and 2) degraded rumen protein (RDP), 3) truly absorbed undegraded protein (ARUP), 4) microbial protein (MCP) synthesized in the rumen from rumen available protein or 5) from total digestible nutrients (TDN), 6) truly absorbed rumen synthesized microbial protein (AMCP), 7) truly absorbed rumen endogenous protein (AECP), 8) total metabolizable protein (MP), as well as 9) the protein degradation balance (PDB). The results show using NRC-2001 with inputs based on in situ and mobile bag techniques measurements, the protein degradation balance and total metabolizable protein supply to dairy cattle could be quantifiably predicted. However, the results differed from that published with the DVE/OEB system (which is a non-TDN based model) although the two models had significant correlations with high R square (> 0.99) values. Using the NRC model, the overall mean for the total absorbed protein in the small intestine was higher (+10 g/kg DM), but the protein degradation protein balance values were lower (-12 g/kg DM) in comparison to that predicted by the non-TDN based model. These differences are due to considerably different factors used in calculations in the two models, although both are based on similar principles. This indicates that a further refinement is needed for a modern protein evaluation and prediction system

Key Words: Modeling Nutrient Supply, Ruminants, NRC and DVE/OEB

T237 Comparison between nylon bag method and gas production method in determination of feedstuff nutritive value. A. Nikkhah* and A. Mahdavi, *University of Tehran*, *Karaj, Tehran, Iran*.

This investigation was conducted to determine dry matter digestibility (DMD), crude protein degradability (CPD), neutral detergent fiber (NDF), acid detergent fiber (ADF) and gas production of some feedstuffs with different methods. Six cannulated bulls (Holstein and Sistani bulls) in a complete randomized design with two replicates were used. The amounts of gas production at 0, 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours and feedstuffs degradation by nylon bag at 0, 4, 8, 16, 24, 48, 72 and 96 hours were measured. The feedstuffs that were used in this study included: alfalfa hay, wheat straw, corn silage, concentrate and cottonseed, which consumed at maintenance level by experimental animals. Dry matter degradability at 96 hours for alfalfa hay, wheat straw and corn silage were 71.52%, 51.02% and 77.89% and at 48 hours for concentrate and cottonseed were 80.59% and 53.51% and the dry matter degradability for these feedstuffs at 24 hours were 66.93%, 33.57%, 68.24%, 79.83% and 48.71%, respectively. The amount of gas production at 96 hours of incubation for alfalfa hay, wheat straw and corn silage were 51, 45, and 75.5 mL/h and for concentrate and cottonseed at 48 hours of incubation were 81 and 58.5 mL/h, respectively. Correlation coefficient between dry matter degradation and gas production for these feedstuffs were 0.99, 0.99, 0.99, 0.96 and 0.99, and correlation coefficient between crude protein degradation and amount of gas production were 0.97, 0.99, 0.99, 0.99 and 0.98 respectively. Due to high correlation coefficient between dry matter degradation, crude protein degradation, ADF degradation, NDF degradation and gas production, regression equations between these parameters and gas production were calculated to estimate amount of these parameters from amount of gas production without doing digestion experiments. The calculated regression equation between alfalfa dry matter degradation and its gas productions was: Y=35.724+0.714X, so for 51 mL gas production for alfalfa at 96 hours, this equation estimate 72.14% degradation for alfalfa dry matter that is in a good agreement with 71.52% from digestion experiments.

Key Words: Feedstuff, Gas Production, Nutritive Value

Ruminant Nutrition: Small Ruminants

T238 Effect of dietary copper supplementation on fatty acid profile of muscle, mesenteric, and subcutaneous adipose tissue in goat kids. E. Ellis[1], W. Bergen[1], S. Solaiman[2], and K. Cummins*[1], [1]*Auburn University*, *Auburn*, [2]*Tuskegee University*, *Tuskegee, AL.*

A feeding trial was conducted to evaluate the effect of dietary copper (Cu) supplementation at 0, 100 and 200 mg/d above basal intake on relative amounts of fatty acids in various tissue depots of goats (n=5/treatment). Copper was given daily in gelatin capsules. Goats were slaughtered at 98 days of the experimental protocol. Samples of longissimus dorsi muscle and subcutaneous and mesenteric adipose tissue were taken after slaughter and flash frozen and kept at -80 degrees C until analysis. Total lipids were extracted with cholorform:methanol (2:1), fatty acid methyl esters were prepared and analyzed using gas chromatography and mass spectrometry. Data are expressed as percent of the total lipids. Dietary Cu supplementation elicited a variable effect depending on the tissue. In muscle C15:0 increased linearly with increasing Cu (P<.05; 0.08, 0.17, 0.17 for 0, 100 and 200 mg/d dietary Cu, respectively). Dietary Cu supplementation resulted in an linear decrease in C14:0 (P<.03; 3.96, 3.22, 2.63 for the 0, 100, and 200 mg/d Cu, respectively) and C16:0 (P<.02; 25.56, 23.76, and 23.86 percent for 0, 100 and 200 mg/d Cu) in subcutaneous adipose. In mesenteric adipose C18:2 trans, trans isomer tended to increase P<.06; 0.05, 0.1, and 0.07 percent for the 0, 100 and 200 mg/d Cu) with increasing Cu. Ten other hydrophobic, methylated compounds for which standards were not available were identified in mesenteric adipose tissue, based on melting point in the GC, linear retention time, and mass, as being altered in relative concentration by dietary Cu supplementation. Two other compounds, one in each of subcutaneous adipose and muscle tissue, were altered by dietary Cu supplementation. Dietary Cu supplementation altered the fatty acid profile of various tissues in the goat kid. The effect varied with tissue and affected different fatty acids in different tissues. The effect on odd-chain fatty acids observed in muscle may indicate an effect of dietary Cu on rumen microorganisms. Dietary Cu supplementation may offer a means of altering carcass lipid profile as well as content.

Key Words: Copper, Goat, Lipid

T239 The effect of dietary n-6/n-3 fatty acid ratio on feed intake, digestibility, and fatty acid profiles in muscle of growing lambs. S. C. Kim*[1,2], A. T. Adesogan[1], C. R. Staples[1], and L. Badinga[1], [1]*University of Florida*, *Gainesville*, [2]*Gyeongsang National University*, *Jinju, Gyeongsangnam-do, Korea.*

This study investigated the effect of modifying the n-6/n-3 ratio of dietary oil supplements on apparent digestibility, growth performance and foreshank fatty acid profile of growing lambs. Forty individually housed, Katadhin cross lambs (average of 20.0 kg initial BW) were fed bermudagrass hay (10.5% CP and 1.25% EE) in ad libitum amounts and were supplemented with a concentrate (18.7% CP and 7.7% EE) containing corn, soybean meal and oil (72:24:4) at 3.7% of BW. The lambs were blocked by BW and randomly assigned to four dietary oil supplement treatments containing n-6/n-3 ratios of 2:1, 10:1, 16:1 and 20:1 by mixing linseed oil, cottonseed oil, and soybean oil. At the end of the 28-d trial, samples of blood, rumen fluid and foreshank tissue were collected at slaughter. Increasing the n-6/n-3 fatty acid ratio of the supplemental oils did not affect DM intake (960 g/d), apparent digestibility of DM (74.1%), CP (49.4%), or EE (82.6%), ruminal fluid concentrations of acetate (32.8 molar %), propionate (37.8 molar %) and ammonia (30.6 mg/100 ml) or BW gain (0.26 kg/d). Plasma concentrations of IGF-1 and insulin tended to increase linearly with increasing n6/n3 ratio (P=0.15). Increasing the n-6/n-3 fatty acid ratio of the supplemental oils linearly changed the fatty acid concentration of the foreshank lipid (% of lipid) as follows: C18:2 (17.0, 20.3, 22.9, and 28.8%), trans-10,cis-12 CLA (0.01, 0.04, 0.06, and 0.04%), C20:4 n-6 (8.9, 10.7,13.1, and 14.7%), and total polyunsaturated fatty acids (31.2, 34.6, 39.9, and 47.9%) increased linearly whereas the n6/n3 ratio increased in a quadratic fashion (5.5, 9.9, 10.6, and 10.6). Alternatively, concentrations of C14:0, C16:0, C16:1, C18:1, C18:3, cis-9,trans-11 CLA, saturated fatty acids, and monounsaturated fatty acids decreased in either a linear or quadratic fashion as the n6:n3 ratio increased. Feeding oils to young lambs can change the fatty acid profile of muscle lipid fractions.

Key Words: Lamb, Digestibility, Fatty Acid Profiles

T240 The effect of supplemental feeding duration on performance of Balouchi ewes. V. Kashki*[1], M. R. Kianzad[2], M. Raisianzadeh[1], M. Nowrozi[1], and A. Davtalabzarghi[1], [1]*Agriculture and Natural Resources Research Center of Khorasan*, *Mashhad, Khorasan, Iran*, [2]*Animal Science Research Institute of Iran*, *Karaj, Tehran, Iran*.

Balouchi sheep are a widespread breed of meat-wool sheep in Iran and Khorasan province. The available pastures in this area are low in energy and protein contents. Therefore supplemental feeding is one important management factor for sheep production. In order to study the effect of supplemental feeding duration on performance of Balouchi sheep, 150 Balouchi ewes, aged higher than 3 years were selected for uniformity in BW, age and production from a flock of approximately 3,000 Balouchi ewes and studied in an incomplete random design. 250 g barley grain was fed once daily for supplementing in periods from pre-breeding to weaning. Treatments included 1) no supplement (control) 2) supplemented from 30 d prior to breeding to weaning 3) supplemented from breeding to weaning 4) supplemented from 30 d prior to lambing to weaning 5) supplemented from lambing to weaning. Ewe body weight changes, grease fleece weight, milk production, lamb birth weight, lamb weaning weight and average daily gain for lambs were measured. Experiment data were analysed using the GLM procedure of SAS (6.12). Treatment had significant effects (P<0.05) on ewe weight 30 d after lambing, and control had less weight. All ewes lost weight 30 d after lambing. Control had higher daily loss weight in 30 d after lambing than other treatments and treatment 5 lost less weight. The ewe weight was affected by treatment at the time of weaning (P<0.05). Daily milk production was not affected by treatment. Fleece weight was affected by treatment (P<0.05) and treatment 2 had the largest value. The lamb birth weight was not affected by treatment. But treatment had significant effects on weight of lambs in 30 d (P<0.05) and treatment 5 and 2 were higher than others. The lamb weaning weight and ADG was significantly different between treatments (P<0.05) and receiving feed treatments had lambs with higher weight than control. Result showed if supplemental feeding ewes is done in pasture condition from 30 d prior to breeding to weaning, ewes won't lose weight in the end of year, and their life time will increase.

Key Words: Supplemental Feeding, Barley Grain, Balouchi Sheep

T241 Vitamin E improves the number of transferable embryos and born lambs in superovulated ewes. H. Luo*, S. Zhu, and Z. Jia, *China Agricultural University*, *Beijing, PR. China*.

The effect of Vitamin E on the multiple ovulation embryos transfer (MOET) was studied in two experiments. Fourteen ewes (Poll Dorset) were divided into two groups in Exp 1, and Vitamin E was added 400mg/day to the diet and 16 times higher than the NRC standard in the treatment group. Both group ewes were superovulated normally. The number of the transferable embryos per donor in the treatment group was higher significantly ($P < 0.01$) than in the control group (5.2 and 2.4 respectively). The ratio of the transferable embryos to eggs recovery and the A-grade transferable embryos per donor were significantly different ($P < 0.01$) with 44% vs 100% and 2.25 vs 4.43 in the control and the treatment, respectively. The percentage of number of A-grade transferable embryos was 60.8%, more 2.18 transferable embryos per donor than the control ($P < 0.01$). To investigate the effect of vitamin E on the number of the born lambs of synchronized estrus ewes, the embryos, obtained from the control group and the treatment group in Exp.1, were transferred to the recipients (Small-tail Han sheep, Local sheep) of the control group and the treatment group in Exp.2, respectively. One A-grade transferable embryo was transferred for each recipient. Significantly differences ($P < 0.01$) were found for the rate of the lambs born with 46.15% (6/13) vs 88.88% (16/18) in the control and the treatment groups respectively. However, one dead lamb was in the treatment group, and one weak lamb was in each group. There were no differences significantly ($P > 0.05$) on the birth weights of born alive lambs and the gain body weight per day between two groups. The beneficial effects of Vitamin E could be attributed to its antioxidation. In conclusion, the present study showed that supplement of Vitamin E in the ration increased significantly ($P < 0.01$) the embryos yield and the number of born lambs.

Key Words: Vitamin E, Embryo Transfer, Ewe

T242 Effects of mild heat stress and sub-acute ruminal acidosis on acid-base balance and gastrointestinal tissue histology in lambs. N. Odongo*, O. Alzahal, M. Lindinger, T. Duffield, E. Valdes, S. Terrell, and B. McBride, *University of Guelph*, *Guelph, Ontario, Canada.*

The effect of heat stress (HS) and grain induced sub-acute ruminal acidosis (SARA) on acid-base balance and gastrointestinal tissue integrity in lambs was investigated using 24 yearling wether lambs. Lambs were blocked by body mass and assigned to one of 4 treatments: 1) thermo-neutral zone (temperature = 18 to 20°C; relative humidity (RH) = 30%; TN); 2) TN + SARA; 3) heat stress (temperature = 35°C for 9 h/d, 20°C for 15 h/d; RH = 40%; HS); and 4) HS + SARA in a 2 x 2 factorial experiment. Blood samples were collected by jugular venipuncture and analyzed for pH, blood gases and plasma ions. After all measurements in live animals had been taken on d 17, lambs were slaughtered and tissue samples obtained from the rumen, duodenum, jejunum, ileum and caecum for histological assessment. HS lambs had higher respiration rates (157 vs. 85, HS vs. TN; $P < 0.05$) than the TN lambs. At d 10, HS lambs on the control diet (HS + control) had lower pCO_2 (38 vs. 46, HS vs. TN; $P < 0.05$) whereas HS lambs on the SARA diet (HS + SARA) had higher pCO_2 (42 vs. 37, HS vs. TN; $P < 0.05$). Although the HS + control lambs had lower ($P < 0.05$) [SID] than the HS + SARA lambs at d 10, from d 14 to d 17, all HS lambs had lower [SID] (52 vs. 47 (d 14), 48 vs. 46 (d 17), TN vs. HS; $P < 0.05$). HS + SARA lambs had higher [Cl^-] (106 vs. 102 (d 14), 107 vs. 104 (d 17), HS + SARA vs. HS + control; $P < 0.05$) and lower [HCO_3^-] (27 vs. 29 (d 14), 30 vs. 32 (d 17), HS + SARA vs. HS + control; $P < 0.05$). HS + control lambs had higher papillae count in the ventral sac (rumen) than HS + SARA lambs (1.5 vs. 1.3, control diet vs. SARA; $P < 0.05$). These results suggest that in the short-term, SARA may counteract the alkalizing effects of mild HS on acid-base balance without affecting gastrointestinal tissue integrity.

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Key Words: Heat Stress, Ruminal Acidosis, Acid-Base Balance

T243 Assessment of milk yield and milk composition using soybean hulls as a roughage replacer for Santa Ines ewes. R. C. Araujo, A. V. Pires*, I. Susin, C. Q. Mendes, G. H. Rodrigues, I. U. Packer, and L. V. Gerage, *ESALQ/ University of São Paulo*, *Piracicaba, SP, Brazil.*

Soybean hulls (SH) as an alternative feed to forage may maintain the NDF level and increase energy concentration of ruminant diets. The objective of this experiment was to evaluate the efficacy of replacing coastcross hay NDF by SH NDF on lactation performance of Santa Ines ewes. Fifty-six lactating ewes (initial BW 56.0 ± 0.5) were penned individually and used in a complete randomized block design according to parity, type of rearing (single or twin), offspring gender and lambing date. Hay NDF from a 70% roughage-based diet (SH0) was replaced with SH NDF by 33% (SH25), 67% (SH54) and 100% (SH85), containing 0, 25, 54 and 85% of SH in the diet DM, respectively. Diets were formulated to provide a similar amount of NDF (57%) and CP (16%). Ewes were milked by hand once a week, from second to eighth week of lactation (weaning time). Milk production in a 3h-interval was recorded and sampled for composition determination by infrared analysis. A quadratic effect ($P < 0.01$) for 3-h milk production (142.4, 179.8, 212.6, 202.9 g) and DMI (2.27, 2.69, 3.25, 3.00 kg/day) was observed as SH level increased from 0 to 85%. Milk fat (7.59, 7.86, 7.59 and 7.74 %), protein (4.53, 4.43, 4.40 and 4.55%), lactose (4.95, 5.06, 5.15 and 5.13%) and total solids (18.24, 18.54, 18.39 and 18.64%) were similar ($P > 0.05$) for SH0, SH25, SH54 and SH85, respectively. Body weight gain during the trial was 0.37, 0.03, 4.80 and 2.80 kg, as SH level increased from 0 to 85%, showing a cubic effect ($P < 0.01$). Week effect ($P < 0.01$) was observed for milk production, DMI and milk components. Treatment and week of lactation interaction ($P < 0.05$) was observed for DMI and milk protein percentage. The addition of SH as a non-forage fiber source for lactating ewes improved DMI and milk production without changing milk components percentage.

Key Words: Fiber Source, Hair Sheep, NDF

T244 Apparent digestibility of pomegranate seed fed to sheep. R. Feizi*[1], A. Ghodratnama[1], M. Zahedifar[2], M. Danesh Mesgaran[3], and M. Raisianzadeh[1], [1]*Agricultural and Natural Resources Research Center of Khorasan*, *Mashhad, Khorasan, Iran*, [2]*Animal Science Research Institute Iran*, *Karaj, Tehran, Iran*, [3]*Ferdowsi University of Mashhad*, *Mashhad, Khorasan, Iran*.

Pomegranate by-products (peel and seed) contain about 40-45 percent of the fruit's weight, but little information is available on their nutritive value. The general objective of this study was to evaluate nutritive value of pomegranate seed (PS). In order to determine the apparent digestibility of PS 16, Baloochi rams were used in a completely randomized design with 4 replicates in each of 4 treatments. The animals were allocated to individual metabolic cages with four diets including (1) 100% alfalfa hay as a basal diet, (2) 75% alfalfa+25% PS, (3) 50% alfalfa+50% PS and (4) 25% alfalfa+75% PS. A three-period feeding schedule was used consisting of adaptation (10 d), preliminary (21 d) and restricted intake period (10 d) in which total feces were weighed and sampled daily. Data were analysed using the GLM procedure of SAS. The results indicated that amount of DM, OM, CP, CF, ether extract (EE), nitrogen free extract (NFE) and total extractable tannins (TET) of PS were 94.8, 96.8, 11.4, 38.9, 1, 45.5 and 3.5% respectively. The data indicated that increasing the percentage of PS from 25 to 75 resulted in a significant decrease ($P<0.05$) of nutrients digestibility, however, when the digestibility of PS was determined by difference method, there was not significant difference between levels of 25, 50 and 75% of PS. The coefficient digestibility of DM, OM, CP, CF, EE, energy, NFE, TDN and digestible OM content in DM (D-value) PS that calculated by difference method were 44.8, 44.7, 62.5, 21.5, 38.3, 45, 61.5, 45.9 and 48.4% respectively. The results of this experience demonstrate the potential of PS can be used in animal nutrition. Also indicated that inclusion of PS up to 25% of the diet has no negative effect on the nutrients intake and digestibility.

Key Words: Digestibility, Pomegranate Seed, Sheep

T245 Effect of feeding pistachio skins on feed intake, milk yield and milk composition in lactating saanen goats. A. A. Naserian and P. Vahmani*, *Ferdowsi University of Mashhad*, *Khorasan, Iran*.

Pistachio skins (seed coats) are a by-product of the pistachio processing in order to produce green kernels. The objective of this study was to determine the effect of pistachio skins (PS) as a feed ingredient for lactating dairy goats in the early lactation. Four multiparous lactating saanen goats (55±7.2 DIM and 47.12±6 Kg BW) were used in a 4×4 replicated Latin square design experiment. Goats were fed a mixture of 40% alfalfa hay and 60% concentrate (DM basis) ad libitum and milked twice daily. Treatments were 1) 0% PS (Control diet), 2) 7% PS, 3) 14% PS, and 4) 21% PS in dietary dry matter. The PS were substituted for wheat bran in the control diet. Each experimental period was for 21 days, which included 14 days of adaptation to the experimental diets followed by 7 days sampling period for determination of dry matter intake (DMI), milk production and composition. Chemical analysis showed that PS contained 21.3% CP, 19.6% ether extract, 37.6% NDF, 22.1% ADF, and 4.2% ash (DM basis). Increasing levels of PS in diets had no significant effect on DMI, milk yield, milk protein, lactose and SNF ($P>0.05$), but there was a trend for increased milk production and milk protein for goats fed 14% PS compared with goats fed other treatments. Milk fat was increased ($P<0.05$) from 3.1% to 3.96% as the level of PS in the diet increased from 0 to 14% in dietary DM. DMI as a percentage BW was increased ($P<0.05$) for goats fed 21% PS compared to goats fed 7% PS or control diet. The result of this study showed that because of the nutrient content, PS can be a desirable feed ingredient for dairy goats in the early lactation. However additional research projects are needed to determine the nutritive value and effect of PS on other ruminants, particularly in dairy cattle.

Key Words: Pistachio Skins, Milk Composition, Dairy Goats

T246 Dried citrus pulp as a replacement for corn in diets for feedlot lambs. G. H. Rodrigues, I. Susin*, A. V. Pires, C. Q. Mendes, R. C. Araujo, I. U. Packer, and M. F. Ribeiro, *ESALQ/University of São Paulo*, *Piracicaba, SP, Brazil*.

Dried citrus pulp (DCP) is a high energy by-product and may be used to replace corn in early weaned lamb diets. Sixty-four Santa Ines ram lambs (initial BW 18 ± 0.6 kg and 73 ± 1 d old) were assigned to a complete randomized block design according to body weight and age at beginning of the trial. The objective was to evaluate the effects of replacing corn by dried citrus pulp on lamb growth and carcass yield. Lambs were fed a 90% concentrate (ground corn and/or DCP, soybean meal and minerals) and 10% coastcross hay (*Cynodon* spp) diet for 56 days. DCP was added at 23.7, 46.1 and 70.4% of the diet DM replacing corn from the control diet (CON) by 33, 67 and 100% corresponding to the experimental treatments DCP24, DCP46 and DCP70, respectively. Lambs were slaughtered when reached 33-34 kg BW. Average daily gain (ADG) and dry matter intake (DMI) showed a cubic ($P<.05$) effect (ADG: 253, 267, 203 and 166 g; DMI: 943, 1007, 859 and 843g/d for CON, DCP24, DCP46 and DCP70, respectively). Feed efficiency presented a quadratic response. Carcass yield was not affected ($P>0.05$) by citrus pulp inclusion in the diet. However, lambs fed high amounts of DCP needed more days to slaughter. Dried citrus pulp can be included in high concentrate diets for early weaned lambs, up to one fourth of the diet dry matter, with no detrimental effects on performance.

Key Words: By-Product, Hair Sheep, Performance

T247 Comparative effects of soybean meal, canola meal, cull chickpeas and cull chickpeas-meat meal on apparent digestibility of diet for sheep. J. F. Obregón*, J. A. Moroyoqui, J. L. Verdugo, and A. Estrada, *FMVZ-Universidad Autónoma de Sinaloa*, *Culiacan, Sinaloa, Mexico*.

With the objective of determining the comparative effects of soybean meal, canola meal, cull chickpeas and cull chickpeas-meat meal on apparent digestibility of diets for sheep, a digestibility experiment was conducted. Four Pelibuey sheep, males (BW = 21 ± 0.79 kg) were used in a Latin square design experiment. The sheep were placed individually in metabolic crates (0.6 x 1.2 m), and randomly assigned to consume one of four diets in that consist the treatments: 1) diet with 17.21% of CP and 3.49 Mcal of DE/kg, containing (DM basis): soybean meal 16.5%, corn 57%, Sudan grass hay 15%, sugar cane molasses 9%, and mineral premix 2.5% (SM); 2) diet similar to control, but containing 21.5% of canola meal and 52% of corn (CM); 3) similar to control but with 55.5% of cull chickpeas and 18% of corn (CHP); 4) diet similar to control but containing 45.5% of cull chickpeas, 3% meat meal and 25% of corn (CHPM). Diets were offered twice a day (0800 and 1600 h), after six days of adaptation period, samples of diets (1 kg) and the total feces produced were collected during four continuous days. Samples were dried and weighed. DM and CP were performed, and apparent digestibility was calculated. Dry matter apparent digestibility decreased ($P = 0.03$) by CM treatment with values of 80.23%, 82.07%, 81.78% and 81.21% for CM, SM, CHP and CHPM, respectively. Crude protein digestibility was not affected ($P = 0.98$) by treatments with values of 76.48%, 76.77%, 76.03% and 76.71% for SM, CM, CHP and CHPM, respectively. The content of digestible energy of diets with SM and CHP (3.51 and 3.50 Mcal/kg) was higher ($P = 0.01$) than the diets with CM and CHPM (3.43 and 3.45 Mcal/kg), as consequence of that DE of cull chickpeas was estimated to be near of 3.85 Mcal/kg contented in blend soybean meal-corn, ingredients that was substitute for cull chickpeas. The addition of 3% meat meal at cull chickpeas decreased ($P = 0.01$) the DE in the diet. It is concluded, that cull chickpeas and cull chickpeas-meat meal can be included in diets for sheep substituting usual sources of protein as soybean meal and canola meal.

Key Words: Cull Chickpeas, Digestibility, Sheep

T248 The effect of treated wheat straw with molasses, urea and calcium hydroxide on performance of feedlot lambs. R. Feizi*[1] and A. Mohrrery[2], [1]*Agricultural and Natural Resources Research Center of Khorasan, Mashhad, Khorasan, Iran*, [2]*Shahrekord University, Shahrekord, Chaharmahal Bakhtiari, Iran*.

In order to study the effect of wheat straw (WS) treated with molasses, urea and calcium hydroxide on average daily gain (ADG), feed intake (FI), feed conversion (FC) and carcass characteristics, 36 Iranian Balouchi lambs weighing 31 ± 3.25 kg and average age of eight months were used in a completely randomized design with 6 treatments, each consisting of 6 animals. Wheat straw was treated with solutions (1 liter/kg DM) containing molasses (M) plus either urea (U) or limestone powder (LP) and ensiled for 21 days. Dietary treatments were: 1) WS +10% M + 0% U 2) WS + 10% M + 4% U 3) WS + 10% M + 8% U 4) WS + 10% M + 4% LP 5) WS + 10% M + 8% LP and 6) Alfalfa hay was considered as control. Concentrate part of diet were balanced based on start weight and daily gain according to recommendation of NRC (1989). Lambs were fed individually on total mixed ration TMR (roughage:concentrate; 40:60) ad lib. Data were analysed using the GLM procedure of SAS. ADG, FI and FC in lambs fed alfalfa were 212, 1726 g/day and 8.25, respectively. These parameters were significantly better (P<0.05) in alfalfa treatment compared with other treatments. Among the diets including treated wheat straw, the greatest rate (P<0.05) of ADG were observed for ration with 8% of urea. Economic comparison indicated that treated wheat straw with 8% of urea caused reduced feed costs per kg live weight gain compared with other treatments.

Effect of treated wheat straw with molasses, urea and calcium hydroxide on performance of lambs

	Wheat Straw + 10% M					Alfalfa	SEM
	0% U	4% U	8% U	4% LP	8% LP		
ADG (g/day)	149^{c}	157^{bc}	171^{b}	162^{bc}	148^{c}	212^{a}	7.738
FI (g/day)	1456^{d}	1478^{cd}	1583^{bc}	1631^{ab}	1497^{cd}	1726^{a}	43.725
FC	9.75^{ab}	9.56^{ab}	9.28^{b}	9.98^{ab}	10.35^{a}	8.25^{c}	0.355
dressing percent	46.95^{b}	47.18^{b}	47.90^{b}	47.95^{b}	48.46^{b}	51.71^{a}	0.763

Means on the same row with different superscripts significantly differ (P<0.05).

Key Words: Lamb, Urea, Calcium Hydroxide

T249 Growth performance of sheep fed with diets containing soybean meal, cull chickpeas or cull chickpeas-fish meal as protein source. J. F. Obregon*, E. Ibarra, A. Gomez, A. Estrada, and F. G. Rios, *FMVZ-Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico*.

For comparison of growth performance, sheep were fed diets containing soybean meal, cull chickpeas or cull chickpeas-fish meal. Seventy five hair sheep (males; BW = 17.33 ± 2.3 kg) were used in a complete randomized block experiment design. The sheep were weighed and blocked by weight, in groups of five were placed in fifteen pens (2 x 3 m), and assigned to consume one of three diets (DM basis) in that consisted the treatments: 1) Diet with 17.27% CP and 3.48 Mcal of DE/kg, containing: soybean meal 18%, corn 54.5%, stover corn 15%, sugarcane molasses 10% and mineral premix 2.5% (CONT); 2) Diet containing: soybean meal 5.5%, cull chickpeas 40%, corn 27%, stover corn 15%, sugarcane molasses 10% and mineral premix 2.5% (CHP); and 3) Diet with: cull chickpeas 40%, corn 29%, fish meal 3.5%, stover corn 15%, sugarcane molasses 10% and mineral premix 2.5% (CHPFM). Animals were weighed on day 1 and day 56 at the finish of the trail, feed was offered twice a day under free access condition. Treatments did not affect (P = 0.62) end weight (30.91, 30.58 and 31.46 kg) for CONT, CHP and CHPFM, respectively. Average daily gain (0.242, 0.236, and 0.254 kg) were similar (P = 0.55) between dietary treatments. Feed intake in dry matter basis (0.880, 0.901 and 0.913 kg/day) was not modified (P = 0.54) by treatments. Feed/gain ratio were similar (P = 0.42) between treatments with values of 3.65, 3.84 and 3.73 for CONT, CHP and CHPFM, respectively. It is concluded, that cull chickpeas and cull chickpeas-fish meal can be used in diets as protein source without affecting growth performance of sheep.

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Key Words: Cull Chickpeas, Growth Performance, Sheep

Teaching/Undergraduate and Graduate Education

T250 Determining graduation rate of students who initially enrolled as animal science majors at the University of Missouri during a consecutive four-year period. G. Jesse* and M. Ellersieck, *University of Missouri, Columbia*.

Data obtained primarily from the University of Missouri's Student Information System (SIS) were used to determine graduation rate of students who initially enrolled as Animal Science majors as freshmen or transfer students during the fall semester of 1996, 1997, 1998 or 1999. Objectives of this study included: 1) determine the percentage of students who completed a B.S. degree in Animal Science (A.S.), 2) determine graduation rate for all students who enrolled as A.S. majors regardless of what degree they completed, 3) determine why students changed their major or failed to complete their B.S. degree, and 4) determine the predictability of graduation rate. Variables included in the analysis of data included: gender, composite ACT score, high school class rank, advising group, high school graduation class size, predicted grade point average, first semester grade point, cumulative grade point and the student's background (farm/ranch, non-farm/ranch or urban). The total number of students in the data set was 457 representing 378 who enrolled as first semester freshmen and 79 transfer students. The data were statistically analyzed using various procedures of SAS. A questionnaire was sent to 256 former students who either did not complete a degree at MU (126) or completed a baccalaureate degree in a major other than A.S. (130) to attempt to ascertain their reason(s) for changing major or leaving MU. Thirty-five percent of the students completed a B.S. degree in A.S. Approximately 14% completed a B.S. degree in some other major in the College of Agriculture, Food and Natural Resources (CAFNR) and 15% completed a baccalaureate degree in some major outside of CAFNR at the university. Graduation rate ws 63.9% which was similar to the campus average. The use of five independent variables resulted in a 64% accuracy at predicting graduation rate. Poor academic performance was the primary reason students did not complete a B.S. degree.

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Key Words: Graduation Rate, Undergraduates, Animal Science Majors

T251 Digital image gallery to sssist learning animal, dairy and poultry sciences: Photos and illustrations solicited. J. Riesen*[1], H. Hafs[2], L. Katz[2], G. McCone[3], P. Schoknecht[4], and M. Stokes[5], [1]*University of Connecticut, Storrs*, [2]*Rutgers University, New Brunswick, NJ*, [3]*National Agricultural Library, Beltsville, MD*, [4]*University of Richmond, Richmond, VA*, [5]*University of Maine, Orono*.