W310 Assessing the ability of the Cornell Net Carbohydrate and Protein System to predict fecal and urinary nitrogen excretion in lactating dairy cows. R. J. Higgs*, L. E. Chase, and M. E. Van Amburgh, *Cornell University, Ithaca, NY*.

Herd level manure nitrogen (N) excretion can be predicted using the Cornell Net Carbohydrate and Protein System (CNCPS). Partitioning of urinary and fecal N is important, especially for predicting air emissions. The objective of this study was to compare CNCPS predictions for fecal N (FN) and urinary N (UN) with published data. Studies (n=24) were selected that measured FN and UN by total collection, presented adequate dietary information, and accounted for >85% of the N intake (NI). Individual diets were dropped if the unaccounted N was > 0.5 SD from the mean. Diets in the resulting data set (n=68) accounted for 94%±3% (mean±SD) of the NI. Crude protein content, dry matter intake and milk production ranged from 12.6-21%DM, 14-27.2kg/cow/day and 18.1-46.1kg/cow/day, respectively. Data was analyzed using a mixed model in JMP where study was included as a random variable. Additional assessments of model accuracy and precision were completed for FN and UN (CCC, MSPE; Table 1). Observed and model predicted NI or Milk N (MN) were not different (P > 0.05). The CNCPS calculates UN by subtracting MN and FN from NI. Both, NI and MN are easily quantifiable making the prediction of FN crucial in establishing the correct partitioning of manure N. In this evaluation, FN was predicted with high precision (r^2=0.94, b=0.01), but lacked accuracy (CCC=0.75, a=0.22). The lack of model accuracy was exaggerated by studies accounting for less than 100% of the NI. However, high precision, but poor accuracy suggests a calibration problem where FN is being over predicted (10%).

Table 1. Precision and accuracy statistics for CNCPS predictions

	Linear regression						MSPE partitioning[b]		
	Intercept	Slope	r^2	MSE	CCC[a]	MSPE	a	b	c
Intake N	-0.91	1.00	1.00	0.72	-	-	-	-	-
Milk N	-0.46	1.00	1.00	1.55	-	-	-	-	-
Fecal N	26.81	0.79	0.94	186.69	0.73	1029.70	0.22	0.01	.077
Urinary N	56.28	0.64	0.95	215.47	0.75	2151.67	0.42	0.20	0.38

[a] CCC=Concordance correlation coefficient; [b] Mean square prediction error partitioned into a = mean bias, b = systematic bias, and c = random variation.

Key Words: CNCPS, nitrogen, modeling

Small Ruminant: Growth, Carcass Traits, Meat Quality, Nutrition

W311 Behavioral aspects and body weight loss in the pre-slaughter management of ewes in distinct physiological stages and meat quality. R. S. B. Pinheiro, A. M. Jorge*, H. B. A. Souza, and J. P. F. da Silveira, *São Paulo State University, Botucatu, SP, Brazil*.

The objective of this study was to know the behavior of Santa Inês ewes in different physiological stages during the pre-slaughter management, as well as their body weight loss, blood hematocrit values and meat quality. 21 cull ewes were used, with mean age of 6 yr, arranged into the following treatments: T1 = ewes which remained in lactation for 60 d with their respective lambs and slaughtered 1 d after weaning; T2 = ewes which remained in lactation for 60 d with their respective lambs and one more period of approximately 30 d without the lambs, aiming to recover lost body weight during nursing and, afterwards, slaughtered; and T3 = ewes which remained in confinement for 60 d and did not give birth during the year. The analysis of variance was carried out according to procedures of SAS, considering the significance level of 5%. The weight of ewes after transportation (journey of 296 km for 4 h 45 min) was lower for T1 in comparison with T2; T3 was not different from the other experimental treatments. Weight loss in kg and percentage of body weight of ewes during transportation was not influenced by the experimental treatments, with mean values of 2.28 kg and 5.15%, respectively. Weight loss of ewes during the period in which they remained in fast in the waiting pen for approximately 16 h before slaughter was proximate between experimental treatments, with mean values of 1.96 kg and 4.56% of body weight, respectively. Blood hematocrit values of ewes before and after transportation and after fast in the waiting pen were not different among themselves, with mean value of 58.5%. At the property and after transportation, hematocrit value was lower than at the moment of bloodletting of animals. Temperature and pH of the Longissimus lumborum muscle 24 h after slaughter were not influenced by the experimental treatments, with mean values of 6.89°C and 5.52, respectively. Meat luminosity of T1 was higher than T3 24 h after slaughter. Red and yellow values of the Longissimus lumborum muscle were not influenced by the treatments studied in this research.

Key Words: animal stress, meat pH, road transportation

W312 Effects of small ruminant species and origin in Ethiopia (Highland vs. Lowland areas) and lengths of rest and feeding on harvest measures. G. Abebe[1], G. Kannan[2], and A. L. Goetsch*[3], [1]*Ethiopia Sheep and Goat Productivity Program, Addis Ababa, Ethiopia*, [2]*Agricultural Experiment Station, Fort Valley State University, Fort Valley, GA*, [3]*American Institute for Goat Research, Langston University, Langston, OK*.

Yearling goats (G) and sheep (S) from Highland (H) and Lowland (L) areas of Ethiopia were used to determine effects of species and origin and lengths of rest and feeding on harvest measures, particularly carcass surface lightness. The H goat used was Arsi-Bale, and the L goat was Somali. The fat-tail indigenous H sheep is thought to be an Arsi-Bale genotype, and the fat-rump indigenous L sheep genotype was the Black Head Ogaden. There were two experiments (each a 2 x 2 x 3 factorial), one with rest for 0, 1, and 2 d before slaughter (R0, R2, and R3, respectively) and the second with feeding 0, 2, and 4 wk (0 wk = 2 d rest; 0F, 2F, and 4F, respectively). There were 10 animals per treatment. In the rest experiment, pH of the *longissimus* muscle 1 d post-slaughter (PS) was 5.91, 6.29, 5.82, and 5.98 (SEM = 0.039) for G-H, G-L, S-H, and S-L, respectively. The instrumental color measure L* (indicating lightness) for the hind leg surface 3 d PS was lower (P < 0.05) for H than for L (34.8, 36.3, 37.4, and 38.9 for G-H, G-L, S-H, and S-L, respectively; SEM = 0.45). Surface L* on d 3 was increased (P < 0.05) by 1 and 2 d of rest compared with 0 d for goats regardless of origin, but was not affected for sheep (33.2, 36.3, 37.2, 38.5, 37.8, and 38.2 for G-R0, G-R1, G-R2, S-R0, S-R1, and S-R2, respectively; SEM = 0.56). In the feeding experiment, *longissimus* muscle pH on d 1 PS was 5.93, 5.97, 5.85, and 5.74 for G-H, G-L, S-H, and S-L, respectively (SEM = 0.036). Surface L* on d 3 was lower (P < 0.05) for H vs. L (36.5, 39.0, 36.2, and 39.8 for G-H, G-L, S-H, and S-L, respectively; SEM = 0.46). Feeding 4 wk increased (P < 0.05) surface L* on d 3 regardless of species and origin (37.7, 36.8, and 39.2 for F0, F2, and F4, respectively; SEM = 0.40). In summary, goat and sheep carcasses from Highland areas of Ethiopia may darken more quickly compared with Lowland areas, and 1 or 2 d of rest before slaughter can increase lightness of the surface of goat carcasses.

Key Words: goat, sheep, carcass

W313 Growth performance and carcass characteristics of goat kids fed diets containing sericea lespedeza. S. Solaiman*, J. Thomas, N. Gurung, Y. Dupree, and C. Drake, *Tuskegee University, Tuskegee, AL*.

Twenty four Kiko cross intact buck kids (BW = 27.9 ± 2.2 kg) were stratified by BW and randomly assigned to four experimental groups (n = 6) and fed diets containing different levels of sericea lespedeza (SL). Animals were offered 30% of the diet bermudagrass hay (BGH), 30% SL/ alfalfa (ALF), and 40% concentrate in a 60: 40 forage: concentrate ration. Treatments were, A) 0% SL (control), B) 10% SL, C) 20% SL, and D) 30% SL where SL replaced ALF. Ground SL was mixed with the concentrate portion of the diet and offered to animals once a day. The mix and BGH were fed separately and intake was adjusted every 4th day to secure a 5 to 10% refusal. Feeds offered and refused were recorded daily and feed composite samples were collected every 3 wk for 12 wk performance period. Body weights were measured every 4 wk, and fecal eggs counted at wk 4 and wk 8 of the study. Blood was collected at wk 1 and wk 12 for complete analysis. After 12 wk goats were harvested and carcass measurements were recorded. There was no difference in initial BW of goats; however, ADG was higher (quadratic, P= 0.01) for goats consuming either 30% ALF or 30% SL diets. Average daily feed intake increased (linear, P = 0.03) as SL increased in the diets; however, G:F (quadratic, P = 0.002), scrotal circumference (quadratic, P = 0.07) and height (quadratic, P = 0.01) were reduced for goats consuming SL diets B and C. White blood cells decreased (linear, P = 0.05), lymphocytes % increased (linear, P = 0.05), serum alanine aminotransferase increased (linear, P = 0.0002) and serum amylase decreased (linear, P = 0.01) as the level of SL increased in the diets. Replacing SL for ALF did not affect carcass characteristics except adjusted fat that decreased (linear, P = 0.02) with increasing SL in the diets. There was no effect of added SL on fecal egg counts. Feeding SL alone (diet D) did not affect ADG and G:F; however, addition of SL in combination with ALF (diets B and C) adversely affected the growth performance and gain efficiency in growing goats.

Key Words: goats, growth performance, sericea lespedeza

W314 Effects of level of barley and corn in concentrate diet fed to Boer kids on growth, meat quality and muscle fatty acid composition. M.-E. Brassard*[1], R. Gervais[1], C. Gariépy[2], P. Y. Chouinard[1], and D. Cinq-Mars[1], [1]*Université Laval, Québec, QC, Canada*, [2]*Food Research and Development Centre, Saint-Hyacinthe, QC, Canada*.

The objective of this study was to investigate the effects of substituting barley grain with corn on growth performance, meat quality, and muscle fatty acid composition of goat kids. Twenty-four Boer males (26.5 ± 1.4 kg) were blocked by body weight and allotted randomly within block to one of three experimental diets. Treatments consisted in varying ratios of corn to barley of the concentrate: 0:100; 50:50; and 0:100. All diets were formulated with 70% concentrate (cereal, soybean meal, and vitamin and mineral premix) and 30% grass hay (DM basis). When all kids reached an average live weight of 43.0 ± 0.9 kg, fifteen kids (n = 5 kids/ treatment; randomly selected) were slaughtered and carcasses weighed. The *longissimus dorsi* was collected 96 h post-mortem from the left side of the carcass. Dietary treatments had no impact on dry matter intake, gain:feed ratio, number of days required to attain slaughter weight, carcass weight and carcass yield ($P \geq 0.22$). There were no differences in Warner-Bratzler shear force values, ultimate pH, ribeye area, cooking loss, moisture, crude protein and fat content ($P \geq 0.12$) among treatments. Saturated and unsaturated fatty acid contents of *longissimus dorsi* fat were unaffected by treatments ($P \geq 0.33$). Total *trans* fatty acids content in meat fat averaged 1.01 ± 0.07%, and were also not affected by the grain source in the diet. Levels of n-3 ($P < 0.01$), and n-6 fatty acids ($P < 0.01$) increased linearly, whereas n-6/n-3 ratio linearly decreased ($P < 0.01$) as corn inclusion in the diets increased. Results revealed that, in the conditions of this experiment, meat fat from kids presented low concentrations of total *trans* fatty acids compared to those generally observed in meat fat from other ruminants. Concentrations of n-3 and n-6 fatty acids in kid meat can be enhanced and n-6/n-3 ratio decreased by including corn to a concentrate-based diet without deteriorating animal performance or meat quality when compared with barley.

Key Words: goat kid, meat quality, fatty acids

W315 Comparative postweaning growth among four groups of percentage Dorper and Katahdin wethers. W. R. Getz*, W. Kimble II, J. Mack, and T. Harris, *Georgia Small Ruminant Research and Extension Center, Fort Valley State University, Fort Valley, GA*.

During the summer and fall of 2005-2007, 96 percentage Dorper, percentage Katahdin, Dorper x Katahdin composite, and crossbred Dorset, Hampshire or Suffolk-sired conventional wethers were evaluated for postweaning growth while on perennial warm-season pastures. Our purpose was to determine if breeding of the lambs was a significant factor in rate of growth in this hot, humid climatic environment. The lambs were weighed at 28-d intervals over an 84-d period. They were supplemented at the rate of 1% of their body weight as needed. Mean values for average weight gain each day were as follows: Dorper crosses (90.7 ± 7.7 g); Katahdin crosses (98.9 ± 9.4 g); composite (73.7 ± 6.4 g); conventional crossbred (105.7 ± 13.9 g). Analysis of variance indicated that breed was a significant ($P \leq 0.04$) source of variation in postweaning daily gain in this population. The composite group appeared to grow slower than other breed groups. This result was not expected and may reflect factors that will be investigated as more data become available. None of the breed groups grew particularly well in absolute terms. This may be a reflection of the climatic forces in southern Georgia.

Key Words: sheep, breeds, crossbreeding

W316 Body composition of growing meat and lactating dairy goats. A. T. Ngwa[1], L. J. Dawson[1,2], R. Puchala[1], G. D. Detweiler[1], R. C. Merkel*[1], Z. Wang[1], K. Tesfai[1], T. Sahlu[1], C. L. Ferrell[3], and A. L. Goetsch[1], [1]*American Institute for Goat Research, Langston University, Langston, OK*, [2]*College of Veterinary Medicine, Oklahoma State University, Stillwater*, [3]*USDA, ARS, US Meat Animal Research Center, Clay Center, NE*.

Growing 3/4 Boer x 1/4 Spanish (B) and Spanish (S) wethers were used to determine influences of diet and breed, and multiparous Alpine does were used to determine how stage of lactation and dietary forage level affect body composition. Growing goats were fed 50% concentrate pelleted diet (C) or one based on grass hay (H) free-choice. Six wethers of each breed were harvested at 0 wk and six of each diet-breed combination were harvested at 14 and 28 wk. Empty body concentration of protein was 18.3, 17.5, 18.3, and 19.7% (SE = 0.29) and of fat was 24.0, 23.4, 10.8, and 10.3% for B:C, S:C, B:H, and S:H, respectively (SE = 0.59). Energy in accreted tissue was 17.0, 18.7, 16.3, and 6.4 MJ/kg for C:wk 1-14, C:wk 15-28, H:wk 1-14, and H:wk 15-28, respectively (SE = 1.39). Initial measures with lactating goats were on six does a few days after kidding (0 mo). Eighteen does were fed a 40% forage diet (40F) and 18 received a diet with 60% forage (60F) for 2, 4, or 6 mo of lactation. Fat in the carcass (13.8, 13.1, 16.5, 11.2, 11.5, and 14.4%), noncarcass

tissues (18.6, 24.2, 33.3, 14.3, 16.5, and 24.5%), and empty body (16.5, 18.7, 25.2, 12.9, 14.1, and 19.5% for 40F-2 mo, 40F-4 mo, 40F-6 mo, 60F-2 mo, 60F-4 mo, and 60F-6 mo, respectively) were affected by stage of lactation and diet ($P < 0.06$). Based on daily change in tissue mass (-141, 56, and 90 g/d; SE = 21.4) and energy (-2.31, 1.11, and 2.90 MJ/d for 1-2, 3-4, and 5-6 mo, respectively; SE = 0.66), energy concentration in tissue mobilized or accreted was 16, 20, and 32 MJ/kg at 1-2, 3-4, and 5-6 mo, respectively. In conclusion, other than with a prolonged limited nutritional plane, an average energy concentration in accreted tissue of growing meat goats is 17.3 MJ/kg. The concentration of energy in tissue mobilized or accreted by dairy goats varies with stage of lactation.

Key Words: goat, body composition, diet

W317 Carcass traits of finishing lambs fed crude glycerin derived from biodiesel agro industry. J. F. Lage[1], P. V. R. Paulino*[1], L. G. R. Pereira[2], M. S. Duarte[1], J. P. I. S. Monnerat[1], E. Detmann[1], N. K. P. Souza[1], M. L. Chizzotti[1], and S. C. Valadares Filho[1], [1]*Universidade Federal de Viçosa*, *Viçosa, MG, Brazil*, [2]*EMBRAPA – Semi–Árido*, *Petrolina, PE, Brazil*.

This trial aimed to evaluate the effect of feeding crude glycerin, derived from biodiesel agro industry, on hot carcass weight (HCW), dressing percentage (DP), backfat thickness (BT), rib eye area (REA), compacity index (CI) and carcass length (CL) of Santa Inês lambs. Thirty intact male lambs (20 kg initial body weight) were randomly assigned to 5 treatments, consisting of increasing crude glycerin levels in the diet: 0, 3, 6, 9 and 12% of diet DM. Six lambs per treatment were used, being individually fed. The diets were isonitrogenous and formulated to meet the requirements for maintenance and gain of 0.3 kg/d. The animals were slaughtered as the BW reached 35 kg, and the carcasses were cooled during 24 h at 0°C. After cooling, measurements of BT, REA, CI and CL were taken. DP was calculated using HCW. REA and BT were measured at the carcass in the region between 12-13th rib and CI was calculated as the ratio of cold carcass weight/carcass length. Data were analyzed using the GLM procedure of SAS and the effects of treatments (linear and quadratic) were considered significant at $P < 0.05$. Glycerin level did not affect BT (mean value of 0.92 mm), REA (mean value of 11.81 cm^2) and CL (mean value of 59.9 cm). However, feeding glycerin decreased linearly HCW, DP and CI, fitting the following regression equations: HWC = 15.7867 – 0.22694 x % of crude glycerin in the diet (linear, $P = 0.0026$); DP = 45.6227 – 0.22061 x % of crude glycerin in the diet (linear, $P = 0.0033$) and CI = 0.2503 – 0.00296 x % of crude glycerin in the diet (linear, $P = 0.0019$). Adding glycerin to finishing lambs diets can have a negative impact on HCW, DP and CI, but not on BT, REA and CL.

Key Words: byproduct, glycerol, sheep

W318 Effects of calcium salts of fatty acids on finishing lamb feedlot performance and carcass characteristics. J. L. Seabrook*, R. K. Peel, and T. E. Engle, *Colorado State University*, *Fort Collins*.

The objective of this study was to investigate the effects of replacing dietary carbohydrate with calcium salts of fatty acids (CSFA) on finishing lamb (n = 60, BW 41.6 ± 1.4 kg) performance and carcass characteristics. Upon arrival, lambs were weighed on two consecutive days and randomly assigned to one of four treatments: 1) Control (CNTL) 0% TDN CSFA; 2) Diet 5 (D5) 5% TDN CFSA; Diet 10 (D10) 10% CSFA; Diet 15 (D15) 15% TDN CSFA. Lambs were housed 3 to a pen and pair-fed one of four dietary treatments (75% concentrate, 25% corn silage) for 59 d. Diets were formulated to be isoenergetic (TDN) and isonitrogenous (DIP and UIP) by adjusted inclusion of flaked corn and pellet. Intake was controlled to balance TDN across treatments; all treatments met NRC requirements. Lambs were weighed every two weeks and performance, ADG, DMI and gain to feed (G:F) ratio was measured. On d 61, lambs were transported and slaughtered at a commercial abattoir. Hot carcass weight was determined at the time of slaughter, and longissimus dorsi (LD) muscle area and BF carcass measurements were determined after 48 h at a 0°C chill. Treatment was a significant ($P < 0.05$) source of variation for overall average daily gain: Lambs receiving CNTL and D5 treatments had similar overall ADG. Lambs receiving D10 and D15 had lower ADG compared to those receiving CTRL or D5. Overall ADG was higher ($P < 0.05$) for lambs receiving D10 than D15. There was a significant ($P < 0.05$) treatment effect for overall GF efficiency. Lambs receiving CNTL and D5 treatments had greater ($P < 0.05$) G:F than lambs receiving D10 and D15. Furthermore, lambs receiving D10 had a greater ($P < 0.05$) G:F than lambs receiving D15. Lambs receiving CNTL, D5 and D10 treatments had heavier ($P < 0.05$) HCW and larger ($P < 0.05$) LD areas than lambs receiving D15. Backfat depth was similar for lambs receiving CNTL, D5 and D10. Control lambs had greater ($P < 0.05$) BF than treatment D15. Data indicate that dietary carbohydrates can be replaced with CSFA at a rate of up to 5% of TDN without significant effects to finishing lamb performance.

Key Words: calcium salt, bypass fat, lamb finishing

W319 Physical and chemical qualities of meat of confined lambs receiving different concentrate:forage ratios in diet. R. S. B. Pinheiro, A. M. Jorge*, E. N. de Andrade, C. de L. Francisco, A. Polizel Neto, and J. P. F. da Silveira, *São Paulo State University*, *Botucatu, SP, Brazil*.

The objective of this study was to evaluate meat quality of lambs in confinement which received diets with different concentrate contents. 18 non-castrated ½ Ile de France ½ Santa Inês lambs were used, with initial weight of approximately 15 kg, arranged into two allotments, represented by Treatment 1 (T1) animals that received forage:concentrate ratio of 35:65 in diet and Treatment 2 (T2) lambs that received forage:concentrate ratio of 65:35 until reaching 32 kg of body weight in confinement, a pre-established weight for animals at slaughter. The forage used in the diets was the corn silage and concentrate: ground corn, wheat bran, soybean bran, salt, dicalcium phosphate, limestone, urea and mineral supplement (Zn 1.6 ppm; Cu 6.3 ppm; Mn 1.5 ppm; Fe 1.1 ppm; Co 10 ppm; I 27 ppm; Na 62 ppm and Se 22 ppm). Lambs from treatments 1 and 2 presented similar values for pH, shear force, cooking losses and meat water retention capacity, with average values of 5.7, 1.03 kgf/cm2, 35.2% and 59.3%, respectively. Forage:concentrate ratio did not influence the centesimal quality of meat of lambs fed with more concentrate or more forage diets for humidity, crude protein, ether extract and mineral matter, with average values of 74.0%, 19.3%, 5.47%, 1.17% and 19.31%, respectively. This fact can be explained as the diets used in this experiment have similar proportions of protein (T1 = 15.99% and T2 = 15.97 CP) and energy (T1 = 2.57 and T2 = 2.63 Kcal/kg DM). We conclude that lambs terminated in confinement receiving different concentrate contents in diet resulted in similar meat quality; therefore, diet choice depends on the cost of the ingredients of diet at the moment of confinement.

Key Words: feeding, meat tenderness, sheep

W320 Effect of shed type and supplementation on fatty acid profile in lamb tissues. M. A. Brown*[1], Y. S. Peng[2], and J. P. Wu[2], [1]*USDA-ARS, Grazinglands Research Laboratory, El Reno, OK*, [2]*Gansu Agricultural University, Lanzhou, Gansu, PRC*.

Meat from Small Tail Han sheep is an important dietary component of people in western China. Five-mo-old Small Tail Han ewe lambs (n = 40) were used to study the effect of supplementation [control (C), C+ sunflower seed (160 g/d) and C+ protected fat (30g/d and 60g/d)] and shelter type (conventional vs. greenhouse shed) on fatty acid (FA) composition in different tissues (*longissimus lumborum* muscle, subcutaneous back fat and kidney fat) in a winter feeding trial. Temperatures ranged from -12 to 6°C in conventional sheds and -3 to 20°C in greenhouse sheds. Five lambs were assigned to each of 8 treatment combinations (shed type x supplement). Mixed model linear models included shed type, supplement, shed type x supplement, lamb in shed type and supplement (random), tissue (repeated), tissue x shed type, tissue x supplement, tissue x supplement x shed type, and a random subunit residual. Sunflower seed supplementation appeared to increase concentrations of conjugated linoleic acid (CLA, 18:2^{c9t11}) ($P < 0.05$) in three tissues independent of shelter type. Total polyunsaturated FA in muscle and kidney fat were greater than those in back fat ($P < 0.05$ and $P < 0.10$), and muscle was greater than kidney fat and back fat in ratio of polyunsaturated to saturated (P:S) FA ($P < 0.01$). Averaged over tissue and shelter, sunflower supplemented lambs were greater than lambs fed other supplements for P:S ($P < 0.01$). However, the sunflower seed appeared to increase the ratio of omega-6 to omega-3 FA ($P < 0.05$) in all tissues, and to a greater extent in muscle ($P = 0.10$). In this study, protected fat supplementation did not substantially change the FA profile of lamb tissues. Generally, FA composition of lamb tissues was not affected by shelter treatment but there was some indication that tissue differences in oleic acid, CLA (18:2^{t10c12}), and short-chained FA depended on shed type ($P < 0.10$). Results imply that supplementation with sunflower seed may change FA profile of different lipids in lambs and their nutritional value, but shed type may have only a minor influence on FA composition of lipids in muscle fat, kidney fat, and back fat.

Key Words: lamb, fatty acid, sunflower seed

W321 Fatty acid profile from the longissimus muscle of grazing Merino lambs with or without winter supplementation in Northern Patagonia. L. Villar*[1], E. Pavan[2], C. Giraudo[1], and F. Santini[3], [1]*INTA-EEA Bariloche, Bariloche, Rio Negro, Argentina*, [2]*INTA-EEA Balcarce, Balcarce, Buenos Aires, Argentina*, [3]*INTA-CIA Castelar, Hurlingham, Buenos Aires, Argentina*.

The objective of this experiment was to study the effects of winter supplementation on longissimus muscle (LM) fatty acid (FA) profile of heavy Merino lambs raised at the Hills and Plateaus of Northern Patagonia. Forty six male lambs (8 mo) were randomly divided in two groups: one group was not supplemented during the study (CTRL), whereas the other one (SPPL) received 200 g alfalfa pellet and 150 g oat grain daily from June 15th to September 9th (95 d). Each group had free access to a 70 ha plot of shrub grass steppes (70° 03′ W and 41° 05′ S); groups switched plots every 15 d. When treatment mean LW reached 35 kg, 12 lambs from the group were randomly selected and slaughtered, and a sample from the LM was taken for FA evaluation. Samples were stored at -20 °C until FA profile was determined by GLC. Data were analyzed by ANOVA using GLM procedure of SAS. Winter supplementation did not affect ($P > 0.05$) total FA concentration in the LM (1.74 ± 0.12%) or the proportion of the highly atherogenic FA C14:0 (3.10 ± 0.26%) and C16:0 (26.6 ± 0.57%). Docosahexaenoic acid (C22:6 n-3) proportion was similar ($P > 0.05$) in both groups (0.34 ± 0.02%). Conjugated linoleic acid (CLA) cis-9, trans-11 proportion was decreased ($P = 0.03$; SEM = 0.02) from 0.35% of total FA in CTRL to 0.28% in SPPL, and C18:1 trans-11 proportion was decreased ($P = 0.02$; SEM = 0.11) from 2.57% in CRTL to 2.12% in SPPL. Taking CRTL values as a reference, SPPL reduced total n-3 PUFA proportion ($P = 0.05$; SEM = 0.42) from 6.62% to 5.30%, C18:3 n-3 ($P = 0.05$; SEM = 0.25) from 3.78% to 2.99%, and C22:5 n-3 ($P = 0.03$; SEM = 0.07) from 1.24% to 0.98%. The ratio n-6: n-3 was increased ($P < 0.001$; SEM = 0.07) by SPPL from 2.20 in CTRL to 3.06 in SPPL. These results suggest that a small level of supplementation can affect LM FA composition without changing total FA content.

Key Words: CLA, fatty acids, longissimus muscle

W322 Influence of feed deprivation time on physiological responses and microbial loads in meat goats. M. Vanguru, J. H. Lee, G. Kannan*, T. H. Terrill, and B. Kouakou, *Fort Valley State University, Fort Valley, GA*.

Previous findings have indicated that diet and feed deprivation time prior to slaughter influence fecal shedding of bacteria in goats. This experiment was conducted to determine the effects of preslaughter feed deprivation time on skin and carcass microbial loads and physiological responses in goats. Thirty-two Spanish × Kiko goats (BW = 18.8 ± 0.82 kg) were randomly assigned to one of 4 feed deprivation times (FDT; 0, 9, 18, or 27 h) before slaughter. Blood samples were collected to analyze for metabolites prior to slaughter. Immediately after slaughter and evisceration, the pH values of rumen liquor and cecal digesta were determined. Rumen and rectal contents were collected and transported to the laboratory for culture and determination of microbial loads. Initial pH of Longissimus muscle (LM) was determined at 15 min postmortem on each carcass. Swab samples were collected from skin and carcass of each animal to assess the bacterial loads. FDT did not influence glucose, plasma urea nitrogen, and non-esterified fatty acid concentrations, and creatine kinase activities. The 27-h FDT group had higher ($P < 0.05$) rumen pH than 0 or 9 h FDT groups. However, the microbial counts of rumen and fecal contents were not influenced by FDT. FDT had no effect on the initial pH (6.87) of LM. Both skin and carcass microbial counts were not affected by FDT. The E. coli, total coliform, and aerobic plate counts on skin were 1.13, 1.49, and 3.78 $\log_{10}$CFU/cm^2, respectively, and those on carcasses were 1.51, 1.65, and 3.11 $\log_{10}$CFU/cm^2, respectively. The results indicate that pre-slaughter FDT alone up to 27 h may not significantly affect blood metabolites and skin and carcass microbial loads in goats.

Key Words: goats, feed deprivation, carcass contamination

W323 Chemical composition, in vitro degradability, and consumption of *Calliandra calothyrsus* and tropical grass hay mixtures by goats and sheep. A. A. Rodriguez*, G. Castro, V. Rivera, E. Valencia, and P. Randel, *University of Puerto Rico*.

The chemical composition, in vitro degradability, and intake of *Calliandra calothyrsus* (CC) mixed tropical grass hay (TGH) was determined. Leaves of CC were manually harvested, sundried, and mixed with TGH at five different proportions: 100:0, 75:25, 50:50, 25:75 and 0:100 w/w. Triplicate samples from each combination were analyzed to determined CP, NDF, ADF, lignin, P and Ca content. In vitro degradability as % of DM (IVDMD) and NDF degradability as % of total cell-wall content

(NDFD) were determined after 48 h of incubation. To determine forage consumption two identical 2 by 2 Latin square experiments were conducted using four castrated mature native goats (BW 43.18 kg) and four crossbred lambs (BW 30.10 kg) as experimental units. In each experiment animals were assigned to two diets; 100% TGH and TGH mixed with CC in 50:50 proportion. Both experiments consisted of a 7 days diet adjustment period and 5 d of data collection. Crude protein, lignin, P, and Ca content increased ($P < 0.05$) as percentage of CC increased in the mixtures. DMD and NDFD also increased as proportion of CC was increased, but cell wall components (NDF and ADF content) decreased. Forage consumption was lower ($P < 0.05$) in animals fed with TGH:CC mixture than with TGH alone (757 vs 594 g/d and 1293 vs 1028 g/d for sheep and goats, respectively). Consumption of CC by goats and sheep constituted 37% and 28% of the total legume offered and 26% and 20% of total forage intake, respectively. In summary, chemical composition, IVDMD, and NDFD was improved as percentage of CC increased in TGH:CC mixtures, however, inclusion of CC at 50% of the total forage offered in tropical grass hay based diets decreased forage dry matter intake in goats and sheep.

Key Words: Calliandra Calothyrsus, chemical composition, intake

W324 The use of glycerin in lamb and ewe diets. M. Terré*[1], P. Casado[2], M. Salas[1], and A. Bach[1,3], [1]*IRTA-Unitat de Remugants, Barcelona, Spain*, [2]*General de Piensos de Soria S.A., Soria, Spain*, [3]*ICREA, Barcelona, Spain*.

Thirty-nine Ripollesa weaned lambs (40 ± 3.9 d old and 15 ± 1.3 kg of BW) were arranged in 3 groups to study three different diets that included 0%, 5% or 10% glycerin in the concentrate. Lambs were fed the treatment concentrate (18.2% CP, 4.36 Mcal of GE/kg DM) and straw ad libitum until the slaughter weight (24 ± 1.1 kg). Animals were grouped in groups of 5 or 4 lambs, weighed weekly, and concentrate and straw intake and water consumption measured weekly. Blood samples to determine glucose and insulin concentrations were obtained at 2 and 4 wk of the study, and carcass weight was recorded at the slaughterhouse. In a second experiment, 35 Ripollesa ewes were arranged in 3 groups to study three different diets that included 0%, 3% or 5% glycerin in the concentrate diet. Ewes were grouped in 6 groups of 6 or 5 ewes and were fed 1.32 kg DM of a concentrate (14.2% CP, 4.32 Mcal of GE/kg DM) and straw ad libitum. Straw intake was measured daily, and water consumption weekly. Body condition score was recorded before and after parturition, and 1 wk before weaning their lambs. Blood samples were obtained every 2 wk to determine glucose, insulin, NEFA and β-hydroxybutyrate. Rumen samples were obtained 2 wk after all ewes lambed to determine rumen pH. None of the parameters measured in lambs and ewes were affected by the glycerin content of the concentrate. Assuming an energy content of glycerin of 3.47 Mcal of ME/kg, it can be included as an ingredient in lamb and ewe diets without impairing the growth of lambs, without reducing concentrate or straw intake, and without affecting blood metabolites.

Key Words: lambs, ewes, glycerin

W325 Methane emission by goats consuming condensed tannin-containing forage at different frequencies. R. Puchala*[1], G. Animut[1], A. L. Goetsch[1], T. Sahlu[1], V. H. Varel[2], and J. Wells[2], [1]*American Institute for Goat Research, Langston University, Langston, OK*, [2]*USDA, ARS, US Meat Animal Research Center, Clay Center, NE*.

Twenty-four yearling Boer x Spanish wethers (33.5 ± 0.36 kg BW) were used in a 32-d experiment to assess effects of frequency of feeding condensed tannin (CT)-containing fresh sericea lespedeza (SL; *Lespedeza cuneata*) on ruminal methane (CH_4) emission. Fresh SL (15.3% CT) was fed free-choice every day (1SL), other day (2SL), fourth day (4SL), and eighth day (8SL), with ad libitum consumption of fresh alfalfa (0.2% CT) on other days. Measures occurred on the last 8 d of the experiment. Ruminal fluid for microbial assays was collected 1 d after SL feeding and at the end of the longest interval (short and long interval samples, respectively). Data were analyzed using mixed model procedures of SAS (Version 8.2, 2001, SAS Inst. Inc., Cary, NC, USA). Average daily DMI (0.94, 0.96, 1.01, and 0.95 kg, respectively; SEM = 0.057) was similar among treatments, and average daily heat production was less ($P < 0.05$) for 1SL and 2SL vs. 4 SL and 8SL (444, 452, 531, and 530 kJ/kg $BW^{0.75}$). Average daily CH_4 emission differed among all treatments ($P < 0.05$; 9.7, 11.6, 15.5, and 18.3 g/d, respectively), but emission on days when SL was fed did not differ (9.7, 10.2, 10.7, and 10.7 g/d for 1SL, 2SL, 4SL, and 8SL, respectively; SEM = 0.64). The number of protozoa in the short interval sample was similar among treatments (5.2, 5.3, 5.7, and 6.5 x 10^5/mL; SEM = 0.98), whereas the number in the long interval sample differed among treatments ($P < 0.05$; 6.5, 10.4, 18.4, and 20.5 x 10^5/mL for 1SL, 2SL, 4SL, and 8SL, respectively; SEM = 1.84). In vitro CH_4 emission (3-wk incubation for methanogens) was similar among treatments for the short interval sample (18.2, 18.2, 19.7, and 20.0 mL; SE = 1.45) but less ($P < 0.05$) for 1SL and 2SL vs. 4SL and 8SL in the long interval sample (20.5, 20.3, 26.3, and 29.5 mL, respectively). In conclusion, greatest effects of CT of SL occurred with daily feeding, although there were carryover effects with 2SL. The influence of SL CT on CH_4 emission was immediate with no or minimal time for adaptation, and the effect appeared attributable to activity of methanogenic bacteria and protozoa.

Key Words: goat, condensed tannin, methane

W326 The effects of feeding fresh citrus pulp to Merino wethers on wool growth and animal performance. Y. T. E. Fung, J. L. Sparkes, I. van Ekris, A. V. Chaves*, and R. D. Bush, *Faculty of Veterinary Science, The University of Sydney, Sydney, NSW, Australia*.

Two studies were conducted to determine the effects of replacing lupins with fresh citrus pulp in Merino wethers diets: (i) an *in vitro* study which measured ruminal fermentation; and (ii) an *in vivo* study in which 18 mature Merino wethers were fed dietary treatments ($n = 3$) over 56 d to evaluate effects on performance (i.e. DMI, ADG and wool growth). In both the *in vitro* and *in vivo* studies, the control treatment consisted (in diet DM) of alfalfa hay (69.9%), lupins (30.1%) and phosphate (0.3%), while the citrus pulp treatments ($n = 2$; replacing lupins on 20% and 30% DM basis, respectively) consisted of alfalfa hay (61.7 and 63.3%), lupins (18.5 and 6.3%), phosphate (0.34 and 0.33%) and fresh citrus pulp (19.5 and 30.1%). Data were analyzed using the MIXED model of SAS and orthogonal polynomial contrasts were used to determine linear (L) and quadratic (Q) responses to level of citrus pulp. In the *in vitro* study, gas production, net total VFA production as well as *in vitro* dry matter digestibility (IVDMD) were not significantly different among the dietary treatments ($P > 0.05$). Ammonia production in citrus pulp treatments were 2-fold lower compared to the control (L, $P < 0.01$). The addition of citrus pulp to the diet increased the molar proportions of acetic acid and decreased that of butyric, branched-chain VFA (BCVFA), and valeric acids (all L, $P < 0.01$) compared to the control diet. In the *in vivo*

study, DMI, ADG and feed conversion were similar among treatments (P > 0.52). Wool production parameters including clean fleece weight, yield, staple length and strength were not different between diets (P > 0.30). Hence, fresh citrus pulp can be included up to 30% on a DM basis replacing lupins without detrimental effects on wool production and animal performance.

Key Words: in vitro, sheep, wool

W327 Voluntary intake of silage from corn hybrids harvested at two physiological stages. J. P. F. Silveira[1], R. Belintani*[2], V. L. Tierzo[1], D. H. Vieira[3], T. F. Silveira[5], P. R. L. Meirelles[1], L. F. D. Medeiros[4], and C. Costa[1], [1]*São Paulo State University*, *Botucatu, SP, Brazil*, [2]*University of Agrarian Sciences - University of Marília*, *Marília, SP, Brazil*, [3]*Center of Creation of Animals of Laboratory*, *Rio de Janeiro, RJ, Brazil*, [4]*Rural Federal university of Rio de Janeiro*, *Seropedica, RJ, Brazil*, [5]*Agricultural Municipal school Adolfo Alves Rezende*, *Campina Verde, MG, Brazil*.

The increase in dry matter content due to postponing the harvesting date, as well as the corn hybrid chosen, may influence the voluntary intake by ruminants. Therefore, the objective of this experiment was to evaluate the effects of corn hybrid, harvesting stage and their possible interaction on the voluntary intake by sheep. Twenty four ewe lambs (average age, 3 mo; average initial weight of 25 kg) were used. The experiment followed a 2 x 2 factorial (two hybrids, dent and flint; and two harvesting stages, mealy and black layer), with three replicates, organized in a completely randomized design. The mean voluntary intake of dry matter varied from 620 to 750 g/ewe/d. The intake of silage from the flint hybrid was higher than the intake of silage from the dent hybrid (P < 0.05). Increasing the grain physiological maturity reduced the intake of silage from the dent hybrid, but showed no effect on the intake of silage from the flint hybrid. A hybrid x stage interaction was observed, and the highest intake was observed for the flint hybrid at the black layer stage. In conclusion, harvesting for silage should be done at the mealy and black layer stages for the dent and flint hybrids, respectively, as these combinations produced higher intakes.

Key Words: corn hybrids, dry matter intake, forage conservation

W328 Effect of corn hybrid and ensiling process on voluntary intake of lambs. J. P. F. Silveira[1], R. Belintani*[2], V. L. Tierzo[1], P. R. L. Meirelles[1], D. H. Vieira[3], P. Persichetti Junior[1], C. Costa[1], L. F. D. Medeiros[4], and T. F. Silveira[5], [1]*São Paulo State University*, *Botucatu, SP, Brazil*, [2]*University of Agrarian Sciences - University of Marília*, *Marília, SP, Brazil*, [3]*Center of Creation of Animals of Laboratory*, *Rio de Janeiro, RJ, Brazil*, [4]*Rural Federal university of Rio de Janeiro*, *Seropedica, RJ, Brazil*, [5]*Agricultural Municipal school Adolfo Alves Rezende*, *Campina Verde, MG, Brazil*.

The processing of the corn mass ensilage, as well as the hybrid chosen can interfere on voluntary intake of the ruminant animals. Therefore, this study aimed to evaluate the effects of the hybrid, processing and the possible interaction on the voluntary intake for lambs. Twenty-four Santa Inês lambs having an average age of three mo and an average initial weight of 25 kg were used. The experimental design was completely randomized, in a 2 x 2 factorial scheme (two hybrid, dent and flint; and two processing, smashed and no smashed) with three replicates. The average daily intake varied from 1.17 to 1.31 g/hd/d. The silage intake of the flint hybrid was larger than the dent hybrid. The processing reduced the voluntary intake of the hybrid dent silage, but not the intake of the hybrid flint silage. There was an interaction, hybrid x processing, in that intake was less for the processed dent corn hybrid. The flint corn hybrid was associated with increased intake and processing did not impact intake.

Key Words: harvesting date, dent, sheep

W329 Chemical composition, in vitro degradability, intake and digestibility of pigeon-pea (Cajanus cajan var. guerrero) and guinea-grass hay by goats. A. A. Rodríguez*, D. Carmona, L. Gonz´lez, E. Valencia, and P. Randel, *Univertsity of Puerto Rico*, *Mayaguez, PR*.

The chemical composition, in vitro degradability, intake and digestibility of pigeon-pea (Cajanus cajan var. Guerrero; PP) mixed guinea-grass (GG) harvested at 45 d of growth was determined. Pigeon-pea was harvested at 105 d of growth and mixed with GG (at five different proportions: 100:0, 75:25, 50:50, 25:75 and 0:100 w/w. Triplicate samples from each combination were analyzed to determine CP, NDF, ADF, and lignin. In vitro dry matter (IVDMD) and crude protein degradability (CPD) as % of DM, and NDF degradability as % of total cell-wall content (NDFD) were determined after 48 h of incubation. To determine forage consumption and digestibility a 2 by 2 Latin square experiment was conducted using castrated mature native goats (43.18 kg BW) as experimental units. Animals were assigned to two diets: 100% GG and GG mixed with PP in a 60:40 proportion. The experiment consisted of a 7-d diet-adjustment period and 5 d of data collection. Crude protein increased (P < 0.05) as percentage of PP increased in the mixtures, however NDF, ADF decreased (P < 0.05). Lignin was similar for all PP-GG mixtures. CPD also increased (P < 0.05) as proportion of PP was increased. IVDMD was similar in mixtures containing 100:0, 25:75 and 0:100 PP:GG, but higher than those mixed in a 50:50 and 75:25 PP:GG proportion. NDFD was higher (P < 0.05) in the 0:100 and 25:75 PP:GG mixtures than in the 100:0, 75:25 and 50:50 proportions. Forage intake and digestibility was lower (P < 0.05) in animals fed with PP:GG mixture than with TGH alone (1213 vs 968 g/d and 64.64 vs 58.81%, respectively). Consumption of PP by goats constituted 27% of total legume offered and 16% of total forage intake. In summary, chemical composition and CPD was improved as percentage of PP increased in PP:GG mixtures, however, inclusion of PP in proportions higher than 25% decreased IVDMD and NDFD. Diets containing 40% PP also decrease forage intake and digestibility in goats.

Key Words: pigeon-pea, nutritive value

W330 Effects of feeding peanut skins on growth performance and carcass traits of Kiko × Spanish growing male goat kids. A. Stone*[1], N. Gurung[1], S. Solaiman[1], D. Rankins, Jr.[3], G. Abdrahim[2], and W. McElhenney[1], [1]*Tuskegee University*, *Tuskegee, AL*, [2]*Alabama A & M University*, *Normal*, [3]*Auburn University*, *Auburn, AL*.

Peanut skins (PS), a year-round by-product of the peanut blanching industry, are readily available in southeast Alabama and southwest Georgia. It is typically used as animal feeds; however its feeding value has not been fully evaluated for goats. Objectives of this study were to evaluate effects of various dietary levels of PS on DM intake, growth performance and carcass quality of meat goats. Twenty four Kiko cross-bred intact male goats (18.2 ± 1.41 kg initial BW and 3 to 4 months of age) were randomly assigned to one of the four experimental diets (6 goats/diet) containing 47.3% bermudagrass hay plus 52.7% concentrate mix

with 0, 10, 20, and 30.0% of peanut skins, on as-is basis. Feed offered and refusals were collected daily. Body weights were recorded every 4-wk. After 92-d, goats were slaughtered and carcass characteristics were measured. The feed intake, growth, feed efficiency, and carcass quality data were analyzed as a completely randomized design. Initial BW (P = 0.87), final BW (P = 0.20), and average daily gain (P = 0.29) were not different between treatments. The DM intake (P = 0.65) and gain: feed ratio (P = 0.28) were similar among diets. Dressing percent, longissimus muscle area and chilled carcass weight (P < 0.05) decreased linearly with increasing level of PS. No differences were observed (P > 0.05) in hot carcass weight, body wall fat, and kidney and pelvic fat between treatments. The results indicate that PS is a viable feedstuff for meat goats and up to 30% of PS, on as-is basis, can be included in the diet for growing goats without any compromise in DM intake, growth performance and carcass quality.

Key Words: goats, peanut skins, performance

W331 Effects of soybean small peptide on absorption of free amino acids and small peptide in lactating goats. L. Wang, Z.-J. Cao*, H. Liu, and S.-L. Li, *College of Animal Science and Technology, China Agricultural University*, *Beijing, China*.

The objective of the experiment was to study the effects of intraduodenally infused soybean small peptide (SSP) on absorption of free amino acids and small peptide in lactating goat. Four late lactating dairy goats (38.24 ± 2.73 kg BW, milk production 0.5 - 1.0 kg/d) were used in a 4×4 Latin square design. Goats were fitted with duodenal cannulas and implanted with indwelling catheters in carotid artery, proximal and distal mesenteric vein and portal vein. Each goat received four treatments, respectively: infused normal saline, 60 g/d, 120 g/d and 180 g/d SSP into duodenum. Each period of the experiment lasted 17 d, including a 10-d adaptation period and a 7-d infusing period. Throughout the experimental periods, the diets were delivered in 12 equal meals at 2 h intervals by automatic feeders and water was available ad libitum. Normal saline and SSP were dissolved in 700 mL of normal saline continually infused into the duodenum within 24 h during the 7-d infusing period. The mesenteric and portal plasma flows were measured by dye dilution with para-aminohippurric acid. Plasma was deproteinized and the difference in amino acid concentration of supernatant before and after hydrolysis was attributed to peptides. The results showed that the mesenteric-drained visceral net fluxes of total peptide amino acids (TPAA) and total free amino acids (TFAA) increased (P < 0.05 or P < 0.01) when the infused levels of SSP increased. The portal-drained visceral (PDV) net fluxes of TPAA of infused treatments with 60 g/d, 120 g/d and 180 g/d SSP were higher than that of infused normal saline (P < 0.05), but there were no differences among the infused SSP treatments (P > 0.05). The PDV net fluxes of TFAA increased (P < 0.05 or P < 0.01). These results suggest that increasing the PAA amount in duodenum may promote the absorption of PAA and FAA in small intestine.

Key Words: small peptide, free amino acids, absorption

W332 Protein requirements of Boer crossbred kids. I. A. M. A. Teixeira*[1], K. T. Resende[1], J. M. Pereira Filho[2], R. C. Canesin[1], and T. T. Berchielli[1], [1]*Universidade Estadual Paulista/Unesp*, *Jaboticabal, SP, Brazil*, [2]*2Universidade Federal de Campina Grande/UFCG*, *Patos, PB, Brazil*.

Two experiments were conducted to determine protein requirement for maintenance and growth of 64 ½ Boer ½ Saanen crossbred, intact male kids (5 and 15 kg of initial BW for experiment 1 and 2, respectively). In the first experiment, the baseline group was 6 randomly selected kids, averaging 5.6 ± 0.8 kg of BW. An intermediate group consisted of 6 randomly selected kids, fed for ad libitum intake, that were slaughtered when they reached an average BW of 10.0 ± 0.4 kg. The remaining kids (n = 18) were randomly allocated to one of 3 levels of DMI (ad libitum and restricted to 70% or 40% of the ad libitum intake) within 6 slaughter groups. Kids were slaughtered when the ad libitum treatment kid reached 15 kg of BW. In the second experiment, the baseline group was composed of 7 kids, averaging 15.3 ± 0.3 kg of BW. An intermediate group consisted of 6 kids, fed for ad libitum intake, that were slaughtered when they reached an average BW of 20.4 ± 0.7 kg. The remaining kids (n = 21) were randomly allocated to one of 3 levels of DMI, similar to the first experiment, within 7 slaughter groups. Kids were slaughtered when the ad libitum treatment kid reached 25 kg of BW. Individual empty bodies were weighed, ground, mixed, and samples were collected for chemical analyses. The equations to estimate protein body composition and requirements for maintenance and growth were different for each experiment. The metabolic and endogenous nitrogen losses were 395 and 410 mg/ $kg^{0.75}$ of empty BW (EBW)/d for kids in the first and second experiment, respectively. For young animals (experiment 1), the calculated NP for growth ranged from 165 to 168 mg/$kg^{0.75}$ of EBW. On the other hand, older kids presented lower net protein requirements, which ranged from 144 to 135 mg /$kg^{0.75}$ of EBW. These results suggest that meat goat protein requirement is different from the established recommendations. *Sponsored by FAPESP, 04/06626–0.*

Key Words: body composition, goat, maintenance requirements

W333 Nitrogen balance of Saanen goats in early lactation fed diets with different protein: energy ratio. L. Rapetti*, S. Colombini, G. M. Crovetto, and G. Galassi, *Department of Animal Science, University of Milan*, *Milan, Italy*.

Aim of the experiment was to evaluate the protein:energy ratio (MP/NEl) of the diet in early lactating goats on N balance. 8 Saanen goats were used in two consecutive N balance trials at 8-14 (P1) and 28-34 (P2) DIM. The dietary treatments were as follows: 56 (LOW) or 65 (HIGH) g MP/Mcal NEl, estimated with INRA model (2007). The CP contents of the diets were 15.1 (LOW) and 17.3% (HIGH) on DM. Both diets had 1.69 Mcal of NEl on DM. The forages fed (DM basis) were corn silage (28%) and dehydrated alfalfa hay (22%); in diet HIGH, soybean meal and corn gluten meal partially substituted corn grain. 4 d after kidding, goats were confined to metabolic cages. During each 6 d of trial, individual DMI, milk production and total collection of excreta were recorded. All data were statistically analyzed by GLM procedure (SAS, 2008) considering the diet and period effect and their interaction. DMI was influenced only by period, not by dietary treatment (2.06 and 2.97 kg/d, in P1 and P2 respectively; *P*<0.001); milk yield had the same trend increasing from 3.91 to 5.49 kg/d (*P*<0.001). Milk fat, crude protein and casein contents (%) were affected (*P*<0.01) only by period (4.77 *vs* 3.55, 3.67 *vs* 3.47, 2.63 *vs* 2.46, for fat, CP and casein, in P1 and P2, respectively). Milk urea nitrogen (MUN) was directly related to MP/Mcal NEl ratio: on average 6.9 and 15.3 mg/dL with LOW and HIGH diets (*P*<0.001). The higher SBM inclusion in diet HIGH determined a higher CP digestibility (73.3 *vs* 67.8%, *P*<0.001); however, urinary nitrogen excretion resulted higher for this diet (19.7 *vs* 12.9% of N intake, *P*<0.01). N utilization for milk production (milk N, % of N intake) was higher in diet LOW (42.8 *vs* 36.7, *P*<0.01) and lower in the second period (41.4 *vs* 38.2, *P*<0.05) because of the higher DMI. These results suggest that a MP/NEl ratio of about 60 (with approximately 16% CP

on DM), should be adequate to meet the requirements of high yielding dairy goats during early lactation.

Key Words: goats, N balance, protein:energy ratio

W334 Nitrogen balance and ruminal and blood metabolites of Sannen dairy goats infused abomasally with different levels and combination of starch and pectin. M. Sari, A. A. Naserian*, R. Valizadeh, and S. Salari, *Ferdowsi University of Mashhad, Mashhad, Khorasan Razavi, Iran*.

The objective of this study was to examine the effect of abomasal infusion of starch, pectin or combination of both on production and urinary nitrogen excretion of lactating Sannen dairy goats. Four abomasally cannulated goats (average BW 44 ± 2.3 kg, DIM 114 ± 2.1 and milk production 1.65 ± 0.41 kg) were used in a 4×4 Latin square design. Goats were housed in metabolic cages with free access to water and were fed a basal diet consisting of 40% alfalfa hay and 60% concentrates. Each goat was offered the basal diet at 95% of its estimated ad libitum intake throughout the experiment. Treatments were abomasal infusion of different, isoenergetic ratio of starch to pectin: T1 (0.84 g/d), T2 (26.56 g/d), T3 (52.28 g/d), and T4 (77.0 g/d). Purified maize starch and high-methoxyl slow-set citrus pectin were continuously infused from d 9 to 21 of each period. Total collections of urine and feces were conducted for last 4 d of each period and blood and rumen fluid samples were taken 3 h after feeding on d 1 and 3 during each collection period. Milk yield was recorded daily and samples were collected at each milking over the last 2 d of each period. Data were analyzed using the GLM procedure of SAS (2001). Infusions had no significant effect on basal ration intake (P > 0.05). Replacement of abomasal pectin infusion with starch linearly increased urinary N (16.3, 17.9, 18.7, and 19.4 g/d, for T1, T2, T3, and T4 respectively), plasma urea N (14.9, 15.5, 16.3 and 16.5 mg/dL, respectively) and tended to increase milk urea N (P = 0.09). Decreasing amount of infused pectin resulted in linearly decreased fecal N (14.2, 12.7, 12.4, 11.4 g/d, respectively) but did not affect milk and retained N, ruminal NH3-N and pH, plasma concentrations of glucose, triglyceride and cholesterol. Results indicated that increasing carbohydrate fermentation in large intestine by pectin infusion may shift some N from urine to feces and reduce manure ammonia volatilization.

Key Words: fecal and urine N, pectin, starch

W335 Efficiency of energy utilization by lactating Alpine goats. I. Tovar-Luna*[1,2], A. L. Goetsch[1], R. Puchala[1], T. Sahlu[1], and H. C. Freetly[3], [1]*American Institute for Goat Research, Langston University, Langston, OK*, [2]*Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Aridas, Bermejillo, Dgo., México*, [3]*USDA, ARS, US Meat Animal Research Center, Clay Center, NE*.

Thirty-six lactating Alpine does (50.5 ± 1.2 kg BW) were used to determine the effect of stage of lactation on energy utilization. Twelve does were assigned for measurement periods in early, mid-, and late lactation (28-35, 91-98, and 189-196 d of lactation). For six does of each group, after measures with ad libitum consumption of a 60% concentrate diet, feed intake was restricted to the ME requirement for maintenance (ME_m) for 8 d followed by a 4-d fasting period. For the other six does, fasting immediately followed ad libitum consumption. Heat production or energy expenditure (EE) was measured using a head-box calorimetry system the last 2 d with ad libitum intake, near maintenance intake, and fasting. Ad libitum intake of ME was affected (P < 0.05) by stage of lactation (22.2, 24.0, and 18.4 MJ/d), and was similar when fed near ME_m (9.8, 10.4, and 10.8 MJ/d) in early, mid-, and late lactation, respectively. Recovered energy in milk did not differ in early and mid-lactation and was lower (P < 0.05) in late lactation (8.77, 7.84, and 5.40 MJ/d respectively; SE = 0.418). Efficiency of ME utilization for maintenance (k_m) based on ME intake and EE by does fed near maintenance and when fasting was similar (P > 0.05) among stages of lactation (0.780, 0.813, and 0.803 in early, mid-, and late, respectively; SE = 0.0459). However, ME_m (based on fasting after ad libitum intake divided by k_m) was similar (P > 0.05) in early and mid-lactation and lowest (P > 0.05) in late lactation (494, 472, and 412 kJ/kg $BW^{0.75}$; SE = 23.7, respectively). Efficiency of use of dietary ME for lactation (k_{l-d}) was not influenced (P > 0.05) by stage of lactation (0.615, 0.574, and 0.569 in early, mid-, and late lactation, respectively; SE = 0.0191). Although k_m and k_{l-d} by lactating goats were similar among stages of lactation, the ME_m requirement appears lower in late lactation than at early times.

Key Words: goat, energy expenditure, lactation

W336 Blood mineral concentration of goats in semiarid rangelands of central zone in Mexico during the rainy and dry season. R. Rojo-Rubio*[1], A. Z. M. Salem[1,2], A. Olmedo-Juárez[1], A. Hernández-Rodríguez[1], B. Albarrán-Portillo[1], D. López-Aguirre[1], S. Rebollar-Rebollar[1], J.F. Vázquez-Armijo[1], D. Cardoso-Jiménez[1], and J. Hernádez-Martínez[1], [1]*Centro Universitario UAEM, Temascaltepec. Universidad Autónoma del Estado de México, Temascaltpec, Estado de México, México*, [2]*Department of Animal Production, Faculty of Agriculture, Alexandria University, Alexandria, Egypt*.

In semiarid rangelands of central zone in Mexico the annual rainfall is 750 mm. During dry season, rainfall (from October to May) is scarce, thus, most forage species are withered and grazing animals forage intake is too low to meet energy, protein and mineral requirements. This study was carried out to evaluate the effects of season (rainy and dry) and sample location of three different places selected randomly (L1:Luvianos one; L2:Luvianos two; and L3:Luvianos three) at the province of Luvianos in Mexico State on mineral status of blood plasma in crossbred adult goats (LW 35 ± 2 kg), during transition period under the semi-arid rangelands of central zone in Mexico. Blood samples were collected from 66 adult goats (22 per each location) before morning feeding. Blood mineral concentration of P, Na, K, Cu and Zn were assayed and data were analyzed using one way ANOVA test; significant differences between means were tested by Tukey. Results are summarized in Table 1. The information shows little difference between season for mineral concentration in goats, and this maybe due to their native grazing behavior on browse shrubs and tree foliages in the province of Luvianos in México State.

Table 1. Blood mineral concentration (mg/dl) of goats in semi-arid rangelands of central zone in Mexico, during rainy and dry season, 2008.

Season	Location	P	Na	K	Cu	Zn
Rainy	L1	3.82^{ab}	362.8^{b}	21.8^{ab}	0.080	0.052^{b}
	L2	3.19^{ab}	356.4^{b}	17.1^{bc}	0.105	0.065^{b}
	L3	4.74^{a}	362.4^{b}	16.4^{c}	0.088	0.050^{b}
Dry	L1	2.93^{b}	423.4^{a}	26.5^{a}	0.128	0.137^{a}
	L2	2.73^{b}	413.2^{a}	22.1^{ab}	0.101	0.107^{a}
	L3	4.20^{ab}	398.57^{ab}	23.2^{a}	0.105	0.108^{a}

Means with different superscripts within a column differ (P<0.05).

Key Words: status mineral, goats, semi-arid region