must identify, interview, and report upon a companion animal related service organization. An incentive based university wide donation drive to support the local county animal services by providing needed supplies has also been incorporated into the class structure. Qualitative evaluation of the service learning program was conducted using retention, attendance, and course evaluation data. Over three semesters, retention was 87.5, 71.4, and 100.0%, respectively. While only randomly maintained, attendance has remained high (86.3%). Based on course evaluations, 87.5% of students completing the course are highly satisfied with their learning experiences. Service learning is an innovative approach to supplement the learning experiences of undergraduate students and foster an appreciation for community-based service. Students become active participants in their education and foster a sense of gratification in making a difference in the community.

Key Words: Teaching, Service Learning, Companion Animals

113 Relationships among prematriculation academic indicators and collegiate success. C. F. Rosenkrans, Jr.* and J. A. May, *University of Arkansas, Fayetteville*.

Universities are being scrutinized for the success of their students. Those successes are based on student retention, grade point average (GPA), and graduation rate. Accurate methods of determining the likelihood of a student's success at a university are needed so that students requiring additional assistance can be helped before it is academically too late. This study was a retrospective evaluation of new freshman students (n = 120) who matriculated at the University of Arkansas in the fall of 1994, 1995, and 1996, and enrolled in the Introductory Animal and Poultry Sciences course (AGRI 1003). Student high school GPA (HSGPA) and composite ACT score were related to the student's grade in AGRI 1003, graduation status, and the time in months to graduation. The ACT score was correlated ($r > 0.32$; $P < 0.001$) with HSGPA and AGRI 1003 grade. The HSGPA ($r = 0.58$; $P < 0.001$) was correlated AGRI 1003 grade. Student ACT score, HSGPA, and AGRI 1003 grade were all negatively correlated ($r < -0.38$; $P < 0.01$) with the number of months to student graduation. Student's chosen major was not ($P > 0.3$) a source of variation for HSGPA, ACT score, graduation rates, or months to graduation. Students who earned an A letter grade in AGRI 1003 had the highest ($P < 0.01$) HSGPA, and ACT score, and least ($P < 0.01$) amount of time to graduation. Only 56 (47 %) of the new freshmen