M401 Feed intake and performance by yearling Boer goat doelings consuming deep-stacked or ensiled broiler litter. A. L. Goetsch*, G. D. Detweiler, B. Bah, T. Sahlu, and J. Hayes, *American Institute for Goat Research, Langston University, Langston, OK.*

Boer goat doelings (48; 8 per treatment), 10.4 ± 0.13 mo of age and 27.1 ± 0.98 kg BW, were used in a 9-wk experiment to compare feeding value of deep-stacked (DS) and ensiled (EN) broiler litter. Broiler litter was processed for 82 d before feeding. Temperature in the upper area of the DS bay was 55–65°C for 2 wk and that in the lower area was 45–57°C for 10 wk; EN temperature ranged from 0 to 20°C. Treatments were feeding 1% BW (DM) of a 3:1 corn-soybean meal mixture and moderate to high-quality grass hay free-choice (Cont-Hay), 1% BW hay and concentrate mixture free-choice (Cont-Conc), 1% BW hay, 1.1% BW corn, and DS or EN free-choice (DS-L and EN-L, respectively), and 1% BW hay and DS or EN free-choice (DS-H and EN-H, respectively). Daily samples of DS and EN averaged 70.9 and 73.3% OM (DM basis), 21.8 and 23.2% CP, and 34.0 and 37.2% NDF, respectively. Total DM intake was less for H vs. L treatments, similar between DS-L and EN-L, and greater ($P < 0.05$) for EN-H than for DS-H (1.13, 1.28, 0.98, 1.13, 0.59, and 0.80 kg/d Cont-Hay, Cont-Conc, DS-L, EN-L, DS-H, and EN-H, respectively; SE = 0.072). There were similar differences in ADG (126, 234, 58, 75, −46, and −8 g; SE = 10.1) and the ratio of ADG:DM intake (118, 188, 60, 66, −84, and −11 g/kg for Cont-Hay, Cont-Conc, DS-L, EN-L, DS-H, and EN-H, respectively; SE = 12.7). There appeared to be more adaptation over time to EN-H than DS-H, with similar DM intake in wk 1–3 (0.48 and 0.64; SE = 0.082) but greater values in wk 4–6 (0.65 and 0.88; SE = 0.076) and 7–9 (0.64 and 0.87 kg/d for DS-H and EN-H, respectively; SE = 0.080). Likewise, ADG was similar between DS-H and EN-H treatments in periods 1 (−60 and −42 g; SE = 18.5) and 2 (6 and 27 g; SE = 12.5) and greater for EN-H in wk 7–9 (−83 and −9 g for DS-H and EN-H, respectively; SE = 22.2). In conclusion, feeding value of DS and EN for yearling meat goat doelings appears similar with moderate dietary levels, but with limited consumption of other feedstuffs, feeding value of EN may be greater.

Key words: goat, broiler litter, performance

M402 Effects of night-locking on intake, digestion, behavior, and energy use by meat goat does grazing grass/legume pasture. I. Tovar-Luna[1,2], R. Puchala*[1], T. A. Gipson[1], G. D. Detweiler[1], L. J. Dawson[3], T. Sahlu[1], A. Keli[4], and A. L. Goetsch[1], *[1]American Institute for Goat Research, Langston University, Langston, OK, [2]Universidad Autonoma Chapingo, Unidad Regional Universitaria de Zonas Aridas, Bermejillo, Durango, Mexico, [3]College of Veterinary Medicine, Oklahoma State University, Stillwater, [4]Department of Animal Production and Pastoralism, National School of Agriculture, Meknes, Morocco.*

Boer × Spanish does (24), 8 with ruminal cannula, were confined at night with access to grass/legume pasture from 0700 to 1900 h (R) or had continual access (C) in a completely randomized design with repeated measures. Data collection periods (15 d) were in late gestation (L-G; 137 d), early lactation (E-L; 43 d), late lactation (L-L; 97 d), the dry period (Dry), and early gestation (L-G; 65 d). Most does had a litter size of 2, and kids were weaned at 118 d. Pasture access treatment did not affect ingesta composition; CP (20, 13, 15, 13, and 20%) and NDF (51, 59, 63, 61, and 38% in L-G, E-L, L-L, Dry, and E-G, respectively) varied among periods. Kid ADG tended ($P < 0.08$) to be greater for C vs. R (138 vs. 118 g). Fat-corrected (4%) milk yield was greater ($P < 0.05$) for C vs. R in E-L but not L-L (2.04, 0.86, 3.27, and 1.23 kg/d for R/E-L, R/L-L, C/E-L, and C/L-L, respectively). Intake of ME was greater ($P < 0.05$) for R vs. C (823 vs. 735 kJ/kg $BW^{0.75}$). Treatment affected ($P < 0.05$) time lying (12.4 and 10.5), grazing (4.5 and 5.8), and resting (18.5 and 16.7 h for R and C, respectively). Energy expenditure (EE) was greater ($P < 0.05$) for C vs. R (754 vs. 687 kJ/kg $BW^{0.75}$) and recovered energy (RE) in tissue gain was similar between treatments. The RE of lactation (RE_l) from dietary ME was greater ($P < 0.05$) for C vs. R (244 vs. 194 kJ/kg $BW^{0.75}$); however, RE_l from mobilized tissue differed between treatments ($P < 0.05$) in E-L but not L-L (54, 15, 175, and 11 kJ/kg $BW^{0.75}$ in L-G, E-L, L-L, Dry, and E-G, respectively). The EE of activity tended to be greater ($P < 0.07$) for C vs. R (243 vs. 202 kJ/kg $BW^{0.75}$). In conclusion, R decreased activity EE to an extent less than it lessened ME intake, and greatest R impact was in E-L, with reduced RE_l and a tendency for lower kid ADG.

Key words: goat, grazing, energy

M403 Effects of replacing different levels of alfalfa hay and corn silage with sunflower residue silage on feed intake and nutrient digestibility in Mohabadi dairy goats. A. Gholami-Yangije[1], R. Pirmohammadi[1], J. Amini Jabal Kandi[2], and H. Khalilvandi-Behroozyar*[1,3], *[1]Department of Animal Science, Urmia University, Urmia, West Azerbahjan, I. R. Iran, [2]Department of Animal Science, West Azerbaijan Agriculture and Natural Resource Research Center, Urmia, West Azerbahjan, I. R. Iran, [3]Department of Animal Science, University of Tehran, Karaj, Tehran, I. R. Iran.*

Efficient inclusion of agricultural byproducts in ruminants diets is economically and environmentally beneficial. Annual production of sunflower residues in Iran reached 3 million tons in 2005. This study was conducted to determine digestibility of diets where alfalfa hay and corn silage are replaced with sunflower residue silage (SRS) at 4 rates: 0 (control, group 1), 30 (group 2), 60 (group 3) and 90% (group 4). Diets had similar NDF, ADF, CP, ME content and forage: concentrate ratio (81:19) in DM basis. Silages were made by addition of urea and dried whey (0.5% of DM from each) to chopped heads and stalks (3–5 cm, 60:40 ratio). Eight lactating dairy goats (BW = 60 ± 3) in second lactation, were divided into 4 groups of similar BW in 2 4 × 4 Latin square design, with lactation period considered as row block and goat as cloum block. Each Experimental period include 14 d for adaptation and 7 d for sample collection. Diets were formulated according to NRC 2007, prepared each day and provided in 2 equal meals (0800 and 1600h). Animals had ad-libitum access to water. Dry matter intake (DMI) and total fecal excretion of the goats was recorded daily and feed and fecal samples were withdrawn at regular intervals for chemical analysis. Nutrient intake was corrected with nutrient contents of the ort. Data were analyzed by GLM procedure of SAS 9.1 with reapeted Latin square design and duncan test ($P \leq 0.05$). DM intake decreased with increasing levels of SRS, that can be partly due to increased NDF contents in the rations and large particle size of the sunflower stalks. DM and OM digestibility decreased with increasing levels of SRS. Differences in CP and NDF digestibility were statistically significant and highest and lowest values were obtained in group 3 and 4, respectively. This experiment indicated that sunflower residue silage is an acceptable forage for dairy goat and can be replaced with forages up to 60 percent as an uncommon feedstuff in dairy goat rations.

Table 1. DMI and nutrient digestibility of experimental diets

Traits	Group 1	Group 2	Group 3	Group 4	SEM
DMI (kg/d)	1.43[a]	1.45[a]	1.37[a]	1.06[b]	0.06
DM digestibility (%)	75.51[a]	75.48[a]	72.83[a]	57.49[b]	1.86
CP digestibility (%)	76.97[a]	76.57[a]	78.55[a]	65.95[b]	1.62
OM digestibility (%)	77.17[a]	75.55[a]	74.96[a]	57.32[b]	1.89
NDF digestibility (%)	69.59[a]	70.87[a]	73.39[a]	46.18[b]	2.34

[a,b]Means within each row with different superscripts are significantly different ($P < 0.05$).

Key words: sunflower residue silage, dairy goat, feed intake

M404 Effects of inclusion of different levels of sunflower residue silage in dairy goat diets on milk production and composition. A. Gholami-Yangije[1], R. Pirmohammadi[1], J. Amini Jabal Kandi[2], and H. Khalilvandi-Behroozyar*[1,3], *[1]Department of Animal Science, Urmia University, Urmia, West Azerbahjan, I. R. Iran, [2]Department of Animal Science, West Azerbaijan Agriculture and Natural Resource Research Center, Urmia, West Azerbahjan, I. R. Iran, [3]Department of Animal Science, University of Tehran, Karaj, Tehran, I. R. Iran.*

Ruminant species occupy an important niche in modern agriculture because of their unique ability to digest certain feedstuffs, especially agricultural byproducts, efficiently. Sunflower residues is one of these materials that its annual production in Iran reached above 3 million tons. Present study was carried out to determine potential of sunflower residues silage (SRS) in support of lactation instead of alfalfa hay and corn silage at 4 rates: 0 (control, group 1), 30 (group 2), 60 (group 3) and 90 percent of dry matter (group 4). Diets had similar NDF, ADF, CP, ME content and forage:concentrate ratio (81:19) in DM. Silages were made by addition of urea and dried whey (0.5 percent of dry matter from each) to chopped heads and stalks (3–5 cm, 60:40 ratio). Eight lactating dairy goats (BW of 60 ± 3 kg) in second lactation, were divided into 4 groups of similar BW in 2 4 × 4 Latin square design, which lactation period considered as row block and goat as column block. Each experimental period consisted 14 d for adaptation and 7 d for sample collection. Diets were formulated by NRC 2007, prepared each day and provided in 2 equal meals (0800 and 1600), with ad libitum access to water. Goats were milked twice a day and milk production data were recorded and milk sampled daily and analyzed with milkoscan apparatus. DM intake was recorded daily. Data were analyzed by GLM procedure of SAS 9.1 with repeated Latin square design and Duncan test ($P \leq 0.05$). DM intake decreased with increasing levels of SRS. Milk yield decrease with increasing levels of SRS and differences were statistically significant with highest substitution level compared with control. Milk composition percentage was similar across diets but daily milk components production decreased with 60 and 90 percent SRS replacement. Also, there were a significant difference between morning and evening milk fat and total solid percentage. According to these results, sunflower residue silage is an acceptable feed for dairy goat and can be replaced with forages up to 30 percent without affecting milk production and composition.

Table 1. Milk yield and milk composition of sunflower residue silage consuming goats

Traits	Group 1	Group 2	Group 3	Group 4	SEM
Milk yield (kg/day)	1.126[a]	1.103[a]	0.902[ab]	0.763[b]	0.071
CP (kg/day)	0.038[a]	0.038[a]	0.030[ab]	0.025[b]	0.001
Fat (kg/day)	0.049[a]	0.053[a]	0.046[ab]	0.032[b]	0.002
Lactose (kg/day)	0.052[a]	0.050[a]	0.041[ab]	0.035[b]	0.001
TS (kg/day)	0.148[a]	0.151[a]	0.125[ab]	0.106[b]	0.011

[a,b]Means within each row with different superscripts are significantly different ($P < 0.05$).

Key words: sunflower residue silage, dairy goat, milk production

M405 Effect of protein restriction on body characteristics and fat storage in Awassi sheep. S. F. Abi Saab[1,2], F. T. Sleiman[3], F. Ayoub[2], and P. Y. Aad*[4], *[1]Lebanese University, Faculty of Agricultural & Veterinary Sci., Dekwaneh, Lebanon, [2]Holy Spirit University of Kaslik, Faculty of Agricutural Sci., Kaslik, Lebanon, [3]American University of Beirut, Faculty of Agricultural &Food Sci., Beirut, Lebanon, [4]Notre Dame University, Faculty of Natural & Applied Sci., Louaizeh, Lebanon.*

Awassi sheep, the predominant fat-tail breed in Lebanon, stores fat mainly in the tail, resulting in leaner meat. Little research exists on the importance of these fat reserves in compensating for arid rearing during the dry summer months. The objective of this study was to determine the effect of different dietary protein levels on BW, fat distribution and storage in Awassi sheep. Twenty-four rams (7–9 mo) weighing 53.7 ± 6.4 kg were distributed in 3 groups fed 12% (Control-C), 9% (moderately restricted-MR), and 6% (highly restricted-HR) protein diets. Body weight and girth, caudal volume and circumference, organ weights as well as fat distribution were measured over a period of 7 mo at the Agricultural Research and Education Center (AREC) of the American University of Beirut (AUB). Data were analyzed using MSTATC and presented as means ± SEM. Final BW of C (84.3 ± 5.35 kg) and MR (78.3 ± 6.68 kg) was higher ($P < 0.05$) than HR (65.3 ± 7.62 kg), whereas carcass weight was higher ($P < 0.05$) in C (38.0 ± 3.46 kg) than in MR (34.3 ± 1.91 kg) or HR (28.8 ± 3.42 kg). Girth measurement of C (98.6 ± 3.37 cm) and MR (97.7 ± 0.84 cm) was higher ($P < 0.05$) than HR (92.3 ± 4.24 cm). Both caudal volume and circumference were higher ($P < 0.05$) in C (10.5 ± 0.51 L; 58.1 ± 3.01 cm) and MR (9.3 ± 0.91 L; 54.5 ± 2.85 cm) than in HR (7.2 ± 1.63 L; 49.6 ± 4.28 cm), respectively. Abdominal and tail fat weight were greater ($P < 0.05$) in C (2.27 ± 1.05 and 7.94 ± 2.03 kg) and MR (2.0 ± 0.7 and 7.2 ± 1.2 kg) than in HR (0.9 ± 0.3 and 5.0 ± 1.4 kg) whereas organ weights (heart, kidneys, pancreas and testicles) did not vary ($P > 0.05$) among groups. Altogether, these results indicate that moderate protein restriction in diet of Awassi sheep does not greatly affect lean body composition except for the abdominal and tail fat deposition. However, a high restriction of dietary protein greatly depletes Awassi sheep fat reserves as well as significantly affects the carcass weight. We concluded that Awassi sheep uses the stored abdominal and tail fat to compensate for protein dietary restrictions without much decrease in carcass characteristics.

Key words: Awassi, abdominal and tail fat, body characteristics

M406 Nutrient intake and performance of lambs fed diets with different levels of inactive dry yeast. L. D. A. Rufino[1], O. G. Pereira*[1], K. G. Ribeiro[2], S. C. V. Filho[1], and L. L. Cardoso[1], *[1]Fed-*

eral University of Viçosa, Viçosa, Minas Gerais, Brazil, [2]Universidade Federal dos Vales do Jequitinhonha e Mucuri, Diamantina, Minas Gerais, Brazil.

Inactive dry yeast is a co-product obtained during the process of sugarcane alcoholic fermentation that is used as high protein ingredient for animal feed. The objective of this study was to evaluate the nutrient intakes and productive performance of Santa Ines lamb fed diets containing different levels of inactive dry yeast (0, 33, 67 and 100%, DM basis) in substitution of soybean meal. Diets consisted of 60% concentrate and 40% corn silage (DM basis), formulated to be isonitrogenous (15.5% CP, DM basis). Thirty-six lambs non-castrated, averaging 20 kg BW were allotted in a randomized blocks design with 9 replicates. The animals were kept in individual pens with protected feeders and waterers. The experiment lasted 78 d, divided in 3 periods of 21 d after 15 d of adaptation. Dry matter, organic matter, crude protein and ether extract intakes were not affected by yeast levels ($P > 0.05$), registering average values of 947, 905, 151 and 18 g/day, respectively. However, NDF intake decreased linearly ($P < 0.05$) as yeast levels increased in diets. The average daily gain, carcass daily gain, feed conversion and dressing percentage were not affected by yeast levels ($P > 0.05$), which were, on average, 203 g/day, 88 g/day, 4.74 and 44%, respectively. Our results suggest that inactive dry yeast can replace 100% of the soybean meal in diets of lamb. However, the utilization of this co-product depends on economic factors, because more than 90% of the Brazilian production of inactive dry yeast is traded for European countries. Financial support by CNPq and FAPEMIG.

Key words: average daily gain, crude protein, carcass dressing

M407 Effect of low and high oil corn distillers grain on rumen fermentation, growth performance and carcass characteristics of lambs. A. S. O'Hara*[1], A. V. Chaves[1], A. Tanner[2], T. A. McAllister[3,1], D. J. Gibb[3], F. van Herk[3], and R. D. Bush[1], *[1]Faculty of Veterinary Science, The University of Sydney, Sydney, NSW, Australia, [2]Faculty of Agriculture, Food and Natural Resources, University of Sydney, Sydney, NSW, Australia, [3]Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, Alberta, Canada.*

The objective of this study was to determine the effect of replacing a mixture of canola meal and barley grain in the diet with (low and high oil) corn distillers grains with solubles (DDGS) or wheat DDGS on rumen fermentation, feed intake, daily gain, feed conversion and hot carcass weight in lambs. Seventy Canadian Arcott lambs (24.7 ± 3.21 kg) were used in a completely randomized block design over a 14-week trial. Experimental diets were provided ad libitum as pelleted total mixed rations (TMR). In the treatment diets, canola meal and barley grain were replaced with 200 g/kg of dietary DM of either high oil corn DDGS, low oil corn DDGS or wheat DDGS. A positive control diet was added to match the lipid content of 39 g/kg DM of the high oil corn DDGS diet. Average daily gain (ADG) was determined by dividing weight gain by the number of trial days. Feed conversion was calculated as the ratio between DMI and ADG (g of DMI/g of LW gain. An in vitro rumen digestibility trial was conducted using ruminal fluid obtained from 3 nonlactating Holstein dairy cows. Rumen contents were also collected from each lamb at the time of slaughter for testing in vivo rumen fermentation. Data from both the in vivo and in vitro results were analyzed using the MIXED procedure of SAS. The in vitro incubations revealed both corn DDGS diets produced less microbial N and microbial DM than all other diets, however this difference was too minimal to affect growth performance. Similarly, there was no dietary effect on ($P > 0.05$) on in vivo ruminal fermentation or hot carcass weight ($P \geq 0.19$) of the lambs. Lambs fed low oil corn DDGS had lower average daily gains ($P < 0.03$) than those fed either high oil corn DDGS or wheat DDGS, however they did not differ from those fed the control. This research demonstrated that replacing canola meal and portions of barley grain with 200 g/kg DM of either high oil corn DDDGS, low oil corn DDGS or wheat DDGS in finishing lamb ratios could effectively maintain healthy rumen function, growth performance and hot carcass weight.

Key words: barley grain, ruminal fermentation, sheep supplementation

M408 Nutrient intake and performance of lambs fed diets containing different levels of rumen degradable protein. J. L. Silva[1], K. G. Ribeiro*[1], O. G. Pereira[2], S. C. V. Filho[2], D. S. Pina[3], and P. V. R. Paulino[2], *[1]Federal University of Jequitinhonha and Mucuri Valleys, Diamantina, Minas Gerais, Brazil, [2]Federal University of Viçosa, Viçosa, Minas Gerais, Brazil, [3]Federal University of Mato Grosso, Sinop, Mato Grosso, Brazil.*

The objective of this study was to evaluate the nutrient intake and productive performance of Santa Ines lambs in feedlot fed diets containing different levels of RDP. Thirty-one lambs non-castrated, averaging 22 ± 1.94 kg BW were allotted in a randomized blocks design with 8 replicates. The treatments consisted of diets with 40% corn silage and 60% concentrate formulated to contain 4 levels of RDP (9.15, 9.97, 10.79 and 11.61%, in DM basis), corresponding to 14.25, 15.50, 16.75 and 18.00% of CP. The animals were kept in individual cages with protected feeders and waterers. The experiment lasted 48 d, after 10 d of adaptation. The animals were weighed every 14 d until reaching the predetermined weight of 30 kg when they were slaughtered. The DM, EE, NDF and TDN intakes were not affected ($P > 0.05$) by RDP levels in diets, registering average values of 1,056.5, 34.7, 294.9 and 803.1 g/animal/day, respectively. However, CP, RDP and RUP intakes increased linearly ($P < 0.05$) with increasing levels of RDP in the diets. The daily weight gain was not affected ($P > 0.05$) by RDP levels which was, on average, 217 g/day. The carcass yield obtained in relation to empty body weight and feed conversion were not affected ($P > 0.05$) by RDP levels which were, on average 53.7% and 5.1, respectively. The conversion of protein (kg CP intake/kg gain in BW) increased linearly ($P < 0.05$) with increasing levels of RDP, according to the equation $Y = -0.1565 + 0.094*PDR$. In conclusion, the RDP levels evaluated did not change the lamb performance, being able to use the lowest level of RDP (9.15% DM with 14.25% CP), contributing to reduction of nitrogen excretion in environment and feeding costs. Financial support by CNPq and FAPEMIG.

Key words: average daily gain, carcass yield, crude protein

M409 Diet preference of lambs offered a choice of concentrate diets containing different proportions of wheat dried distillers grain with solubles. E. K. R. Charles, A. V. Chaves, E. Jonas, and A. S. O'Hara*, *Faculty of Veterinary Science, The University of Sydney, Sydney, NSW, Australia.*

This study determined if lambs showed an intake preference for diets, that differed in their grain component. The grain consisted of either 20% or 40% wheat dried distiller's grain with solubles (WDDGS) or 60% barley. The study used 36 lambs that were assigned at random to one of 3 groups at 105 d of age (live weight 33.5 ± 4.6kg). All diets were formulated with NRC requirements for growing lambs in mind. Each group was offered the choice of all 3 diets on an ad libitum basis

for a 45 d period with the groups randomly rotated between pens every 7 d to ensure all lambs had access to all pens and all feeders. Daily feed intake, eating patterns, live weight change and wool characteristics were measured. The automatic feeders allowed the evaluation of the total feed intake, total time spent in a feeder and total time eating in the feeder. This allowed the evaluation of an intake preference for a particular diet, accounting for particular behavior of single sheep. Intake preference data was analyzed as a completely randomized design using the proc MIXED procedure of SAS. Means for intake were compared using the LSMEANS/DIFF with treatment, week and the interaction of treatment × week as fixed terms; lambs nested within groups as a random block effect, and week as a repeated measure. Dietary intake preference (as measured by total intake and time spent eating) over the course of the trial varied on a weekly basis (interaction treatment by week $P < 0.001$). The final live weight (39.8 ± 1.88 kg) and wool production was the same for the 3 groups of lambs. There was a tendency for lambs to prefer diets supplemented with WDDGS when compared with the barley grain control diet. There are several possible explanations as to why the lambs may have preferred the WDDGS diets over the control, including the aspects of feed novelty, variety and palatability, as well as the higher crude protein (CP) content of the WDDGS diets.

Key words: wheat distillers, ethanol by-products, sheep

M410 Effect of inclusion of dried citrus pulp on in vitro ruminal fermentation kinetics of a total mixed ration for goats. J. Hernández*[1,2], R. Rojo[1], A. González[2], A. Z. M. Salem[1], F. Lucero[2], J. L. Tinoco[1], A. Carreón[2], and J. F. Vázquez[1], *[1]Centro Universitario UAEM-Temascaltepec, Universidad Autónoma del Estado de México, Temascaltepec, Estado de México, México, [2]Unidad Académica Multidisciplinaria AgronomÍa y Ciencias, Centro Universitario Victoria, Universidad Autónoma de Tamaulipas, Ciudad Victoria, Tamaulipas, México.*

A completely randomized design was used to evaluate the effect of different levels inclusions (0, 100, 200 and 300 g/kg DM) of dried citrus pulp (orange): Control (%): Sorghum grain: 25, Soybean meal: 9, Urea: 1, Molasses: 2, Mineral premix: 3, Buffel grass hay: 60, Dried citrus pulp: 0, T1 (%): Sorghum grain: 15, Soybean meal: 9, Urea: 1, Molasses: 2, Mineral premix: 3, Buffel grass hay: 60, Dried citrus pulp: 10, T2 (%): Sorghum grain: 10, Soybean meal: 9, Urea: 1, Molasses: 2, Mineral premix: 3, Buffel grass hay: 55, Dried citrus pulp: 20, T3 (%): Sorghum grain: 10, Soybean meal: 9, Urea: 1, Molasses: 2, Mineral premix: 3, Buffel grass hay: 45, Dried citrus pulp: 30, on in vitro ruminal fermentation kinetics of total mixed rations balanced for lactating goats (CP 15.5%). One ± 0.002 g of DM of each treatments was weighed in triplicate into 160-mL serum bottles and incubated with ruminal inoculums of 4 goats feeding with a forage (50):concentrate (50) diet. Cumulative gas production was taken at 2, 4, 6, 8, 10, 12, 15, 19, 24, 30, 36, 48, 72 and 96 h post incubation at 39°C. Data of in vitro rumen gas production profiles were analyzed using a completely randomized design and the difference among means the Tukey test was used. Gas production (GP) at 24, 48 and 96 h was higher ($P < 0.01$) in the T3, showing a linear effect ($P < 0.01$). Inclusion of dried citrus pulp in the diet increased (linear effect ($P < 0.0$) the gas production (b) (ml/g DM). Fractional rate of gas production was different among treatments, T1 and T2 had the highest values, control and T3 presented the same values (quadratic effect $P < 0.01$). Lag time (h) had linear effect ($P < 0.01$), control diet had the highest value respect to the others treatments. The inclusion of dried citrus pulp in the diet for goats improved the gas productions parameters, and then this subproduct could be considered as potential feed to ruminant nutrition.

Key words: dried citrus pulp, ruminal fermentation kinetics, goats

M411 The under-nourishment of the Alpine-French goats does not diminish reproductive outcomes, but does affect dynamics of the offspring-growth. R. Rivas-Muñoz[1], E. Carrillo[1], C. A. Meza-Herrera[2], C. Leyva[3], H. Zermeño-González[1], R. Rodríguez-Martínez[3], M. Mellado[3], F. G. Véliz[3], and G. Arellano-Rodriguez*[3], *[1]Instituto Tecnológico de Torreón, Torreón, Coahuila, México, [2]Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Áridas, Bermejillo, Durango, México, [3]Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México.*

The aim of this study was to determine whether under-nourishment decreased the sexual response of Alpine-French goats, as well as to characterize both litter size and offspring -growth dynamics at weaning. Since April 1, a group of females (n = 10) received an experimental diet to provide 70% of their maintenance requirements (T-70), while the other group (n = 10) received a diet to cover 100% of their maintenance requirements (T-100). On October 1, both weight (42.4 ± 1.6 kg) and body condition (3.6 ± 0.1 units) of T-100 were higher ($P < 0.05$) in the T-100 as compared with the T-70 group (28.7 ± 1.1 and 1.8 ± 0.2). On October 9, both groups of females were exposed to one males which was changed every 12 h. Males remained in contact with females during 16 d. The total proportion of females which depicted estrus behavior and kidding were compared by Fisher exact test. Prolificity between groups was compared with the Student *t*-test. Weight data of the offspring were subjected to an ANOVA with repeated measures on 2 factors (Group * Time). All tests were performed using the statistical package SYSTAT 10. The number of estrous females was 100% in both groups ($P > 0.05$). Most of the females kidded in both groups (100 and 90%, T-70 and T-100, respectively, $P > 0.05$). However, the prolificity was higher in the T-100 as compared with the T-70 group (1.8 ± 0.1 vs. 1.1 ± 0.1, respectively, $P < 0.01$). Body weight of offering at birth was similar (2.7 ± 0.1 vs. 2.4 ± 0.2, T-100 and T-70, respectively; $P > 0.05$), however, there was a time by group interaction ($P < 0.05$), final weight was also different (7.6 ± 0.4 vs. 6.1 ± 0.8, T-100 and T-70, respectively; $P > 0.05$).. These results suggest that, irrespective of nutritional level, reproductive outcomes of Alpine-French goats were similar. Nonetheless, both litter size and offspring-growth dynamics at weaning favored the well-nourished females goats.

Key words: goats, under-nourishment, sexual activity

M412 Evaluation of crude glycerin on performance and carcass characteristics of growing meat goats. K. B. Tuoho*[1], N. K. Gurung[1], S. G. Solaiman[1], B. R. Min[1], J.-S. Eun[2], and W. H. McElhenney[1], *[1]Tuskegee University, Tuskegee, AL, [2]Utah State University, Logan.*

Today's high feed costs especially corn price have forced many goat producers to seek alternative energy sources. Crude glycerin (CG), a byproduct of the biodiesel production, is becoming increasingly available in the US and has a potential to partially replace high-starch containing ingredients such as corn. Research has shown that glycerin is converted to propionate in the rumen and acts as a precursor for hepatic glucose synthesis. Therefore, objectives of this were to determine the effects of varying levels of CG inclusion on feed intake, growth performance, feed efficiency, and carcass characteristics in meat goats.

Twenty 4 Boer crossbred intact male goats (23.93 ± 0.98 kg initial BW and 4 to 5 mo of age) were randomly assigned to one of the 4 experimental diets (n = 6) containing 30% bermudagrass hay plus 70% concentrate mix with 0, 5, 10 or 15% CG in the diet on an as-is basis. Feed was offered once a day and water was provided at all times. Goats were weighed every 2 weeks. At the end of 84-d feeding, goats were harvested and carcass characteristics were determined. Feed intake, average daily gain, gain: feed ratio, and carcass data were analyzed as a completely randomized design. Initial BW ($P = 0.99$), final BW ($P = 0.98$), ADG ($P = 0.91$), DM intake ($P = 0.35$), and G:F ratio ($P = 0.32$) were not different among treatments. No differences were observed ($P > 0.05$) in HCW ($P = 0.33$), chilled carcass weight ($P = 0.37$), or kidney and pelvic fat ($P = 0.07$), backfat thickness ($P = 0.71$), body wall fat thickness ($P = 0.94$), LM area ($P = 0.30$) and dressing percent ($P = 0.17$) and shrinkage ($P = 0.98$) among treatments. Results suggest that CG is a viable feedstuff for meat goats and up to 15% of CG can be included in the diet on as-is basis, for growing goats without any compromise in DM intake, growth performance, and carcass quality.

Key words: goats, crude glycerin, growth, carcass characteristics

M413 A meta-analysis for comparing dry matter intake prediction models in dairy goats. G. Caja, X. Roca, A. K. K. Salama, and M. Rovai*, *G2R, Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain.*

Intake prediction is a key factor in dairy goats due to its effects on goat performances and ration costs. Currently available models for dairy goats (INRA, 2007; NRC, 2007; Cannas and Pulina, 2008) estimate daily dry matter intake (DMI) depending on body weight (BW) and daily milk yield (MY). A direct comparison of these models for a similar BW (50 kg) showed marked differences (0.4 to 0.8 kg DM/d) in predicted DMI depending on MY (0 to 6 L/d) and breed type. A meta-analysis of the available data on dairy goat intake from articles published in scientific journals indexed in PubMed and Science Direct through December 2010 was performed to calculate the differences between actual and predicted values across studies. Data were extracted from 125 papers (335 data) from which 219 values obtained under controlled conditions and using conventional diets (i.e., forage:concentrate >30%) were finally retained. Milk yield was standardized to 3.5% milk fat ($MY_{3.5\%}$) and data were normally distributed. Goat performances were, on average, 51.3 ± 0.7 kg BW (29.0 to 85.5), 2.7 ± 0.4 $MY_{3.5\%}$ L/d (0.4 to 6.2) and 2.22 ± 0.04 kg DMI/d (0.8 to 3.5). A stepwise regression was performed to estimate DMI (kg DM/d) from $MY_{3.5\%}$ (L/d) and BW (kg). Prediction models were (±SEM; $P < 0.001$): DMI (± 0.099) = 1.233 (± 0.050) + 0.370 (± 0.017) × $MY_{3.5\%}$; $R^2 = 0.69$; DMI (± 0.075) = 0.553 (± 0.092) + 0.277 (± 0.018) × $MY_{3.5\%}$ + 0.018 (± 0.002) × BW; $R^2 = 0.76$. Comparison of actual data with the results obtained from the meta-analysis data model showed the lowest mean error of the prediction (–0.030 kg DM/d), being lower than the underestimation obtained with the Pulina and Cannas (2008; –0.092 kg DM/d) and INRA (2007; –0.101 kg DM/d) models. On the contrary, the NRC (2007) prediction overestimated DMI on average (+0.185 kg DM/d). Despite agreeing at the intercept (MY = 0) and at high milk yield (MY = 6), the greatest differences between INRA and NRC predictions were observed around the mean. The oposite was observed with the model of Cannas and Pulina (2008). In conclusion, the INRA (2007) model showed the greatest agreement with the results of the meta-analysis.

Key words: feed intake, dairy goat, meta-analysis

M414 Intake and digestibility of rations containing dry yeast in Saanen goats during peripartum. C. R. Alcalde*, B. S. L. Molina, L. R. Lima, L. C. Gomes, and R. Souza, *Universidade Estadual de Maringá, Maringá, Paraná, Brazil.*

The objective to evaluate the intake and digestibility of rations containing dry yeast (sugar cane) as a substitute of soybean meal in Saanen goats. Twenty-four Saanen goats (15 multiparous and 9 primiparous) were used during the peripartum period, distributed in a completely randomized design in factorial arrangement (2 parity order × 3 rations), analyzed in SAEG system. The rations, similar in crude protein (16% CP), were composed of: soybean meal (SB), soybean meal plus dry yeast (SBDY) or dry yeast (DY) as a protein source, and remaining ingredients: ground corn, corn silage, limestone and mineral mixture, and the roughage:concentrate was 40:60. The marker used to estimate the digestibility was the indigestible neutral detergent fiber. After an adaptation period of 10 d, data were collected during the 21 d before and after the partum. Were collected partial samples of feces in the rectum, during 6 d in both periods (prepartum and postpartum). The intake of dry matter and nutrients was higher ($P < 0.05$) for multiparous goats in both evaluated periods. Among the rations, the intake ether extract with the ration SB was higher ($P < 0.05$) than the others, just to the goats in postpartum. The digestibility of dry matter and nutrients were not modified by the parity order to the goats in prepartum. However, in the postpartum primiparous obtained the best digestibility coefficients to dry matter, organic matter, crude protein and total carbohydrate, which resulted in higher ($P < 0.05$) total digestible nutrients (79.77%) related to the multiparous (74.95%) in the same physiological period. Among the rations, the addition of dry yeast reduced the digestibility of ether extract in both evaluated periods, however, the SBDY ration resulted in higher total digestible nutrients (77.02% in prepartum and 78.26% in postpartum) compared with the others rations. Dry yeast can replace soybean meal in rations, providing good nutritional value to Saanen goats in peripartum.

Key words: ruminant, *Saccharomyces cerevisiae*, transition

M415 Net protein requirements for growth of female Saanen goat kids. F. O. M. Figueiredo*, I. A. M. A. Teixeira, K. T. Resende, T. T. Berchielli, L. D. Lima, O. Boaventura Neto, B. Biagioli, and A. R. Rivera, *UNESP - São Paulo State University, Jaboticabal, São Paulo, Brazil.*

The objective of this study was to determine net protein requirements for growth of female Saanen goat kids using comparative slaughter technique. A total of 30 female goats kids with initial body weight (BW) of 30 kg were used. Six animals were slaughtered at beginning of the experiment (baseline animals), another 6 animals were slaughtered when they reached 38 kg of body weight (intermediate slaughter). The remainder was randomly allocated into 6 groups of 3 animals (0%, 30% and 60% of feed restriction) and each group was considered a block. The animals of each group were slaughtered when the animal set in the 0% feed restriction reached 45 kg of body weight. Animals fed ad libitum (initial, intermediate and 0% of feed restriction) were used to estimate body composition and net protein requirements for gain. To estimate net protein maintenance requirements were used the animals subjected to feed restriction (0, 30 and 60% of feed restriction). Logarithmized allometric equations were used to calculate protein body composition through the relationships between protein content and empty body weight (EBW), based on the following equation: Log_10_Protein, g = 2.33 + 0.48 x Log_10_EBW, kg. The protein body composition ranged from 40.48 to 31.40 g/ kg EBW. Net

protein requirements for gain (NP_g_) ranged from 10.99 to 11.30 g/100 g of body weight gain. The net protein requirements for maintenance (NP_m_) was estimated through the equation Retained Protein, g/EBW0.75/d = −0.37 + 0.092 x CP intake, as NP_m_ = 2.03 g/kg0,75BW/day. The total net protein requirement for growth of female Saanen goat kids with body weight ranging from 30 to 45 kg can be estimated by the followed model: Total net protein, g/g of ADG/day = (2.03 xBW00.75) + (1.47 + 0.11 * ADG). (Fapesp project number 2009/06588–4).

Key words: comparative slaughter, gain, maintenance

M416 Net energy requirements for growth of female Saanen goat kids. F. O. M. Figueiredo*, I. A. M. A. Teixeira, K. T. Resende, T. T. Berchielli, C. J. Harter, A. N. Mendonça, S. F. Souza, R. A. Gomes, D. S. Castagnino, and T. F. V. Bompadre, *UNESP - São Paulo State University, Jaboticabal, São Paulo, Brazil.*

The objective of this study was to determine net energy requirements for growth of female Saanen goat kids using comparative slaughter technique. A total of 30 female goats kids with initial body weight (BW) of 30 kg were used. Six animals were slaughtered at beginning of the experiment (baseline animals), another 6 animals were slaughtered when they reached 38 kg of body weight (intermediate slaughter). The remainder was randomly allocated into 6 groups of 3 animals (0%, 30% and 60% of feed restriction) and each group was considered a block. The animals of each group were slaughtered when the animal set in the 0% feed restriction reached 45 kg of body weight. Animals fed ad libitum (initial, intermediate and 0% of feed restriction) were used to estimate body composition and net energy requirements for gain. To estimate net energy maintenance requirements were used the animals subjected to feed restriction (0, 30 and 60% of feed restriction). Logarithmized allometric equations were used to calculate energy body composition through the relationships between energy content and empty body weight (EBW), based on the following equation: log Energy, kcal = 2.60 + 1.59 Log EBW, kg. The energy body composition ranged from 2630.425 to 3508.741 kcal / kg EBW. Net energy requirements for gain (NEg) ranged from 346.61 e 503.62 kcal / 100 g of body weight gain. The net energy requirements for maintenance (NEm) was estimated through the equation Log Heat Production, kcal/EBW0.75/d = 2.02 + 0.00152*EM intake, as NEm = 88.74 kcal/kg0.75 BW0.75/day. The total net energy requirement for growth of female Saanen goat kids with body weight ranging from 30 to 45 kg can be estimated by the followed model: Total Net Energy, kcal/g of ADG/day = (88.84* BW0.75) + (10.78 + 4.84 * ADG) (Fapesp project number 2009/06588–4).

Key words: comparative slaughter, maintenance, gain

M417 Effect of Clinoptilolite (zeolite) substituting for corn-soybean meal on productive performance and carcass characteristics of Pelibuey sheep. A. Estrada-Angulo*, J. D. Urías-Estrada, J. A. Aguilar, J. L. Bolado, H. Davila-Ramos, J. J. Portillo, J. C. Robles, and F. G. Rios, *FMVZ-UAS, Culiacan, Sinaloa, Mexico.*

To determine the effect of 4 levels of clinoptilolite (Zeolite) substituting for corn-soybean meal on growth performance of sheep, 20 Pelibuey ram lambs (BW = 32.6 kg ± 2.2 kg) were fed for 42 d in a randomized block design (experiment). The animals were weighed and blocked by weight in individual form, placed into 20 (2 × 3 m) floor pens, and assigned to one of 4 (4) diets: 1) Control had 16.43% CP and 2.92 Mcal ME/kg, and contained 7.5% corn straw, 5% alfalfa hay, 62% cracked corn grain, 14% soybean meal, 9% sugarcane molasses, and 2.5% mineral premix; 2) similar (like) Control, (ZEO5) had 16.23% CP and 2.91 Mcal of ME/kg, but contained 0.5% zeolite, 61.75% cracked corn grain, and 13.75% soybean meal; 3) like Control, (ZEO10) had 16.03% CP and 2.89 Mcal of ME/kg, but contained 1.0% zeolite and 61.5% cracked corn grain and 13.5% soybean meal; and 4) like Control, (ZEO15) had 15.83% CP and 2.87 Mcal ME/kg, but contained 1.5% zeolite and 61.25% cracked corn grain. Feed was offered twice daily under free access conditions. In daily feed intake, zeolite treatments decreased 6% respect to Control treatment (1187 vs. 1116 g/d). In average daily gain zeolite treatments increased (14.3% than Control group (216 vs. 189 g/d). About feed conversion, zeolite treatments improved in 20.5% respect to Control group (5.21 vs. 6.28). Hot carcass weight, cold carcass weight and dressing percent tended to improve ($P < 0.08$) in zeolite treatments respect to Control group. Rib eye area, carcass characteristics, fat thickness and primary cuts were similar in all treatments ($P > 0.05$). It is concluded, that zeolite is an ingredient of low price and appropriate substitute for a mix of cracked corn grain and soybean meal in diets for Pelibuey sheep.

Key words: clinoptilolite, zeolite, Pelibuey sheep

M418 Effect of live yeast *Saccharomyces cerevisiae* (strain Sc 47) on fattening efficiency and blood parameters of growing Mehraban lambs. N. Baleghi[1], A. Taghizadeh[2], A. FarahAvar[3], and H. Khalilvandi-Behroozyar*[3,4], *[1]Islamic Azad University, Maragheh Branch, [2]Department of Animal Science,University of Tabriz, [3]Department of Animal Science, University of Tehran, [4]Department of Animal Science, Urmia University.*

Yeast (*Saccharomyces cerevisiae*) products may exert beneficial effects on ruminant productivity by either increasing fermentability of fiber and/or allowing rumen microbes to more effectively metabolize end products of ruminal starch fermentation. The objective was to evaluate the possible effects of live yeast on live weight gain and selected blood parameters of growing Mehraban lambs. Twelve male lambs (average BW 34+4.2 kg) randomly assigned to 3 groups: a) control, without additive b) 1 g/day/head and c) 1.5 g/day/ head *Saccharomyces cerevisiae* (strain Sc 47) with 8×10^9 cfu per gram. Additives supplemented via gelatin capsules to TMR ration (alfalfa hay, wheat straw, barley grain, canola meal, wheat bran, Mineral-vitamin mix, calcium carbonate and salt) formulated for 200 g/d weight gain using CNCPS-S. Animals fed experimental rations for a period of 60 d in 2 equal meals. Lambs were weighting after 2 week adaptation period and in weekly intervals after feed restriction. Blood samples withdrawn via heparinized vacuum venoject tubes through Jugular vein in last day of the experiment and analyzed for selected parameters via an autoanalyzer apparatus and commercial kits. Data were analyzed by GLM procedure of SAS 9.1 with CRD design and duncan test ($P \leq 0.05$). addition of 1.5 g/day/head of *Saccharomyces cerevisiae* caused significant increase in daily weight gain. Addition of different levels of *Saccharomyces cerevisiae* failed o induce a statistically significant difference in white and red blood cells, hemoglobin, hematocrit, mean cell volume, mean cell hemoglobin, platelet number, lymphocytes, lymphocytes and monocytes, but a tendency ($P \leq 0.1$) for reduction of white blood cells was determined and supplementation of 1 g/day/head was resulted in least value of white blood cells (70+6, 15.66 ± 2.13 and 32.66 ± 2.13, respectively for control, 1g/day/head and 1.5g/day/head group). These results indicated that supplementation of 1.5 g/day/head of yeast can be beneficial for maximizing live weight gain and improve health status.

Table 1. Characteristics of live weight gain in sheep fed *Saccharomyces cerevisiae*

Item	Group 1	Group 2	Group 3	SEM
Initial weight (kg)	35.36	35.55	36.71	3.15
Final weight (kg)	45.00	45.12	49.12	3.51
Average daily weight gain (g/day)	160.67^{b}	159.51^{b}	206.83^{a}	36.25

Means within a row that do not have a common superscript are different ($P < 0.05$), 1: control, 2: 1 g/day/head *Saccharomyces cerevisiae*, 3: 1.5 g/day/hd *Saccharomyces cerevisiae*.

Key words: *Saccharomyces cerevisiae*, blood parameters, Mehraban lambs

M419 Relationship of blood enzymes and metabolites to residual feed intake of lambs. F. A. Rodriguez-Almeida*, C. Arzola, J. A. Grado-Ahuir, A. Corral, P. I. Ochoa, and G. Jasso-Diaz, *Universidad Autonoma de Chihuahua, Chihuahua, Chihuahua, Mexico.*

The aim of this study was to identify blood enzymes and metabolites (BEM) that do relate to residual feed intake (RFI) as predictor of feed efficiency. A total of 111 F_1 lambs (males and females) weaned at 90 d (BW = 17 ± 3.7 kg), sired by Charollais, Dorper, Hampshire, Suffolk and Texel rams bred to estrus synchronized-Pelibuey and Blackbelly ewes, were utilized. Lambs were fed an ad libitum mixed ration and weighed every 14 d until they reached a minimum BW of 42 kg (81 ± 18 d) for males and 40 kg (110 ± 24 d) for females. At the onset of the feeding trial, blood was collected and creatinine, blood urea nitrogen (BUN), cholesterol, triglycerides, albumin, globulins, glutamate-oxaloacetate transaminase (GOT), glutamate-pyruvate transaminase (GPT), albumin/globulin, GOT/aspartate aminotransferase (AST), GPT/Alanine transaminase (ALT), alkaline phosphatase (ALP), lactate dehydrogenase (LDH), gamma-glutamyl transpeptidase (GGT), creatinine phosphokinase (CPK), BUN/creatinine, and AST/ALT were determined in serum. Residuals of the regression of standardized ADFI on ADG, mid term BW and back fat at slaughter were regarded as RFI (R^2 = 0.55). Animals were classified into 3 categories according to RFI: efficient (first quartile; n = 29), medium (second and third quartile; n = 54), and inefficient (fourth quartile; n = 28). A stepwise analysis was carried out to identify BEM to discriminate animals into feed efficiency groups at the beginning of the feeding period. Entering variables were then analyzed with PROC GLM of SAS, fitting a linear model that included class effects of efficiency group, breed of sire, breed of dam, sex, number weaned (1 or more), 2 way interactions and initial body weight as a covariate. Variables in the discriminant function were ALP, GPT/ALT, CPK, and albumin (R^2 = 0.24). When fat was taken out of the regression equation to predict RFI, the variables in the discriminant function were ALP, AST/ALT and LDH (R^2 = 0.13). It may be concluded that most related variables to feed efficiency groups as defined by RFI were ALP, GPT/ALT, CPK, AST/ALT and LDH.

Table 1. Least squares means for variables affected by growth efficiency groups as defined by RFI: efficient (1st. quartile), medium (2nd. and 3rd. quartile), and inefficient (4th. quartile)

Group	n	ALP ($P < 0.05$)	GPT/ALT ($P < 0.05$)	CPK ($P < 0.05$)	AST/ALT ($P < 0.08$)	LDH ($P < 0.07$)
Efficient	29	170 ± 12^{b}	10 ± 0.8^{b}	200 ± 39^{b}	9.9 ± 0.7^{a}	800 ± 24^{b}
Medium	54	207 ± 9^{a}	13 ± 0.6^{a}	232 ± 29^{b}	8.8 ± 0.5^{ab}	858 ± 17^{a}
Inefficient	28	179 ± 12^{b}	13 ± 0.8^{a}	345 ± 39^{a}	7.7 ± 0.7^{b}	873 ± 23^{a}

Key words: residual feed intake, blood enzymes, metabolites

M420 Nutritive value of *Vicia panonica* forage and its effect on ram Kurdish lamb performance. F. Fatahnia[1], M. Moeini[1], F. Moradi[1], R. Ebnabasi[1], and H. Mirzaei Alamouti*[2], *[1]Department of Animal Science, University of Ilam, Iran, [2]Department of Animal Science, University of Zanjan, Iran.*

This study was conducted to determine chemical composition of *Vicia panonica* forage and its effect on ram Kurdish lamb performance. Male lambs (n = 16; 29 ± 4.3 kg BW; 120 ± 5 d of age) were assigned randomly to one of 4 dietary treatments (7 lambs/dietary treatment). Experimental diets consisted of control diet (without *V. panonica* forage) and diets containing 15, 22.5 or 30% of *V. panonica* forage (DM basis). The experiment lasted for 100 d. Animals were housed in individual shaded pens and fed twice daily with diets (as total mixed ration). *V. panonica* forage used in this experiment had 94.04, 15.55, 1.2, 19.6, 9.5, 1.52 and 0.29% of DM, CP, ether extract, crude fiber, ash, calcium and phosphorus respectively. Data were analyzed using the MIXED procedure of SAS. Dry matter intake was not affected by experimental diets ($P > 0.05$). Average daily gain (ADG) was higher in lambs fed control or 15% *V. panonica* forage containing diets than others ($P < 0.05$). Feed conversion ratio (FCR) was higher ($P < 0.05$) for control and 15% *V. panonica* forage containing diets. Average final weight was similar among all treatment diets. These data indicate that feeding Kurdish lambs diets containing up to 15% *V. panonica* forage did not affect growth performance.

Key words: lambs, nutrition, *Vicia panonica*

M421 Daily supplementation of *Saccharomyces cerevisiae* (strain Sc 47) can cause reduction of blood cholesterol. N. Baleghi[1], A. Taghizadeh[2], A. FarahAvar[3], and H. Khalilvandi-Behroozyar*[3,4], *[1]Islamic Azad University, Maragheh Branch, [2]Department of Animal Science,University of Tabriz, [3]Department of Animal Science, University of Tehran, [4]Department of Animal Science, Urmia University.*

east (*Saccharomyces cerevisiae*) products may exert beneficial effects on ruminant productivity by either increasing fermentability of fiber and/or allowing rumen microbes to more effectively metabolize end products of ruminal starch fermentation. The objective was to evaluate the possible effects of live yeast on live weight gain and selected blood parameters of growing Mehraban lambs. Twelve male lambs (average BW 34+4.2 kg) randomly assigned to 3 groups: a) control, without additive b) 1 g/day/head and c) 1.5 g/day/ head *Saccharomyces cerevisiae* (strain Sc 47) cfu 8 × 102. Additives supplemented via gelatin capsules to TMR ration (alfalfa hay, wheat straw, barley grain, canola meal, wheat bran, Mineral-vitamin mix, calcium carbonate and salt) formulated for 200 g/d weight gain using CNCPS-S. Animals fed experimental rations for a period of 60 d in 2 equal meals. Lambs were weighting after 2 week adaptation period and in weekly intervals after feed restriction. Blood samples withdrawn via heparinized vacuum venoject tubes through Jugular vein in last day of the experiment and analyzed for selected parameters via an autoanalyzer apparatus and commercial kits. Data were analyzed by GLM procedure of SAS 9.1 with CRD design and Duncan test ($P \leq 0.05$). dietary treatments were failed to exert any statistically significant differences in blood urea, glucose, creatinine, albumin, total protein, TG, SGPT and alkaline phosphatase, but there was a trend ($P \leq 0.1$) for increase in blood alkaline phosphates levels. Daily supplementation of *Saccharomyces cerevisiae* was resulted in lower blood cholesterol levels (69.5 ± 4.06, 62.00 ± 4.06 and 51.75 ± 4.06, respectively for control, 1 and 1.5 g/day/head supplementation groups). Also, *Saccharomyces cerevisiae* increased aspartate aminotransferase levels from 102 ± 6.48 to

130 ± 6.48 IU/L in control and 1 g/day/ head supplementation groups, respectively.

Key words: *Saccharomyces cerevisiae*, cholesterol, Mehraban lambs

M422 Cull pinto bean as a supplement to pregnant-lactating hair ewes. F. Castillo*, G. Villalobos, D. Dominguez, J. E. Cruz, A. Anchondo, and J. A. Ortega, *Facultad de Zootecnia y Ecología. Universidad Autonoma de Chihuahua., Chihuahua, Chihuahua, México.*

Cull pinto bean (CPB; *Phaseolus vulgaris*) is a feeding option for sheep producers in northern Mexico. The objective was to evaluate the effect of 3 CPB levels (0, 25 and 50% of concentrate DM) on performance of ewes in late pregnancy (LP) and lactation (L). One-hundred 60 8 pelibuey ewes, 105 multiparous (M), and 63 primiparous (P), were randomly allotted to 1 of 24 pens (8 replications per treatment). Treatments were: 1) Control (C; 0% CPB) Low CPB (L; 25% CPB), and High CPB (H; 50% CPB). Supplements (LP: 0.45 kg; 2.8 Mcal/ Kg DM ME; 15.4% CP; L: 0.95 kg; 2.8 Mcal/Kg DM ME; 21.8% CP) and forage (ad libitum) were offered daily. Ewes were weighed 8 d before calving and each 14 d after it; dry matter intake (DMI) was measured daily; body condition score (BCS) was measured at the end of pregnancy and lactation. Lambs were weighed at birth and each 14 d until weaning. Data for pregnancy DMI (PDMI), lactation DMI (LDMI), pregnancy body weight (PBW), start of lactation body weight (SLBW), end of lactation body weight (ELBW), pregnancy BCS (PBCS) and lactation BCS (LBCS) was analyzed with PROC GLM in a completely randomized design; data for lamb average daily gain (LADG) was analyzed by PROC MIXED in a completely randomized design with repeated measures in the time. Models included treatment and kind of ewe as main effects and their interaction. Interaction effect was not found in any variable ($P > 0.05$). Data for PDMI (C: 1.7, L: 1.7, and H: 1.6 kg), LDMI (C: 2.4, L: 2.3, and H: 2.4 kg), PBW (C: 44, L: 42.7, and H: 42.8 kg), SLBW (C: 41.9, L: 39.6, and H: 40.2 kg), ELBW (C: 39.3, L: 39.2, and H: 38.8 kg), PBCS (C: 2.7, L: 2.6, and H: 2.7) and LBCS (C: 2.8, L: 2.8, and H: 2.8) was not different among treatments ($P > 0.05$). Differences among kind of ewe for PBW (M: 49.5; P: 36.8 kg), SLBW (M: 45.9; P: 35.2 kg), and ELBW (M: 45.1; P: 33.1 kg), were found ($P < 0.05$). No differences ($P > 0.05$) among treatments were found for LADG, lsmeans (kg) were (C: 0.21, L: 0.23, and H: 0.22). Due to the cost of CPB, and equal ewe performance to treatments, CPB use is a recommendable alternative in hair ewe feeding for these productive stages.

Key words: Cull pinto bean, hair ewes, pregnancy-lactation

M423 Effect of different sources of lipid on blood parameters of sheep. E. H. C. B. van Cleef*, D. A. V. Silva, A. C. Homem Júnior, and J. M. B. Ezequiel, *São Paulo State University, Jaboticabal, São Paulo, Brazil.*

Twenty crossbred sheep (19.5 ± 2.9 kg BW) were used to evaluate the effect of different lipid sources on hemogram and serum concentrations of AST, GGT, triglycerides, cholesterol, glucose and urea. The animals were confined for 80 d, in individual pens and received 5 experimental diets containing sunflower grain (SG), peanuts grain (PG), peanut oil (PO) or protected fat (PF) and a control diet without added lipid (CON), formulated in roughage: concentrate ratio of 40: 60, with corn silage as roughage and concentrate composed of corn, soybean meal, citrus pulp and mineral supplement. The blood samples were taken when the animals reached 37 kg BW, 3 h before and after feeding by jugular vein puncture. The statistical design was a completely randomized and the contrasts among treatments and control × lipid sources were analyzed. The lipid sources did not alter ($P > 0.05$) the serum concentrations of GGT triglycerides and urea, comparing to the control diet. Although some contrasts show significant differences ($P < 0.05$) in blood parameters studied, the results are within normal ranges as suggested by the literature. However, it is emphasized that the animals that received PO diet showed increases ($P < 0.05$) in cholesterol value and decrease in erythrocyte and hemoglobin, comparing to grain diets studied (PG and SG), which may indicate damage to animal health and consequent production decrease. The protected fat caused decrease ($P < 0.05$) in erythrocyte count and hemoglobin concentration. All the parameters analyzed showed minimum variations in serum concentrations when compared with normal indicated by the literature. The increase serum levels of AST and cholesterol in pure oil diets ($P < 0.05$) can indicate possible liver alterations. It was concluded that the inclusion of lipids from oil seeds is better for animal health than oil, and that the control diet conducted to more favorable results of serum AST and cholesterol.

Key words: blood, feedlot, ruminant

M424 Use of ionophores in Santa Inês lambs diet for meat production. P. M. França[1], J. R. O. Pérez[1], V. A. A. Reis[1], I. F. Furuscho-Garcia*[1], R. F. Leite[2], F. Oliveira[3], S. P. Greca[1], and I. Leopoldino Junior[1], *[1]Universidade Federal de Lavras, Lavras, Minas Gerais, Brasil, [2]Universidade Paulista Júlio de Mesquita Filho, Jaboticabal, São Paulo, Brasil, [3]Universidade Paulista Júlio de Mesquita Filho, Botucatu, São Paulo, Brasil.*

The experiment was carried out at the Sheep Production Sector of Federal University of Lavras (UFLA), Brazil, to evaluate the effect of adding ionophores (monensin and lasalocid) in the diet on performance, digestibility, carcass and meat quality characteristics in lambs on feedlot. Eighteen lambs were used in a Completely Randomized Design and the animals were allotted to 3 treatments (control diet, diet plus monensin, diet plus lasalocid), with 6 replicates per treatment. The ionophore dose was based on the rumen content using the equation: y = −0.0014 x2 + 0.2034 × −0.8376, that is obtained through a compilation of data on rumen content (kg) relative to body weight (kg) from several experiments conducted in the Department of Sheep Production, (UFLA). A reference dose of 14.85 mg per kg of rumen contents was given. The lambs were slaughtered at 45 kg live weight. Data were analyzed using GLM procedure of SAS and the means compared using the *t*-test. The use of ionophores, monensin and lasalocid increased the average daily weight gain of lambs, but did not affect consumption. In the digestibility trial, the intake and the dry matter, crude protein, neutral detergent fiber and acid detergent fiber digestibility were not influenced by additives. Initial and final pH, color, tenderness, cooking loss, and chemical composition of meat were not affected by ionophores. The concentration of the fatty acid C18:2 C9T11 (CLA) in Longissimus lumborum muscle increased with the use of monensin and lasalocid, which may be a promising tool to further improve the nutritional value of meat and an important strategy to promote this product. In conclusion, the use of ionophores in the diet of confinement lambs can produce favorable results if used properly.

Key words: carcass, meat quality, sheep

M425 Evaluation of behavior and apparent dry matter intake of sheep in tropical pasture. F. P. Portilho*[1,2], J. M. S. Diogo[1], and S.

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The aim of this study was to evaluate the ingestive behavior (size of bite, bite rate and grazing time) and apparent dry matter intake in sheep grazing *Cynodon dactylon* 'Coastcross' and *Panicum maximum* 'Aruana'. For the evaluation of feeding behavior, adult male, crossbred Santa Inês (n = 3; 42 kg) were used (one animal per plot). Data were collected on the DM content (%), canopy height (cm), the availability of dry matter (kg DM / ha), the percentage of leaves (%), the percentage of stem (%) and the percentage of dead material (%), leaf: stem and leaf, dead material. The data were analyzed using the T TEST procedure in SAS, and correlations were generated through excel. The plots of Aruana (2,113 and 2,121 kg DM / ha) and Coastcross (1,545 and 2,619 kg DM / ha; February and June cuts, respectively) did not differ ($P > 0.05$). In February there were no differences ($P > 0.05$) among the grasses or the average percentage of leaf, stem and dead material. However, there were differences ($P < 0.05$) in average canopy height and average content of dry matter. The canopy height was higher ($P < 0.05$) in Aruana compared with Coastcross, 68cm and 35cm, respectively. The DM content was higher in Coastcross (42%) compared with Aruana (36%). In June there were no differences ($P > 0.05$) among the forages in average canopy height, average content of dry matter and mean percentage of dead material. In this period differences in mean percentage of leaves and average percentage of stems were observed ($P < 0.05$). On the other hand, no significant difference was observed related to the intake behavior of sheep in both forages, in those evaluation periods. The plots of both forages did not differ ($P > 0.05$) in the size of bite between the evaluation periods. The correlation between apparent consumption and bite size of the Aruana (0.92) and Coastcross (0.86) were positive. The *Panicum maximum* and *Cynodon dactylon* were similar regarding the pattern of intake behavior and apparent consumption of sheep, regardless of the evaluation period. The dry matter content influenced positively the grazing time and bite rate of sheep, in both forages.

Key words: forage, sheep, Santa Inês

M426 Palatability of sainfoin (*Onobrychis viciifolia* Scop.) in sheep. H. Khalilvandi-Behroozyar*[1,2], M. Dehghan-Banadaky[1], and K. Rezayazdi[1], [1]*Department of Animal Science, University of Tehran, Karaj, Tehran, Iran,* [2]*Department of Animal Science, University of Urmia, Urmia, West Azerbaijan, Iran.*

Sainfoin is a tanniferous legume forage. Reports about sainfoin CT contents and effects are very variable. Along with possible beneficial effects of tannins, adverse effects on palatability could be demonstrated. An experiment was carried out to evaluate palatability of sainfoin hay compared with control forage (alfalfa), using 6 nonlactating Zandi ewes (45 ± 5 kg BW). Diets were formulated to meet 110% of maintenance energy requirements, using CNCPS-S software and fed 2 equal meals per day at 0800 and 2000 h. Sainfoin and alfalfa provided exactly half of ME. The experiment started with the morning feeding on the first day and finished after the morning feeding on the tenth day. First 3 d were considered as preliminary period. The allocation of the 2 forages was switched between troughs for evening meals, to avoid association of place, forage type, and time of day by the animals. To evaluate the palatability of the sainfoin in comparison with alfalfa, intakes of 2 diets were measured by weighing the boxes at a fixed time (t). Based on preliminary tests, t was set to 10 min after feeding, that was approximately equivalent to the time needed to consume about half of the total feed. Palatability index (PI) was calculated according to Ben Salem et al. (1994) as amount of test forage consumed compared with control forage following the equation: PI (t) = [ITT (t)/ICtr (t)].100, where ITT (t) equals intake of sainfoin after time t per total intake after half a day, and ICtr (t) equals intake of control (alfalfa) eaten after time t per total intake after half a day. Total phenolic, total tannin and condensed tannin contents of sainfoin were 39.4, 38.5 and 21.3 g/ kg of DM, respectively. Palatability index of sainfoin compared with alfalfa, was 274%. Sainfoin CT was reported to have a different monomeric constitution and a higher degree of polymerization than others, that can be responsible for this result. It can be concluded that the chemical properties of CT may be important than the CT content in determining palatability.

Key words: sainfoin, palatability, sheep

M427 Effect of feeding tannin-containing pine bark on fecal bacterial population and methane gas production in Kiko-cross goats. B. R. Min*, S. Solaiman, R. Shange, and R. Ankumah, *Tuskegee University, Tuskegee, AL.*

Eighteen Kiko-cross meat goats (33.4 ± 0.98 kg; n = 6) were used to determine DM intake, fecal DM output, fecal bacterial and in vitro methane gas production. Animals were fed condensed tannins (CT)-containing pine bark (PB) for 83 d and total fecal was collected for 7 d with 2 periods. Experimental treatments included: the control diet – 0% PB and 30% wheat straw (WS; 0.17% CT DM); 15% PB and 15% WS (1.6% CT DM) and 30% PB and 0% WS (3.2% CT DM) as fed. Freshly dried PB and WS were finely (1.5–3 mm) ground and incorporated in the grain mix to provide 0, 16, and 32 g CT/kg DM in 0, 15, and 30% PB diets, respectively. Fecal bacterial populations were measured using a 16S-based pyrosequencing technique to characterize and elucidate changes in bacterial diversity among the diets. Fecal samples collected from each goat were pulled for each treatment for sequencing analysis. In vitro methane gas production was measured as plunger displacement (mL) at 0 to 24 h incubation periods with fecal inoculants that were obtained from experimental animals. Total methane gas production was estimated from total fecal DM output and in vitro methane gas production per unit of fecal material. Fecal DM output was linearly increased ($P < 0.04$) with PB supplementation (375, 386, and 460 g DM/animal for 0, 15 and 30% PB diets respectively), but estimated methane gas (291, 158, and 51 mL/goat per d; $P < 0.01$) and in vitro methane (0.77, 0.42, and 0.11 mL/g of feces) gas production decreased (linear; $P < 0.001$) as the level of PB increased in the diet. Predominant fecal genera were Flavobacteriaceae (up to 18%), Oscillibacter (up to 15%), and Oscillibacter spp. (up to 17%) of microbial population in 0, 15 and 30% PB diets, respectively. The proportion of Flavobacteriaceae (25, 4.5, and 3%), Acinetobacter (4.6, 3.1, 4.1%), Acinetobacter-baumannii (4.9, 3.0, and 5.8%), Moraxellaceae (4.4, 1.1, 1.2%), and *E. coli* (6.3, 2.1, and 2.1%) population decreased as the level of PB supplement increased in the diet. These results indicated that feeding PB reduced methane gas and *E. coli* population and modified fecal bacterial population.

Key words: fecal bacteria, methane gas, pine bark