

and milk fat were greater with PM than with AM silage. Reduced milk urea nitrogen (MUN) with feeding PM compared to AM silage indicates improved N utilization. Ruminal pH tended to be lower on AM than on PM silage; this was probably associated to the increased ruminal acetate and total volatile fatty acids (VFA) on alfalfa cut in the morning. The greater ruminal acetate:propionate ratio observed with AM silage suggests that ruminal metabolism was shifted towards lipogenesis. Overall, increased alfalfa silage TNC content with afternoon harvest resulted in improved performance of dairy cows.

**Table 1.**

Item	AM silage	PM silage	SED	P
DMI, kg/d	18.8	20.0	0.22	<0.01
Milk yield, kg/d	19.2	20.1	0.18	<0.01
Milk protein, %	3.22	3.24	0.02	0.37
Milk protein, kg/d	0.61	0.65	0.01	<0.01
Milk fat, %	3.96	4.04	0.08	0.31
Milk fat, kg/d	0.75	0.82	0.02	<0.01
MUN, mg/dL	18.9	17.2	0.27	<0.01
Body weight gain, kg/d	0.55	0.23	0.08	<0.01
Ruminal pH	6.34	6.41	0.04	0.09
Ruminal acetate, mM	66.7	63.5	0.96	0.02
Ruminal propionate, mM	15.8	15.3	0.25	0.10
Ruminal butyrate, mM	6.36	6.14	0.13	0.13
Ruminal total VFA, mM	91.6	87.9	1.27	0.02
Ruminal acetate:propionate ratio	4.27	4.17	0.04	0.05

**Key Words:** Alfalfa Silage, Diurnal Harvest, Total Nonstructural Carbohydrates

## Goat Species

**595 *In vitro* larval activity and *in vivo* gastro-intestinal parasites infestation in goats grazing tropical legumes.** K. A. H. Valentin<sup>\*1</sup>, B. R. Min<sup>2</sup>, E. Valencia<sup>1</sup>, A. Rodriguez<sup>1</sup>, W. E. Pinchak<sup>2</sup>, J. E. Miller<sup>3</sup>, and J. P. Muir<sup>4</sup>, <sup>1</sup>University of Puerto Rico, Mayaguez, Puerto Rico, <sup>2</sup>Texas Agricultural Research Center, Vernon, <sup>3</sup>Louisiana State University, Baton Rouge, <sup>4</sup>Texas Agricultural Research Center, Stephenville.

In Exp. 1, eight naturally parasite-infected growing Boer goats were randomly allocated to two treatments. One treatment (n = 4; initial LW = 18.8 ± 0.5 kg) entailed grazing of *Arachis* (*Arachis pintoi*) from September to December 2006 with a second treatment of *Calliandra* (*Calliandra calothyrsus*) (n = 4; initial LW = 14.4 ± 0.5 kg) grazing up to 84 days. In Exp. 2, three purified tannins (*Calliandra*, *lespedeza* (*Lespedeza cuneata*), and *Acacia* (*Acacia angustissima* var. *hirta*) and commercially available tannin monomers (ellagettannin, gallotannin, and catechin) were used *in vitro* to determine the effect of legume forage tannins and monomers on the larval migration inhibition (LMI %) rates of infective third-stage larvae of *Haemonchus contortus* (*H. contortus*). For the *in vitro* study, *Calliandra* was chosen because of anthelmintic activity measured in Exp. 1, while, *Lespedeza* and *Acacia* tannins were included because of known anthelmintic activity. Exp. 1 mean fecal egg counts (5262 vs. 7644 eggs/g;  $P < 0.001$ ) and FAMACHA score (2.5 vs. 2.9;  $P < 0.02$ ) were lower for *Calliandra* than for *Arachis*. ADG (11.1 vs. -34.7;  $P < 0.02$ ) and packed cell volume (22.3 vs. 20.5;  $P = 0.13$ ) were greater for *Calliandra* than for *Arachis*, respectively. *In vitro* DM digestibility was lower ( $P < 0.001$ ) for *Calliandra* but crude protein and condensed tannins were greater ( $P < 0.01$ ) than for *Arachis*. In the presence of 2 and 4 mg purified tannin/ml (using a Sephadex LH-20), LMI rates of *H. contortus* increased with *Lespedeza* and *Calliandra* extracts. There was no dose response of *Acacia* extract on LMI. *H. contortus* exhibited dose dependent ( $P < 0.01$ ) response to 1, 2, and 4 mg/ml of ellagettannin, gallotannin, catechin tannin monomers though differential inhibitory activity was observed: ellagettannin > gallotannin > catechin.

**Key Words:** Gastrointestinal Nematodes, Tannins, Tropical Legumes

**596 Effects of hay inclusion on intake, total tract nutrient utilization and ruminal fermentation of goats fed spineless cactus (*Opuntia ficus-indica* Mill) based diets.** E. L. Vieira<sup>1</sup>, A. M. Batista<sup>1</sup>, A. Guim<sup>1</sup>, F. F. Carvalho<sup>1</sup>, A. C. Nascimento<sup>1</sup>, R. F. Araújo<sup>1</sup>, and A. F. Mustafa<sup>\*2</sup>, <sup>1</sup>Universidade Federal Rural de Pernambuco, Pernambuco, Brazil, <sup>2</sup>McGill University, QC, Canada.

A study was conducted to determine the effects of increasing levels of tifton bermudagrass hay in cactus-based diets on total tract nutrient utilization and ruminal fermentation parameters of goats. Five ruminally fistulated goats were used in a 5 × 5 Latin square experiment with 17-d periods. Experimental diets contained (g/kg) 765, 670, 572, 473 and 373 spineless cactus and 50, 150 250, 350, and 450 tifton bermudagrass hay, respectively. Results showed that that DMI increased quadratically ( $P < 0.05$ ) while intake of OM, CP and NDF increased linearly ( $P < 0.05$ ) as the level of hay in the diet increased. However, intake of non-fiber carbohydrates (NFC) decreased quadratically ( $P < 0.05$ ) as a result of hay inclusion. Total tract digestibility of DM (average 70.6%), OM (average 73.7%), CP (average 80.4%), NDF (average 55.3%), and NFC (average 90.4%) were not influenced by hay level in the diet. Nitrogen retention was similar for all dietary treatments, however, N supply to the small intestine increased quadratically ( $P < 0.05$ ) as the level of hay in the diet increased. Hay inclusion linearly increased ( $P < 0.05$ ) ruminal pH and NH<sub>3</sub>-N concentration, and rumen content of DM and NDF. Rumen turnover of DM and NDF quadratically decreased ( $P < 0.05$ ) while rumen disappearance of DM and NDF increased quadratically ( $P < 0.05$ ) as the level of hay in the diet increased. It was concluded that inclusion of tifton bermudagrass hay in high cactus diets improved feed intake without adversely affecting total tract nutrient utilization or ruminal fermentation. A minimum of 150 g/kg of hay should be included in high cactus diets to avoid digestive disturbances and maximize feed intake.

**Key Words:** Goats, Nutrient Utilization, Spineless Cactus

**597 Evaluation of Chevron on risk factors for coronary heart disease.** D. D. Burnett\*, S. B. White, M. M. Corley, and R. N. Corley, III, *Tuskegee University, Tuskegee, AL.*

Chevon (goat meat) is consumed world-wide and consumption in the United States has increased recently due to many factors including its potential as a healthy alternative to traditional meats. Goats deposit most of their fat internally versus intramuscularly in other livestock species thus chevon contains relatively less fat than other meat products and appeals to health conscious consumers. The serum lipid profile represents the types and amounts of circulating lipids, and in general meat fats have been implicated in the elevation of circulating lipids particularly LDL and total cholesterol (TC) fractions. This is associated with an increased risk for Cardiovascular (CVD), which is the leading cause of death in the United States. Over 50% of deaths from CVD result from Coronary Heart Disease (CHD), a major form of CVD in which diet plays a pivotal role. The objective of this study was to evaluate chevon as a primary protein source on risk factors for CHD. Fifty male Golden Syrian hamsters 4-weeks in age were randomly assigned to one of 5 dietary treatments. Retail meat cuts were used in diet formulation with lean beef, pork, chicken, chevon or casein serving as the sole protein source. Diets were fed ad libitum for twenty-eight days and voluntary feed intake (VFI) and average daily gain (ADG) was recorded. On day 28, the hamsters were fasted for 24 hours, euthanized and blood was collected for plasma lipid analysis. VFI for chevon was lower ( $P < 0.05$ ) than for all other diets. VFI for casein was 4.7% lower than beef and pork and was similar to chicken. ADG was 12.9% higher ( $P < 0.05$ ) for the animals consuming the beef and pork diets compared to chevon, chicken and casein, which supported similar gains ( $P > 0.05$ ). Plasma levels of LDL, HDL, and TC were not influenced by diet ( $P > 0.05$ ). Chevron did not affect the serum lipid profile, although it is important to note that the lean meat cuts in this study appeared to be heart healthy relative to casein. Future research will include the use of more economical cuts of meat in diet formulation and to determine the contribution of endogenous lipids to the serum lipid profile as affected by diet.

**Key Words:** Chevron, Cardiovascular Disease, Serum Lipid Profile

**598 Effects of stabilized rice bran on growth, feed efficiency, carcass characteristics, and occurrence of urinary calculi in wether Boer goats fed a complete pelleted diet.** G. V. Pollard\*<sup>1</sup> and R. V. Machen<sup>2</sup>, <sup>1</sup>*Texas State University, San Marcos,* <sup>2</sup>*Texas Agricultural Experiment Station, Uvalde.*

Sixteen wether Boer goats individually penned were utilized in a 102 d study to determine the effects of stabilized rice bran (RB) on ADG, feed efficiency, carcass characteristics, and occurrence of urinary calculi. Treatments evaluated were: control (no added RB), 45 g/d RB, 90 g/d RB, and 135 g/d RB, these diets accounted for 0, 0.8, 1.6, and 2.4 g supplemental P/d, respectfully. Goats were fed at 3.25% BW for 102 d once daily with free choice access to water and weighed every 14 d. Any goat that developed symptoms of urinary calculi was treated for the blockage and to alleviate symptoms. Goats that died were necropsied and stones were collected and bladders examined for evidence of rupture. On d 102 all goats were shipped to a commercial slaughter plant where carcass data were collected. Data were analyzed as a randomized design using the GLM procedure of SAS. Goats fed the control diet and 45 g/d RB had greater ( $P = 0.041$ ) overall ADG, FG, and 102 d live weights than those fed 90 g/d RB or 135 g/d RB. A

primary area of interest in this study was the relationship between RB and occurrence of urinary calculi. In total five goats developed calculi on this study, three (two deaths) on the 135 g/d RB treatment and two (one death) on the 90 g/d RB treatment. Goats receiving the control and 45 g/d RB had greater ( $P = 0.035$ ) hot carcass weight than goats fed the 90 g/d RB and 135 g/d RB diets. Fat thickness (FT) and leg circumference (LC) did not differ ( $P = 0.247$ ) among goats fed the control, 45 g/d RB, or 90 g/d RB, while the 135 g/d RB treatment had lower ( $P = 0.088$ ) FT and LC. Muscle confirmation was greatest ( $P = 0.051$ ) for goats fed the control and 45 g/d RB diets, with the 90 g/d RB diet being intermediate, while the 135 g/d RB diet was lowest. Animal performance varied greatly across treatments, but was consistently lower for goats receiving 90 g/d RB and 135 g/d RB, and the only occurrences of urinary calculi developed on these treatments.

**Key Words:** Goat, Growth, Urinary Calculi

**599 The performance of Spanish kids born under mixed-species grazing system.** S. Gebrelul, T. Walsh\*, Y. Ghebreyessus, V. Bachireddy, and R. Payne, *Southern University, Baton Rouge, LA.*

Records of 542 body weights, body condition (BCS) and FAMACHA (FS) scores were analyzed to evaluate the performances of Spanish kids born under mixed species grazing system. In a  $2 \times 42$  factorial, 40 Spanish does and 14 Brangus cows were randomly assigned to continuous (CONT) or rotational grazing (ROT) systems, and two grazing schemes, goats alone (GTA) or grazed mixed with cattle (MXD). A land area of approximately 20 ha on Bermuda grass was divided into four pastures, two 8 ha each for mixed-species grazing and two 2 ha each for goats-alone grazing. The rotational pastures were further divided, using electric fences, into four paddocks each to facilitate rotational grazing. Each paddock was grazed for 7 days and allowed to rest for approximately 21 days. Measurements on kids born during 2005 and 2006 were taken every 28 days. Body weights were analyzed using SAS's Proc MIXED procedure where grazing schemes, grazing system, months of grazing, year of birth and interactions were included as fixed and animals as random effects in the model. Chi-square analysis was used for BCS and FS. All fixed effects were significant ( $P < 0.05$ ) sources of variation. MXD kids weighed more ( $19.2 \pm 0.4$  vs.  $15.2 \pm 0.4$  kg,  $P < 0.01$ ) than GTA kids. CONT kids were heavier ( $18.0 \pm 0.4$  vs.  $16.50 \pm 0.4$  kg,  $P < 0.05$ ) than ROT kids. Body weights ranged from  $7.9 \pm 0.2$  in April to  $21.8 \pm 0.5$  kg in October. Within each month, MXD kids were heavier ( $P < 0.05$ ) than GTA kids. Significantly more GTA kids (31.5% vs. 18.5%) scored BCS of 2 or lower, while significantly more MXD kids scored (25.5% vs. 17.7%) BCS 3 or higher. Differences ( $P < 0.05$ ) in FAMACHA score of 2 were observed in GTA and MXD kids (22.2 vs. 14.4%) as well as in kids in CONT or ROT (19.6 vs. 15.7%) grazing system. Results suggested that goats could graze with cattle to efficiently utilize available forage resources under limited resources farming systems.

**Key Words:** FAMACHA, Goat, Mixed Grazing

**600 The performance of Spanish does under mixed-species grazing system.** S. Gebrelul, T. Walsh\*, Y. Ghebreyessus, V. Bachireddy, and M. Berhane, *Southern University, Baton Rouge, LA.*

A long-term, mixed grazing project was designed to determine the performance of goats grazing with cattle. In a 2x2 factorial, 40 Spanish goats and 14 Brangus cows were randomly assigned to continuous or rotational grazing systems, and two grazing schemes. Approximately 20 ha of Bermuda grass were divided into four pastures, two 8 ha for mixed species grazing and two 2 ha for grazing goats alone. The rotational pastures were subdivided into 4 equal sized paddocks, in which each paddock was grazed for 7 d and rested for 21 d. Goat weights, body condition scores and FAMACHA scores were collected every 28 d. Records of 1437 weights were analyzed using SAS MIXED procedure where grazing schemes, grazing systems, months of grazing and interactions were included as fixed and animals as random effects in the model. Body condition and FAMACHA scores were analyzed using Chi-square. Weights of goats grazing with cattle ( $36.9 \pm 0.6$  kg) were heavier ( $P < 0.01$ ) than goats grazed alone ( $34.6 \pm 0.6$  kg). A similar effect was noted using grazing system ( $P < 0.001$ ), where goats continuously grazing averaged  $37.7 \pm 0.6$  kg, as compared to  $33.8 \pm 0.6$  kg for those rotationally grazed. Significant weight differences ( $P < 0.01$ ) were observed in the interaction of grazing scheme and system with goats grazed with cattle continuously weighing more ( $39.9 \pm 0.8$  kg) as compared to the other three interactions. The majority of goats, regardless of grazing scheme or system, tended to have a body condition score between 2 and 3 on a 5 point scale. A shift in the scores was observed starting in the spring and moving toward fall, where there was an increase in those scoring 3 or better. Similar trends were observed with FAMACHA scores, with the majority of goats scoring a 2 or 3. A shift in FAMACHA scores was observed starting in the spring through the fall, with a decrease in those scoring 4 and an increase in those scoring 3. Preliminary results suggest that goats could graze together with cattle to efficiently utilize available forage resources.

**Key Words:** FAMACHA, Goats, Mixed Grazing

**601 The effect of mixed species grazing systems on soil compaction and permeability.** Y. Ghebreyessus\*, V. Bachiredy, S. Gebrelul, R. Payne, M. Berhane, and Z. Augustine, *Southern University, Baton Rouge, LA.*

A study to evaluate the effect of mixed species grazing systems on soil physical properties particularly soil compaction and permeability was conducted. Animals were grazed on Bermuda grass pastures during the summer and ryegrass during the winter. In a 2x2 factorial, 40 Spanish goats and 14 Brangus cows were randomly assigned to continuous or rotational grazing systems, and two grazing schemes (goats alone and goats mixed with cattle). A land area of approximately 20 ha on Bermuda grass was divided into four pastures, two-8 ha each for mixed-species grazing and two-2 ha each for goats-alone grazing. The rotational pastures were further divided, using electric fences, into four paddocks each to facilitate controlled grazing. Each paddock was grazed for 7 days and allowed to rest for approximately 21 days. Soil physical properties that determine soil compaction and permeability were collected in Fall and Spring seasons. The parameters were penetrometer reading, bulk density, soil water content and soil infiltration rate. Based on one year data significant difference in penetrometer readings was found between seasons, grazing systems, among species and grazing by specie interactions. Soils with rotational cattle grazing were more compact compared with the other treatments. Mean penetrometer readings were  $4.4 \pm 0.1$  and  $4.19 \pm 0.2$  revolutions for the rotational and continuous grazing, respectively. Soil compaction by goats was the lowest ( $3.4 \pm .2$  revolutions). Bulk density, which is a measure for soil compaction, was significant among species with cattle grazing 1.48 and goats 1.34 Mg/m<sup>3</sup>. Soil water content was higher (25.6 vs. 19.7,  $P < 0.05$ ) in spring than fall, indicating more compaction in spring months. Soil permeability was significantly higher (0.45 vs. 0.13 cm/hr,  $P < 0.05$ ) with goat grazing as compared with cattle grazing.

**Key Words:** Goats, Mixed Grazing, Soil Compaction

## Joint National Extension Workshop: Changing the Future of Food Animal Production

**602 Introduction to the symposium: The lengthening chain of change.** R. E. Stup\*, *The Pennsylvania State University, University Park.*

Extension has a rich history of helping farmers to adopt new technology and improved management practices. Throughout most of Extension's history change could be initiated by exposing farmers to information that demonstrated the benefits of the new technology or practice. Extension educators used on-farm demonstration, farmer meetings, newsletters, factsheets and many other methods to present research-based information to farmers. The farmer evaluated the concept he was presented with and made a decision about whether, when, and how to apply the change in his own farm. This method of change could be viewed as a short chain of change extending from education to implementation (i.e. extension educator presents concept to farmer who decides and implements the change). This chain of change was successful throughout much of the twentieth century and in many cases it is still successful today. In recent decades, however, farmers have expanded operations and thus increased the number of people

employed. As farms grew larger, the farm owner was less likely to personally perform production operations, because other employees did that. The chain of change from education to implementation grew longer as employees were added to farms (i.e. extension educator presents concept to farmer, farmer decides whether and when to implement change, farmer trains and directs employees, employees implement change). In addition, the implementation end of the chain sometimes looks more like a web because multiple employees are involved in implementation. Obviously, this chain is much longer and more prone to breaks. The longer and more complex chain of change that we deal with today requires Extension to understand organizational change processes, not just individual education processes. This is a significant challenge and opportunity for Extension. It is a challenge because change management involves learning a new set of skills. It is an opportunity because there are few other entities in the agricultural sector that focus on organizational change. This session will introduce you to change processes and share how some Extension educators have dealt with rapidly changing industries.

**Key Words:** Change Management, Extension, Industry Changes