

lower birth weights ($P=0.05$) than calves born to dams fed supplemental Mn (32.5 vs. 38.3 kg). Whole blood samples were lower in Mn ($P=0.01$) from calves born to control heifers than calves born to supplemented heifers. Several calves born to control heifers suffered from varying signs of Mn deficiency. These symptoms included unsteadiness, enlarged joints, dwarfism, and superior brachygnathism. Results of this study indicate that 18 mg Mn/kg diet DM during gestation is not adequate for normal calf development.

Key Words: Manganese, Heifers, Reproduction

336 Effects of nutrient restriction and organically bound selenium on maternal and fetal organ mass in pregnant ewe lambs. M. A. Ward^{*1}, J. S. Caton¹, J. B. Taylor², J. J. Reed¹, P. P. Borowicz¹, K. A. Vonnahme¹, D. A. Redmer¹, and L. P. Reynolds¹, ¹North Dakota State University, Fargo, ²USDA-ARS Sheep Experiment Station, Dubois, ID.

To examine effects of nutrient restriction and dietary Se on maternal and fetal visceral tissues, 36 pregnant Targhee-cross ewe lambs (53.8 ± 1.3 kg) were randomly allotted to one of four treatments in a 2 x 2 factorial design. Factors were nutrition (maintenance; M vs. 60% maintenance; R) and dietary Se (7.4

$\mu\text{g}/\text{kg}$ BW; NSe vs. 81.5 $\mu\text{g}/\text{kg}$ BW; HSe) from a seleno-yeast product. Selenium treatments were initiated 21 d before breeding and restriction treatments on d 64 of gestation. All diets were similar in CP (16.0%) and energy (2.12 Mcal/kg) density. On d 140 ± 5 of gestation, ewes were slaughtered and tissues harvested. There were no nutrition x Se interactions in ewe data; therefore, main effects are reported. Maintenance fed ewes had heavier ($P < 0.09$) BW (66.3 vs. 55.9 ± 1 kg), stomach complex (1266.3 vs. 935.5 ± 24.9 g), small intestine (569.9 vs. 456.5 ± 12.4 g), large intestine (367.7 vs. 271.3 ± 13.6 g), liver (688.4 vs. 563.3 ± 16.1 g), and kidney (142.9 vs. 127.7 ± 3.6 g) compared with R. Stomach and intestinal differences persisted when data were scaled by empty body weight (EBW). Lung and blood mass (% of EBW) increased ($P < 0.09$) in ewes fed R compared with M diets. Ewes fed HSe had lower ($P < 0.05$) lung mass (0.90 vs. 0.97 ± 0.03 % EBW) compared with NSe. Restricted maternal diets decreased ($P < 0.05$) fetal BW, empty carcass weight, crown rump length, and liver, pancreas, perirenal fat, small intestine, and spleen weights compared with fetuses from M fed ewes. Ewes fed HSe had fetuses with heavier ($P < 0.05$) BW, empty carcass, total viscera, heart, lung, kidney, spleen, and large intestine compared with those fed NSe. These data indicate that maternal nutrition impacts both maternal and fetal organ mass. Further research is needed to assess impacts of maternal nutrition on growth and production of offspring.

Key Words: Nutrient Restriction, Pregnancy, Selenium

Ruminant Nutrition: Small Ruminants

337 Nutritional evaluation of broccoli (*Brassica oleracea*) fodder for goats. K. R. Yadav^{*}, B. S. Tewatia, and S. S. Khirwar, CCS Haryana Agricultural University, Hisar, Haryana, India.

Broccoli has been introduced in India recently and nearly 75% of the plant material is left out in the field after harvesting for human consumption. This left over material has potential value as animal feed. Chemical composition and in vitro dry matter digestibility of eight varieties of broccoli were determined with the objective of utilizing as green fodder for goats. These varieties contained 20.3 to 29.4% crude protein on dry matter (DM) basis while in vitro dry matter digestibility ranged from 77.4 to 92.6%. A digestion trial was conducted on five non-lactating Beetal goats having similar body weight and age, maintained on fresh chaffed broccoli plants as sole feed. The total DM intake of experimental goats was 624.4 ± 39.9 g/d, which was 2.67% of the body weight. Broccoli was highly palatable but its consumption was limited due to high moisture content. The digestibility coefficient of DM, OM, CP, EE, CF and NFE were 83.70, 84.04, 87.84, 87.08, 69.64 and 83.84%, respectively. The broccoli contained 23.94% digestible crude protein (DCP) and 87.20% total digestible nutrients (TDN) on DM basis. All the goats were in positive nitrogen, calcium and phosphorus balance. The results indicated that green broccoli could be utilized as animal feed after harvesting the heads for human consumption.

Key Words: Broccoli, Proximate Composition, Beetal Goat

338 Effects of linseed and cottonseed supplementation on fatty acid composition of goats milk and muscle of suckling kids. A. Nudda^{*}, G. Battacone, S. Fancellu, and G. Pulina, University of Sassari, Sassari, Italy.

The effects of dietary fat supplements on fatty acid (FA) composition of goat milk and possible consequence in the FA profile of muscle in suckling kids was investigated. Fifteen Sarda breed goats, fed 1.2 kg/day of concentrate and hay ad libitum, were divided in two groups supplemented with: i) 40 g/d of fat from linseed (LS), characterized by a high C18:3 concentration, ii) 40 g/d of fat from cottonseed (CS), having high C18:2 content. Kids were fed exclusively on maternal milk until slaughtering (approximately 50 days of age). Twenty-four hours after slaughtering, the *Longissimus dorsi* (LD) muscle was removed from kids. FA profile of goats milk and kids LD was determined. The milk FA profile was significantly influenced by the diets. Compared to CS, the use of LS signifi-

cantly decreased the content of C6-C14 (22.5 vs 19.7%), C16:0 (23.0 vs 20.4) and n6/n3 ratio (7.9 vs 3.5), whereas increased the content of t11-C18:1 (4.54 vs 2.38%) and C18:3-n3 (1.34 vs 0.67%). Moreover, the content of conjugated linoleic acid (CLA) isomers c9,t11 (1.46 vs 0.86%), t11,c13 (0.10 vs 0.03%), t11,t13 (0.11 vs 0.06%) and others trans,trans isomers (0.13 vs 0.10%) were higher in LS group ($P < 0.10$). The t10,c12 CLA content was low both in LS and CS (0.01 vs 0.02; $P = 0.13$). The differences in the FA profile of LD between LS and CS groups tended to mirror the differences observed in milk, even if the lack of significant difference probably due to the small number of kids. The results suggested that it may be possible to modify the nutritional value of FA profile of meat from suckling kids by manipulating the diet of the mothers.

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Key Words: Goat Milk, Kid Muscle, Fatty Acid

339 Effects of feeding oilseeds on total tract nutrient utilization and milk composition of lactating ewes. R. Zhang, A. Mustafa^{*}, and X. Zhao, McGill University, Ste-Anne-De-Bellevue, QC, Canada.

Sixteen pure breed Dorset ewes (39 ± 8 DIM) were used in a completely randomized design to determine the effects of feeding different oilseeds on total tract nutrient utilization and milk composition of lactating ewes. Ewes were randomly assigned to one of four dietary treatments (4 ewes per treatment): a control diet with no oilseed (C), a canola seed supplemented diet (CS), a sunflower seed supplemented diet (SS) and a flaxseed supplemented diet (FS). All diets were formulated to be isonitrogenous and the oilseed diets were formulated to contain 6% fat. Experimental period was 21 d in duration with the first 14 d for diet adaptation and the last 7 d for data collection. Results showed that Oilseed supplementation had no effect on DMI (average 2.6 kg/d) or on total tract digestibility of CP (average 62%), NDF (average 57%) and ADF (average 55%). However, DM and gross energy digestibilities were higher ($P < 0.05$) for ewes fed FS than for those fed C or CS. Ether extract digestibility was highest for FS, intermediate for SS and lowest for CS and C ($P < 0.05$). Ewes fed CS produced less ($P < 0.05$) milk than those fed the other dietary treatments. Milk fat and protein percentages were higher ($P < 0.05$) for ewes fed the oilseed diets relative to those fed C. However, milk protein fractions were not affected by dietary treatments. Cheese yield was higher ($P < 0.5$) from milk of ewes fed

oilseed diets than from milk of ewes fed C. However, cheese fat and protein percentages were not affected by dietary treatments

Key Words: Oilseeds, Lactating Ewes, Milk Composition

340 Lactational effects of including soybean oil in the concentrate of dairy goats to increase CLA in milk. M. A. Bouattour, R. Casals*, E. Albanell, X. Such, and G. Caja, *Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain.*

A total of 24 Murciano-Granadina dairy goats milked once daily throughout lactation were used to study the effects of adding soybean oil (SBO) to the concentrate, on lactational performances and fatty acids profile of milk. After 30 DIM, goats were allocated to two balanced groups according to number of lactation, BW and daily milk yield, and kept in two separate pens. Goats were fed daily with a mixture of 50% dehydrated fescue (90.7% DM; 12.3% CP, and 59.0% NDF) and 50% alfalfa pellets (90.9% DM, 15.0% CP, and 47.3% NDF), and 1 kg of concentrate (89.7% DM, 18.5% CP, and 12.4% NDF), to which the SBO was or was not added. Dietary treatments were: C (control) and SBO (6% SBO in the concentrate). Ether extract in the concentrate increased from 4.1 to 9.3% by effect of SBO. The experiment consisted of a two period crossover design (28 d each), during which the forage was offered ad libitum in the pens (1000 and 1700) and the concentrate was individually fed in two portions at milking (0900) and in the afternoon (1600). Data was analyzed using the PROC MIXED of SAS. Final SBO intake in the ration was 2.4% on DM basis. There was no effect of SBO on intake (2.34 kg DM/d), milk yield (1.87 L/d), FCM (2.03 L/d), milk conversion rate (0.86 L/kg DM), BW (40.5 kg), and BCS (2.68). Addition of SBO increased milk fat content (4.4 vs. 4.8%; $P < 0.001$) and fat yield (83 vs. 88 g/d; $P < 0.05$), without effect on milk protein content (3.42%). Short and medium chain fatty acids were reduced ($P < 0.01$) by SBO: C10:0 (11.1 vs. 8.9%), C12:0 (6.2 vs. 4.2%), C14:0 (11.2 vs. 8.6%), and, C16:0 (26.8 vs. 21.9%). On the contrary, SBO increased ($P < 0.01$) long chain fatty acids: C18:0 (8.9 vs. 11.5%), C18:1 (20.4 vs. 27.8%), C18:2 (4.0 vs. 5.1%) and cis 9-trans 11 CLA (0.72 vs. 2.17%). Increase in CLA was 200% compared to control. In conclusion, adding a moderate dose of SBO in the concentrate of dairy goats was a useful way of increasing milk fat and CLA content, without negative effects on intake, milk yield and protein content.

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Key Words: Soybean Oil, Dairy Goats, CLA

341 Effects of addition of different fats to flushing diet on reproduction in ewes. A. Nikkhab*, H. Sadeghi Panah, and A. Zare, *University of Tehran, Karaj, Tehran, Iran.*

To determine the effects of addition of different supplemental fats to flushing diet on reproductive parameters in Iranian fat-tailed ewes, a randomized complete block design was used. Fifty-two non-lactating and non-pregnant six years old Zandi ewes were selected. Feeding of diets was carried out, from two weeks before ram introducing until three weeks after it. Diets were: 1) without supplemental fat, 2) containing 4.5% calcium salts of fatty acids from tallow, 3) containing 4.5% calcium salts of fatty acids from soybean oil and 4) containing 2.25% calcium salts of fatty acids from tallow + 2.25% calcium salts of fatty acids from soybean oil. Diets were isoenergetic and isonitrogenous. Laparoscopy was performed and follicles larger than 3mm and corpus luteum (CL) on both ovary were counted and number of CL was concerned as ovulation rate (OR) index. At lambing, number, weight and sex of lambs and lambing date of ewes were recorded. Analyses of variance were performed using the general linear models procedure of the SAS. OR in group 3 was higher than other groups ($p < 0.05$). Number of follicles which were larger than 3mm in group 2 was lower than other groups ($p < 0.05$). Pregnant rate from first, total of two and three first service periods in groups 3 were higher than other groups ($p < 0.05$). Lambing rate and lamb crop from each of the three service periods were highest in group 3 and lowest in group 1 ($p < 0.05$). Twinning rate from first service period in group 3 was higher than other groups and in groups 2 and 4 was higher than group one ($p < 0.05$). Twinning rate from total of two first service period in groups

3 and 4 were higher than group 1 ($p < 0.05$). No significant differences were detected among dietary groups for twinning rate from total of three first service period. Addition of fat supplement especially from rich sources of unsaturated fatty acids to flushing diet had positive effects on the OR and reproduction performance of ewes. Based on these results we can say that ovary of ewe might need special fatty acids for optimum function. To appear this subject, we need more studies in future.

Key Words: Ewe, Flushing, Ovulation Rate

342 Effects of abomasal infusion of wheat starch or cottonseed oil on performance of lactating Sannen dairy goats. M. Bashtani, A. A. Naserian*, and R. Valizadeh, *Ferdowsi University of Mashhad, Mashhad, Khorasan, Iran.*

Four multiparous lactating Sannen dairy goats in mid lactation (110 days post-partum) were used in a 4×4 Latin squares design to determine the effects of abomasal infusion of wheat starch and cottonseed oil on milk yield and composition. Treatments were abomasal infusion of 1. water (600 ml/d), 2. cottonseed oil (45 g/d), 3. wheat starch (100 g/d in 600 ml water) and 4. mixture of cottonseed oil and wheat starch (22.5 and 50 g/d in 600 ml/d respectively). Goats were fed with a basal diet consisting of 40% alfalfa hay and 60% concentrates that were offered ad libitum. The amount of infused was isocaloric. Each experimental period was 7 days, The first 5 days were used to adaptation goats to infusion treatments, and the last 2 days of each period, were taken samples of milk, rumen liquid and blood. Infusion carried out twice daily with a 50-ml syringe. Infusion of cottonseed oil decreased intake of DM and increased milk fat and total solids. No treatments effects on milk yield, total protein, true protein, casein, NPN, MUN of milk were observed. Cholesterol and triglycerides of plasma increased by infusion of cottonseed oil, however, infusion of starch with cottonseed oil only increased plasma glucose concentration. Ruminant pH and $\text{NH}_3\text{-N}$ concentration were different among treatments. It is concluded that abomasal infusion of cottonseed oil decreased DMI and increased milk fat percentage.

Acknowledgements: Ferdowsi University of Mashhad

Key Words: Cottonseed Oil, Wheat Starch, Dairy Goat

343 Effects of abomasal infusion of glucose or cottonseed oil on performance of lactating Sannen dairy goats. M. Bashtani, A. A. Naserian*, and R. Valizadeh, *Ferdowsi University of Mashhad, Mashhad, Khorasan, Iran.*

Four multiparous lactating Sannen dairy goats in mid lactation (139 days post-partum) were used in a 4×4 Latin squares design to determine the effects of abomasal infusion glucose and cottonseed oil on milk yield and composition. Treatments were abomasal infusion of 1. water (600 ml/d), 2. cottonseed oil (48 g/d), 3. glucose (100 g/d in 600 ml water) and 4. mixture of cottonseed oil and glucose (24 and 50 g/d in 600 ml water respectively). Goats were fed a basal diet consisting of 40% alfalfa hay and 60% concentrates that were offered ad libitum. The amount of infused was isocaloric. Each experimental period was 7 days, the first 5 days were used to adaptation goats to infusion treatments, and the last 2 days of each period, were sampled from milk, blood, and rumen liquid. Infusion of glucose solution and cottonseed oil carried out twice daily with a 50-ml syringe. DMI and milk yield were not affected by any of the infusion treatments. Infusion of cottonseed oil or mixture of glucose and cottonseed oil increased content of milk fat and tended to decreasing content of milk total protein. True protein, casein, NPN, and MUN of milk were not also affected by any of the infusion treatments. Plasma cholesterol and triglycerides concentrations were elevated by infusion the cottonseed oil and mixture of glucose and cottonseed oil, but no effect on other plasma metabolites (glucose, BUN) were observed. pH and $\text{NH}_3\text{-N}$ concentration were not different treatments. It is concluded that in mid lactation, abomasal infusion of cottonseed oil increased milk fat percentage.

Acknowledgements: Ferdowsi University of Mashhad

Key Words: Glucose, Cottonseed Oil, Dairy Goat

344 The effect of live yeast (*Saccharomyces cerevisiae*-1026) on rumen fermentation parameters and blood metabolites of sheep. M. Nowrozi*¹, M. Danesh Messgaran², and M. Abazari¹, ¹*Agriculture and Natural Resources Research Center of Khorasan, IRAN, Mashhad, Khorasan, Iran,* ²*Ferdosi university, IRAN, Mashhad, Khorasan, Iran.*

In order to examine the effect of live *Saccharomyces cerevisiae*-1026 on rumen fermentation parameters and blood metabolites, four rumen fistulated Balouchi lambs at approximately 6 months of age and mean weight of 35±4 kg were randomly assigned to two treatment groups in a change-over split-split plot design. Treatments were: H) High fiber diet (30% concentrate + 70% hay), HY) H + 4 g Yeast /head/d, C) High concentrate diet (70% concentrate + 30% hay) and CY) C + 4 g Yeast /head/d. Yeast supplement contained 1-1.5×10¹⁰ live cells per gram with 96.6% of dry matter and 46% of crude protein. Blood and ruminal fluid samples were collected over a 108 d period at 27 d intervals (including: 10 d of transition period, 14 d of adaptation to the new diet and 3 d of sampling). Yeast culture did not have considerable effect on ruminal fluid of lambs fed HY diet; only it slightly increased the pH from 6.38 to 6.58 during 3 h after feeding, besides, in lambs received CY diet, two hours after feeding a slight increase (P<0.1) was observed due to yeast function (6.05 to 6.22). Both HY and CY treatments significantly affected the ammonia concentration of ruminal fluid; HY decreased (P<0.05) the ammonia contents of ruminal fluid during 1 to 4 h after feeding and CY showed similar effect during 0.5 to 3 h after feeding. Blood urea was significantly decreased 3 h after feeding by HY diet when compared with animals fed H diet (10.72 vs. 13.76 mg/dl). CY significantly prevented the blood urea from increasing two hours after feeding in comparison with C treatment (10.69 vs. 13.74 mg/dl). The production of microbial protein exhibited slight increase in HY treatment (7.48 vs. 6.03 g) and for CY, its increase was not significant (5.85 vs. 5.53 g). The results of present study demonstrate that yeast may increase the efficiency of feed due to increased ammonia consumption by microorganisms existed in rumen.

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Key Words: *Saccharomyces Cerevisiae*, Rumen Fermentation, Sheep

345 Effect of two beta-adrenergic agonists and low energy diet on carcass composition, adipose cell size, blood hormones and metabolites in an Iranian fat-tailed breed of sheep. M. Nowrozi*¹, M. Abazari¹, M. Raisianzadeh¹, A. Zare Shahne², and M. Mohammadi³, ¹*Agriculture and Natural Resources Research Center of Khorasan, Mashhad, Khorasan, Iran,* ²*Tehran University, Karaj, Tehran, Iran,* ³*Guilan University, Rasht, Guilan, Iran.*

Effects of terbutaline (T), metaproterenol (M) and low energy diet (LE) on carcass composition, adipose cell size, blood hormones and metabolites of 72 Moghani culled ewes were evaluated in a completely randomized design for three months. In the first month, ration (12.14 MJ/kg DM) was similar for seven groups and the eighth group was fed low energy ration (10.71 MJ/kg DM) in the whole of study. Diets were fed ad libitum. After 30 days terbutaline and metaproterenol were added to the ration each one at three doses of 5, 10 and 20 mg/kg DM for 60 days. Data were analysed by SAS (1992) and means were compared with LSMEAN. T10 (10 mg/kg DM terbutaline) and M20 increased (P<0.05) final and cold carcass weights of ewes. LE ewes had lower daily dry matter intake than controls (1126 vs. 1500 g/day). Except for T5 and LE, all beta-adrenergic treated groups showed improved (P<0.05) gain:feed of 17.6 to 26.9% compared with controls. Increased (P<0.05) carcass efficiency was obtained by M5, M10 and M20 relative to controls (49.94, 50.07 and 50.64% vs. 46.31%). Total carcass crude protein was higher (P<0.05) for ewes receiving the M20. Ewes treated with T20, M5, M10, M20 and LE had lower (P<0.05) fat-tail weight than controls (3.64, 3.55, 3.54, 3.52, 3.99 kg vs. 4.52 kg). Both beta-agonists and low energy diet resulted in lower (P<0.01) adipocyte mean diameter. Plasma insulin concentration was 24% and 50% lower for M5 ewes than controls on days 30 and 60 respectively. Blood urea concentration was reduced by LE treatment 12.5 and 23.8% on days 30 and 60 respectively. In the second month, plasma T4 concentration was increased (P<0.05) by middle dose of both beta-agonists but in the next month this effect disappeared. Metaproterenol, terbutaline and low energy diet had significant effect on plasma triglyceride, cholesterol, HDL and LDL concentrations. Results indicated that metaproterenol causes a repartitioning of nutrients resulting in improved gain:feed, increased carcass meat and lowered weight of fat tail.

Key Words: Beta-Agonist, Terbutaline, Metaproterenol

Teaching/Undergraduate and Graduate Education: Scholarship of Teaching as Related to Promotion and Tenure

346 The scholarship of teaching and learning: The synergy of scholar and teacher. W. M. Schlegel*, *Indiana University, Bloomington.*

“What we urgently need today is a more inclusive view of what it means to be a scholar – a recognition that knowledge is acquired through research, through synthesis, through practice, and through teaching.”

Ernest Boyer (1990) *Scholarship Reconsidered, Priorities of the Professoriate.*

We continue in the 21st century to struggle with what it means to be a scholar and how scholarship is recognized and rewarded. With vast commitments to our discipline, institution, students, colleagues, family, community, and efforts to be global citizens, we struggle to find a balance and to do so within a system of institutional rewards that has not yet caught up with the interdisciplinary and integrative view of scholarship. Scholarship and teaching have been considered antithetical rather than synergistic. The scholarship of teaching and learning [SOTL] integrates the intellectual efforts of research and teaching. Integration of the fundamental and cutting-edge questions of a discipline with how those questions are conceived, represented, understood, and applied allows for the synergy of disciplinary scholar and teacher resonating a scholarship that is greater than the sum of its individual parts. This scholarly synergy affords a creative synthesis of ideas that enhances and renews our disciplinary thinking and teaching. SOTL is problem posing, aided by methods appropriate to disciplinary epistemologies, with application of results to practice, communication of re-

sults, self-reflection, and peer review and it is a process that facilitates advancement of the profession of teaching (Shulman & Hutchings, 1999). This endeavor is quite different from the pursuit of excellence in teaching and scholarly teaching. This presentation will address these differences as well how SOTL is being represented by individual faculty, disciplines, and institutions with mention of an emerging international society to support this work. Examples illustrating this view of a synergistic relationship between research and teaching will be introduced with a discussion of how this synergy enhances the efforts of both endeavors providing a larger context for the work.

Key Words: Teaching, Learning, Scholarship

347 Promotion and tenure on the basis of excellence in teaching: An institutional perspective. L. Connor*¹ and J. Armstrong², ¹*University of Florida, Gainesville,* ²*Michigan State University, East Lansing.*

Excellence in teaching must be achieved in the prevailing institutional culture (beliefs, values, rules, and processes). Both faculty and administration must be involved in this quest. Teaching must be placed on the same plane as research/extension with no preferential treatment. To attain an appropriate teaching culture, the following institutional actions should be considered: 1) teaching