

## Small Ruminant: Sheep

**TH273 Influence of production traits on the sheep enterprise profitability: A modeling approach.** V. Demers Caron\*<sup>1</sup>, D. Pellerin<sup>1</sup>, and F. W. Castonguay<sup>1,2</sup>, <sup>1</sup>Université Laval, Québec, Québec, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Sherbrooke, Québec, Canada.

Many production traits have an impact on the net income in sheep production systems. Because these traits are all interconnected, it is difficult to quantify their relative impact on the enterprise profitability. A deterministic model, *SimulOvins*, has been developed to simulate the operation of a sheep flock, either in extensive or intensive production systems (3 lambings in 2 years). This discrete events simulation, built on a daily basis, takes into account the following criteria: production structure (number of breeding groups, interval between matings), herd size, breeds, crossbreeding system, parity, ewe fertility and prolificacy at each mating group depending on the breeding season and the out-of-season breeding techniques used, lamb growth and carcass quality adjusted for litter size, culling and mortality rates, production costs (feed, out-of-season breeding techniques, management...) and revenues from lambs sold (new crop, light or heavy lambs), culled animals and wool. Some of the outputs that could be obtained are: flock fertility and prolificacy, number of lambings attained per ewe per year, number of lambs of each type sold per week, labor and space requirement, revenues, variable costs and gross margin. Productivity can be calculated for each mating group, year, breed or parity. By conducting simulations, it is possible to assess the impact of farm-level management decisions on the flock performances. Then, the conversion of the technical data in economic data allows the estimation of the effects of these changes on the profitability. Special efforts were made to build a user friendly tool so that it can be not only used for research, but also for teaching purposes and, ultimately, to help experts in supporting farmers in their management decisions.

**Key Words:** Sheep, Model, Profitability

**TH274 Estimating average fiber diameter and variability of wool fleeces using Optical Fibre Diameter Analysers (OFDA 100 and 2000).** F. A. Pfeiffer\*, C. J. Lupton, and D. F. Waldron, *Texas AgriLife Research, San Angelo, TX.*

Average fiber diameter (AFD) and variability (CV) of wool fleeces are important value determining traits that are measured and used to make animal selection decisions. The traits are accurately determined for individual animals by shearing the whole fleece and measuring a representative (cored) sample using standard methodology. Such procedures are time consuming and expensive. Consequently, faster, less expensive methods have been investigated. Mid-side samples shorn from 729 rams participating in central performance tests between 2004 and 2007 were measured as-is with an OFDA2000 instrument (BSC Electronics, Ardross, Australia) to obtain AFD2 and CV2. The samples were also guillotined close to the base of the staple, and sub-samples were cleaned and measured with an OFDA 100 to obtain AFD1 and CV1. Subsequently, the rams were shorn and whole fleeces were sampled and measured (OFDA 100) in a standard manner to obtain AFD and CV. Data were analyzed using MEANS, TTEST, and REG procedures of SAS. AFD1 > AFD > AFD2 (22.5, 21.8, and 21.6  $\mu\text{m}$ , respectively,  $P < 0.01$ ) and CV > CV1 ( $P < 0.0001$ ) = CV2 ( $P = 0.56$ ; 20.2, 16.0, and 16.1%, respectively). Regression analyses are summarized in Table 1.

In conclusion, the  $r^2$  and slope values indicate the faster methods were not capable of accurately estimating AFD or CV of whole fleeces. Estimates of AFD were more accurate and precise than those of CV. In the absence of standard whole fleece measurements, AFD1 and AFD2 would provide useful guidance for selection purposes.

**Table 1. Regression analyses**

y	x	$r^2$	SEy	Slope
AFD	AFD1	0.79	0.63	0.76
AFD	AFD2	0.73	0.70	0.73
AFD1	AFD2	0.78	0.75	0.87
CV	CV1	0.16	2.40	0.59
CV	CV2	0.21	2.32	0.69
CV1	CV2	0.56	1.18	0.77

**Key Words:** Fiber Measurement, Sheep, Wool

**TH275 Performance of F<sub>1</sub> crossbred lambs from Dorper and Katahdin rams and Pelibuey and Barbados Blackbelly ewes.** G. M. Pérez, F. A. Rodríguez-Almeida\*, M. A. Levario, J. C. Ontiveros, J. A. Villareal, B. Piña, O. G. Núñez, J. R. Peña, and J. A. Ortega, *Universidad Autónoma de Chihuahua, Chihuahua, Chihuahua, México.*

The objective was to compare growth performance and carcass traits of F<sub>1</sub> crossbred lambs sired by Dorper (Dp) and Katahdin (KH) rams mated to Barbados Blackbelly (BB) and Pelibuey (PB) ewes. Fifty six male lambs from five DP rams and 43 from three KH rams were used. Ewe numbers were 52 for BB and 32 for PB. Lambs were from three different lots according to date of lambing. Weights were recorded at birth (LW), weaning (WW; 90 d of age) and slaughter (SW; after 56 d on feedlot). Feed intake (FI) was calculated as the difference between the daily amount of feed offered and the amount rejected. The feedlot diet was balanced according to NRC requirements, with 13 % CP and 3.15 Mcal of ME/kg of DM through an average of 28 kg of BW, and 11 % CP and 3.17 Mcal of ME/kg thereafter. Carcass traits analyzed were yield (CY), weight (CW), length (CL), depth (CD), ribeye area, back fat depth, and weights of kidney fat (KF), rear leg, thorax and loin. Data were analyzed with PROC MIXED of SAS. The model included fixed effects of sire breed, dam breed, number of lambs born (1, 2 or 3), lot, and the interaction of sire breed by lot, and random effects of sire and dam within their respective breeds. Breed of sire was important for LW ( $P < 0.03$ ), CY ( $P < 0.07$ ), and weights of rear leg ( $P < 0.03$ ) and thorax ( $P < 0.06$ ). Lambs from KH rams were heavier than lambs from DP rams ( $2.73 \pm 0.08$  vs  $2.19 \pm 0.08$  kg) at birth, but not thereafter. Lambs sired by DP rams had carcasses with greater CY ( $53.8 \pm 0.5$  vs  $52.5 \pm 0.6$  %) and heavier rear leg ( $2.36 \pm 0.05$  vs  $2.19 \pm 0.06$  kg) and thorax ( $2.60 \pm 0.06$  vs  $2.39 \pm 0.07$  kg) than lambs sired by KH rams. Breed of dam was significant ( $P < 0.01$ ) only for ADG, with a larger mean for lambs from PB than from BB ewes ( $0.298 \pm 0.005$  vs  $0.275 \pm 0.006$  kg/d). In conclusion, lambs sired by DP rams had similar growth performance than lambs sired by KH rams, but resulted in larger carcass yield and weight of a high value cut: the rear leg.

**Key Words:** Growth, Carcass Traits, Hair Sheep Crosses

**TH276 Productive performance and carcass characteristics of hair sheep of different genotypes in feedlot.** F. G. Rios\*, P. Hernandez, J. F. Obregon, D. C. Acosta, R. Cortina, J. J. Ortiz, and J. J. Portillo, *FMVZ-Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.*

To determinate the productive performance and carcass characteristics of hair sheep of different genotypes in the feedlot, 48 ram lambs, 16 Dorper × Pelibuey (D×P), 16 Katahdin × Pelibuey (K×P), and 16 Pelibuey (P), (BW=38.97 ± 1.56 kg) were used in a randomized complete block experiment where block was initial weight. The lambs were assigned to consume a diet fed ad libitum with 15.5 % CP and 2.89 Mcal of DE/kg, consisting of 66 % whole corn grain, 12 % Sudan hay grass, 11.7 % soybean meal, 7.0 % molasses cane, 2.7 % mineral premix, and 0.6 % sodium bicarbonate, during 45 d. Feed intake (FI), average daily gain (ADG), feed efficiency (FE) and carcass traits, were recorded. The data were analyzed with ANOVA for randomized blocks design; Tukey test were utilized to examine the effect of genotype. The harvest weight, FI, ADG and FE were similar (P>0.05) among the breed types. Hot carcass weight were heavier (P<0.05) for D×P and K×P (30.58, and 29.01 vs. 28.40 kg; 0.481 SEM), than genotype P; and *Longissimus thoracis* area was largest (P<0.01) for P and D×P carcasses than genotype K×P (12.68, and 12.30 vs. 10.94 cm<sup>2</sup>; 0.256 SEM). Carcasses of D×P and K×P had greater (P<0.05) fat thickness measurements than P carcasses, and marbling score was greater (P<0.01) in P carcasses than D×P and K×P types. Length of leg was largest (P<0.01) for P carcasses than D×P and K×P. Depth of leg and compact leg index were higher (P<0.05) for D×P and K×P carcasses than genotype P. Carcasses from type P had higher (P<0.01) mesenteric fat and retail product yield than D×P and K×P lambs. Chilled carcass weight (29.07 kg), dressing percentage (58.25 %), body wall thickness (14.28 mm), compact carcass index (0.385), and empty body weight (46.22 kg), were similar (P>0.05) among the breed types. It is concluded that Dorper × Pelibuey hair sheep had superior carcass characteristics but similar productive performance to Pelibuey and Kathadin × Pelibuey types in the feedlot.

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**Key Words:** Hair Sheep, Carcass Traits, Genotypes

**TH277 Comparative reproduction characterization among four crossbred groups of hair sheep: Prolificacy.** W. R. Getz\*, S. Mobini, and S. Gelaye, *Fort Valley State University, Fort Valley, GA.*

The use of hair or shedding breeds of sheep in commercial lamb production systems appears to be increasing in Georgia and the Southeast. Profitability from these enterprises is influenced to a large degree by the number of lambs born and sold. Reproductive rates have been shown to be influenced by breed and type of sheep. Over a six-year period, prolificacy data were collected from 145 ewes in four breed groups. A total of 248 parturitions were recorded including 103 parturitions from crossbred ewes composed of Dorset, Hampshire, Suffolk or western dual-purpose heritage; and three groups of ewes of hair sheep heritage. The hair sheep data included 28 parturitions from halfbred or ¾-bred Katahdin ewes, 26 parturitions from halfbred or ¾-bred Dorper ewes, and 91 parturitions from 50% white Dorper × 50% Katahdin composite ewes. Number of lambs born per ewe across all breed groups was 1.71±.0359. Wool crossbred ewes = 1.67±.0607 lambs; Dorper-cross ewes = 1.69±.0923 lambs; Katahdin-cross ewes = 1.71±.0869 lambs; and Dorper × Katahdin composite = 1.76±.0592 lambs per parturition.

Differences among the individual breed groups were minimal. These data suggest that either of the breed groups would be equally prolific in commercial lamb production systems in middle Georgia.

**Key Words:** Sheep, Breeds, Prolificacy

**TH278 Male effect on heat distribution and pregnancy rate to timed AI and throughout the breeding season in postpartum Santa Ines ewes.** M. V. Biehl<sup>1</sup>, A. V. Pires\*<sup>1</sup>, I. Susin<sup>1</sup>, C. Q. Mendes<sup>1</sup>, F. S. Urano<sup>1</sup>, R. S. Gentil<sup>1</sup>, E. M. Ferreira<sup>1</sup>, G. H. Rodrigues<sup>1</sup>, and M. L. Day<sup>2</sup>, <sup>1</sup>*Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*, <sup>2</sup>*The Ohio State University, Columbus.*

Objectives were to evaluate the effect of presence of the male on distribution of estrus after synchronization and pregnancy rate to timed AI and through the breeding season. Santa Ines ewes (n=270; 45 to 60 days postpartum) were blocked according to parity, lambing date, body weight and body condition score (BCS) and assigned to either: Treatment I (control, n=93) no ram exposure; Treatment II (n=97) presence of teaser rams with lateral deviation of the penis; Treatment III (n=80) presence of vasectomized teaser rams. Rams were introduced into the respective treatments (1 ram:30 ewes) 20 days before the application of an intravaginal progesterone releasing device (Eazi-Breed CIDR<sup>®</sup> with 33 mg of progesterone). The CIDR was withdrawn after 7 days, an injection containing 300 IU of eCG (Folligon<sup>®</sup>) and 5 mg of dinoprost (Lutalyse<sup>®</sup>) was given at that time. Estrous detection was performed continuously from CIDR withdrawal until intracervical timed AI (TAI) 55 hours later. Ewes were exposed to intact rams (3 rams/treatment) for 45 days; beginning 10 days after TAI. Pregnancy status was determined by US at 45 days after TAI and 30 days after the breeding season. Mean BCS was 3.0 ± 0.2. Estrus was detected in 140 (52%) at a mean of 45 ± 13 hours after CIDR withdrawal (21 and 41% between 24-36 and 37-48 hours, respectively), and did not differ between treatments. There was no differences among treatments for pregnancy rate to TAI (34.5%, 93/270) to the first natural mating after TAI (37%, 100/270), or at the end of the breeding season (89.6%, 242/270). These data suggest that TAI approximately 10 hours before recommended by the CIDR manufacturer would coincide with onset of estrus in a greater proportion of ewes. Neither exposure to rams or type of teaser ram used influenced pregnancy rate to TAI or during the breeding season.

**Key Words:** Male Effect, Hair Sheep, TAI

**TH279 Retention of sperm motility, viability and fertility in ram semen after liquid storage at 4°C for up to 96 hours.** J. L. Mook, J. R. Collins, and S. Wildeus\*, *Virginia State University, Petersburg.*

The availability of reliable overnight shipping has provided new opportunities for the use of sheep semen stored at refrigerated temperatures prior to insemination. This experiment evaluated sperm motility and viability, as well as fertility, of ram semen stored at 4°C for up to 96 h. Semen was collected on 7 consecutive days by artificial vagina from 6 hair sheep rams during the breeding season (November), and 4 ejaculates with the highest initial motility were pooled each day. Pooled semen was diluted in a Tris-egg yolk (2.5%) extender with antibiotics, but without glycerol to a concentration of 400 million sperm/ml, pack-

aged in 0.25 ml straws, and stored horizontally at 4°C. Straws were evaluated in triplicate for motility (Minitube SpermVision CASA) and viability (Giesma staining) at 24 h intervals for 96 h immediately after warming and after incubation at 37°C for 6 h. Fertility was assessed in 0 and 72 h-liquid stored semen using 64 post-pubertal ewes. Ewes were estrus synchronized with flurogestone acetate sponges (40 mg, 12-14 d), and 500 IU eCG at sponge removal, and were inseminated in 4 timed, intrauterine artificial insemination sessions on successive days. Data were analyzed for the effect of day of collection, length of storage and incubation on sperm quality, and for the effect of 72 h-storage on fertility. Day of collection affected ( $P<0.01$ ) total (Tmot) and progression of motility, but had no effect on sperm velocity or viability. There was a linear decline ( $P<0.001$ ) from 0 to 96 h in motility (Tmot 76.4 to 56.6%), curvilinear velocity (218.8 to 176.6  $\mu\text{m/s}$ ) and viability (79.1% to 68.1%). Incubation had no effect on sperm motility at any stage of storage, but viability and velocity declined ( $P<0.01$ ) following incubation. Fertility was not different between fresh and 72 h-stored semen (45.2 vs. 41.9%, respectively), but fluctuated between insemination sessions (31.3 to 60.0%). Data suggest that liquid ram semen experienced only a moderate decline in motility and viability after extended cooled storage, but further research is needed to account for the variability observed in individual collections.

**Key Words:** Semen, Ram, Fertility

**TH280 Meat characteristics of crossbred lambs fed normal or heated whole cottonseed<sup>1</sup>.** R. R. P. S. Corte\*<sup>2</sup>, P. R. Leme<sup>2</sup>, G. Aferrri<sup>2</sup>, A. S. C. Pereira<sup>2</sup>, and S. L. Silva<sup>2</sup>, <sup>1</sup>FAPESP, São Paulo, São Paulo, Brazil, <sup>2</sup>Universidade de São Paulo, Pirassununga, São Paulo, Brazil.

Thirty-two crossbred lambs, sixteen males and sixteen females, with average weight and age of 20 kg and 75 days were fed for 63 days to evaluate the effects on the meat characteristics of lambs when there was an inclusion in their diets, in different levels, of normal or heated whole cottonseed. The animals were fed four different experimental diets: CA0, with 0% of cottonseed, CA10, with 10% of cottonseed, CA20, with 20% of cottonseed and CA20H, with 20% of heated cottonseed. For shear force, sensory panel and cholesterol analysis, samples of *Longissimus* muscle were used. Shear force was evaluated with a Warner Bratzler in samples aged 1 or 7 days, trained sensory panel was performed with samples aged 7 days, and cholesterol for enzymatic method was performed with spectrophotometric reading. The animals were assigned to a randomized block design by crossbred type ( $\frac{1}{2}$  Dorper  $\frac{1}{2}$   $\times$  Santa Inês and  $\frac{1}{2}$  Dorper  $\times$   $\frac{1}{2}$  Texel). Effects of treatments were evaluated by analysis of variance using the *MIXED* procedure of SAS software. There was no blocked effect and gender effect on objective tenderness characteristics, sensory panel or cholesterol. Meat characteristics, such as objective tenderness, were not affected by treatments and aging, with values for CA0 of 3.74, CA10 2.77, CA20 3.77 and CA20H 3.24 kg. Samples which were aged for 1 day had a mean shear force value of 3.46 kg and those aged 7 days had a mean value of 3.01 kg. Sensory qualities (characteristic flavor, off-flavor, juiciness, texture, characteristic taste and strange flavor) were not affected by the experimental diets. Off-flavor was classified as very weak indicating that the meat did not present any unpleasant characteristics. Grades given by the panelists have suggested that the analyzed lamb meat had an excellent acceptance regardless of gender or treatment. Meat cholesterol was not affected by the diets with a mean value of 90 mg/100g.

**Key Words:** Sub Product, Small Ruminant, Meat Attributes

**TH281 Fatty acid composition of meat from crossbred lambs fed normal or heated whole cottonseed<sup>1</sup>.** R. R. P. S. Corte\*<sup>2</sup>, P. R. Leme<sup>2</sup>, A. S. C. Pereira<sup>2</sup>, G. Aferrri<sup>2</sup>, and J. C. C. Balieiro<sup>2</sup>, <sup>1</sup>FAPESP, São Paulo, São Paulo, Brazil, <sup>2</sup>Universidade de São Paulo, Pirassununga, São Paulo, Brazil.

To assess the effects of whole cottonseed (at different levels) or heated cottonseed in the diet on fatty acid composition in the meat of lambs, thirty-two crossbred lambs (16 males and 16 females with mean weight and age of 20 kg and 75 d) were fed for 63 days four diets: CA0, with 0% cottonseed, CA10, with 10% cottonseed, CA20, with 20% cottonseed and CA20H, with 20% heated cottonseed. At slaughter, a sample of the *Longissimus* muscle was taken for analysis of fatty acid composition. Lipids were extracted for fatty acid composition, and fatty acids methyl esters were determined by gas chromatography. The experiment had a randomized block design by crossbred type ( $\frac{1}{2}$  Dorper  $\frac{1}{2}$   $\times$  Santa Inês (D-SI) and  $\frac{1}{2}$  Dorper  $\times$   $\frac{1}{2}$  Texel (D-T)). Effects of treatments were evaluated by analysis of variance using the *MIXED* procedure of SAS software. The block and the diets had an effect on total saturated fatty acids (SFA) ( $P=0.001$ ,  $P=0.03$ ), monounsaturated fatty acids (MUFA) ( $P=0.017$ ,  $P=0.002$ ) and on the ration of unsaturated/saturated fatty acids (UFA/SFA) ( $P=0.002$ ,  $P=0.03$ ) and monounsaturated/saturated fatty acids (MUFA/SFA) ( $P=0.002$ ,  $P=0.002$ ). The meat of D-SI crossbred type had a higher proportion of SFA (48.30%), lower proportion of MUFA (43.66%) and lower ratio of UFA/SFA (1.08%) and MUFA/SFA (0.91%) when compared to the D-T (SFA=45.62, MUFA=45.14, UFA/SFA=1.20, MUFA/SFA=0.99%). The meat of animals fed diets with whole cottonseed (CA10, CA20 and CA20H) had a higher proportion of SFA (46.96, 48.17 and 47.58%), lower proportion of MUFA (44.23, 43.52 and 43.27%) and consequently lower ratio of UFA/SFA (1.13, 1.08 and 1.11%) and MUFA/SFA (0.94, 0.90 and 0.91%) when compared with the control diet CA0 (SFA=45.12, MUFA=46.58, UFA/SFA=1.22 and MUFA/SFA=1.04%). Whole cottonseed supplementation increased meat SFA and decreased MUFA. The effect of gender was significant for total polyunsaturated fatty acids (PUFA) ( $P=0.007$ ), omega 6 ( $\omega_6$ ) ( $P=0.004$ ) and for the ratio of PUFA/SFA ( $P=0.008$ ) in the animals meat. The male meat presented a higher proportion of PUFA (9.71%) and  $\omega_6$  (8.24%) and a higher ratio of PUFA/SFA (0.21%) when compared to the female meat (PUFA=7.57,  $\omega_6$ =5.83, PUFA/SFA=0.16).

**Key Words:** Sub Product, Small Ruminant, Fat Acid Profile

**TH282 Effects of added protein and dietary fat on lamb performance and carcass characteristics when fed differing levels of dried distiller's grains with solubles.** M. L. Van Emon\*, A. F. Musselman, P. J. Gunn, M. K. Neary, R. P. Lemenager, and S. L. Lake, *Purdue University, West Lafayette, IN.*

The objective of this study was to evaluate the influence of dietary protein and fat in dried distiller's grains with solubles (DDGS) on feedlot performance and carcass characteristics in finishing lambs. Sixty crossbred lambs were allotted ( $33.17 \pm 4.67$  kg) into pairs (ewe and wether) and fed one of five isocaloric dietary treatments: 1) a corn based diet with DDGS included to meet CP requirements (25% of DM; CON), 2) CON with DDGS included at twice the amount of CON (50% of DM; 50DDGS), 3) CON with added protein to equal the CP in the 50DDGS diet (CON+CP), 4) CON with added vegetable oil to equal the fat in the 50DDGS diet (CON+VO), and 5) CON with protein and fat added to equal the CP and fat in the 50DDGS diet (CON+CPVO). Lambs were harvested when they obtained an approximate 12<sup>th</sup> rib fat

depth of 0.51 cm. Average number of days on study did not differ ( $P = 0.78$ ) between treatments. Average daily gain ( $P = 0.48$ ) and final BW ( $P = 0.69$ ) were not influenced by treatments. However, G:F tended ( $P = 0.13$ ) to be lower in CON ( $0.0480 \pm 0.0042$ ), CON+CP ( $0.0448 \pm 0.0053$ ), and CON+VO ( $0.0476 \pm 0.0064$ ) than 50DDGS ( $0.0732 \pm 0.0374$ ) and DMI tended ( $P = 0.14$ ) to be higher in CON ( $4.92 \pm 0.90$  kg/pen/d) and CON+VO ( $4.82 \pm 0.66$  kg/pen/d) than 50DDGS ( $3.62 \pm 1.34$  kg/pen/d). Dietary treatment did not affect HCW ( $P = 0.79$ ), dressing percentage ( $P = 0.34$ ), 12<sup>th</sup> rib fat depth ( $P = 0.71$ ), LM area ( $P = 0.67$ ), body wall thickness ( $P = 0.57$ ), yield grade ( $P = 0.71$ ), flank streaking ( $P = 0.62$ ), leg score ( $P = 0.96$ ), or ether extract ( $P = 0.36$ ). Although DMI tended to decrease and G:F tended to increase in the 50DDGS treatment, added CP or fat from DDGS had no overall effect on lamb performance or carcass characteristics. Therefore, these data indicate that DDGS can be included in feedlot lamb diets at levels up to 50% of DM without affecting overall performance or carcass quality.

**Key Words:** Distiller's Grains with Solubles, Lamb, Performance

**TH283 Two levels of dried distillers grains with solubles on growth performance and carcass characteristics of Pelibuey sheep.** A. Estrada-Angulo\*, E. J. Lopez, G. Contreras, B. I. Castro, J. F. Obregon, and A. B. Perez, *CA-205-FMVZ-UAS, Culiacan, Sinaloa, Mexico.*

To determine the effect of two levels of dried distillers grains with solubles (DDGS) substituting partially at whole corn grain on growth performance and carcass characteristics of Pelibuey sheep. 20 Pelibuey ram lambs (BW= 33.1 kg) were fed for 70 days in a randomized block experiment design. The animals were weighed and blocked by weight in 10 groups of two, placed into 10 (2 × 3 m) floor pens, and assigned to one of two diets: 1) DDG25 had 17.3% CP and 3.53 Mcal DE/kg, and contained 25% dry distillers grains with solubles, 12.5% Sudan hay, 52% whole corn grain, without soybean meal, 8% sugarcane molasses, and 2.5% mineral premix; 2) like Control, DDG40 had 18.4% CP and 3.53 Mcal of DE/kg, but contained 40% DDGS and 37% whole corn grain. Feed was offered twice daily under free access conditions. In the first 35 days of the experiment, diet had no effect on ADG (265 and 255 g/day), DMI (1.109 and 1.149 kg/day), or feed/gain (4.132 and 4.556) for DDG25 and DDG40 respectively. Also, for the entire 70-d period, ADG (267 and 263 g/d), final weight (51.69 and 51.65 kg), and feed/gain (4.61 and 4.68) were similar ( $P > 0.05$ ) for DDG25 and DDG40 respectively. Hot carcass weight (29.8 and 29.83 kg), dressing percent (57.6 and 57.7%), fat thickness (0.24 and 0.24 inches), rib eye area (15.74 and 15.23 square centimeters), carcass length (114 and 115.6 cm), leg circumference (45.4 and 46.8 cm), were not affected by DDGS level. It is concluded, that dry distillers grain with solubles can substitute partially in 25 or 40 % at whole corn grain in complete diets for Pelibuey sheep.

**Key Words:** Dried Distillers Grains, Whole Corn Grain, Pelibuey Sheep

**TH284 Dried distillers grains as a supplement for grazing ewe lambs.** I. Susin\*<sup>1</sup>, D. D. Clevenger<sup>2</sup>, G. D. Lowe<sup>2</sup>, P. A. Tirabasso<sup>2</sup>, and S. C. Loerch<sup>2</sup>, <sup>1</sup>*Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo(USP), Piracicaba, SP, Brazil,* <sup>2</sup>*The Ohio State University, Wooster.*

Dried distillers grains plus solubles (DDGS) is a by-product of ethanol production and is a good source of protein and energy for ruminants. Frequently, weaned ewe lambs do not meet their nutritional requirements when pasture is the sole source of feed. When nutritional requirements are not met, growth rate is reduced and animals may be more vulnerable to parasite infection. Sixty-two ewe lambs ( $24.5 \pm 0.5$  kg BW and 2 mo. old) were used to determine the effects of supplementing DDGS on grazing performance and parasite status. Four orchardgrass paddocks were used with 15 or 16 lambs each. Ewe lambs in each paddock were randomly assigned to one of two experimental treatments: 1) control (only pasture), or 2) DDGS =1.3% BW of DDGS supplementation on pasture. Paddock was considered the experimental unit and a totally randomized design was used. Supplementation of DDGS started one week before weaning and continued throughout the grazing period. Weight and anemia status (via eye scoring=FAMACHA) were recorded for all lambs weekly during the grazing period. An anthelmintic dose was administered orally to ewe lambs that had FAMACHA score of 3 or more. Blood packed cell volume (PCV) and fecal egg count (FEC) were determined for all lambs on d 21, 49 and 69 post-weaning, as well as for those that required deworming based on FAMACHA score. A logarithmic transformation was used for the FEC data. ADG was greater ( $P < 0.08$ ) for DDGS supplemented lambs ( $147 \pm 23$  vs.  $252 \pm 23$  g) during the grazing period. Percentage of lambs treated with anthelmintic was greater ( $P < 0.07$ ) for control ( $65.6 \pm 5$ ) compared to DDGS groups ( $40.0 \pm 5$ ). However, there was no effect of supplementation on FEC or PCV. For the ewe lambs not treated with anthelmintic, ADG was greater ( $P < 0.03$ ) for those supplemented with DDGS ( $249 \pm 14$  g) compared to controls ( $132 \pm 14$  g). On day 21 post weaning, control lambs had a greater ( $P = 0.037$ ) FEC compared to the DDGS group. Supplementation of grazing lambs with DDGS increased ADG and reduced post weaning susceptibility to internal parasite infection.

**Key Words:** Distillers Grains, Parasite, Sheep

**TH285 Dried distillers grains as a supplement for finishing ewe lambs.** I. Susin\*<sup>1</sup>, A. Radunz<sup>2</sup>, D. D. Clevenger<sup>2</sup>, G. D. Lowe<sup>2</sup>, P. A. Tirabasso<sup>2</sup>, and S. C. Loerch<sup>2</sup>, <sup>1</sup>*Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo(USP), Piracicaba, SP, Brazil,* <sup>2</sup>*The Ohio State University, Wooster.*

Dried distillers grain plus solubles (DDGS) have a high amount of fat. Fat supplementation can affect performance and ruminant carcass composition. Sixty-two ewe lambs were used in a feedlot experiment to determine the effects of supplementation with DDGS on performance, carcass characteristics and meat quality of lambs fed corn or DDGS based diets. During a preceding 10 wk grazing period lambs were housed in four separate orchardgrass paddocks. Half of the lambs (2 paddocks) were supplemented with DDGS at 1.3% of BW. After the grazing period, lambs were placed in four feedlot pens (maintaining integrity of the groups) for the finishing experiment. Ewe lambs were fed either a corn-based finishing diet (control=CT) or a finishing diet containing 30% DDGS (DDGS) on a DM basis. The DDGS replaced corn and soybean meal in the control diet. A 14d adaptation period was used, at the beginning of the feedlot phase, to gradually adjust lambs to the feedlot diets. When the final average target weight (52kg) was reached, 16 lambs from each feeding regimen were slaughtered. Initial BW in the feedlot was 35.0 and 41.3 kg for CT and DDGS lambs, respectively. There was no difference ( $P = 0.70$ ) in ADG (268 vs. 274 g for the control and DDGS group, respectively). However, total DMI was higher ( $P = 0.001$ ) for control (106.9 kg/head) than DDGS (71.9

kg/head) ewe lambs, because control lambs needed 3 additional weeks to attain the targeted slaughter weight. There were no differences in carcass wt (26.6 vs. 26.4 kg), dressing percentage (53.7 vs. 53.5), back fat depth (0.63 vs. 0.64 cm), body wall thickness (1.83 vs. 1.79 cm), LM area (14.7 vs. 15.2 cm<sup>2</sup>), slice shear force (14.1 vs. 9.9 kg), cooking losses (17.5 vs. 19.2%), total fat (4.1 vs. 4.2%), color or quality grade due to feeding regimen. However, lambs fed DDGS showed a tendency ( $P < 0.10$ ) to accumulate more soft back fat compared to the control group (6.25 vs. 25%). Supplementing DDGS to grazing and finishing ewe lambs decreased days on feed during the finishing phase. However, DDGS supplementation may change characteristics of the back fat deposited.

**Key Words:** DDGS, Feedlot, Sheep

**TH286 Effects of barley straw treated with different levels of urea and elemental sulfur in diets of late gestation ewes: effects on lambing and dietary In vitro digestibility.** K. RezaYazdi\*, H. Khalilvandi, and N. Vahdani, *University of Tehran, Karaj, Tehran, Iran.*

The various cereals extensively cultivated for grain production also generate large amounts of straw with a high cell wall content of poor digestibility. Urea ammoniation makes polysaccharides more available to enzymatic hydrolysis. However this treatment may result in additional sulfur needs of the animal for synthesis of sulfur containing amino acids by rumen microorganism, considering that straws have low levels of sulfur. The purpose of the present trial was to assess the sulfur supplementation of urea-treated barley straw on performance of late gestation ewes. This was done using 72 Varamini late pregnant (90 days) ewes until parturition, with 9 dietary levels of urea (5% solution) treated barley straw (UTBS) and elemental sulfur (ES), in 3×3 factorial design in a CRD (3 levels of UTBS: 0, 20 and 40 percent and 3 levels of ES: 0, 0.1 and 0.2 percent). The lambs were fed 9 isocaloric and isonitrogenous diets for 60 days according to NRC. Lambs were weighed immediately after parturition. The method of Tilley and Terry was used for In vitro digestibility.

The results indicated that ewes that received 40% UTBS and 0.2% ES had highest lamb birth weight (4.82 kg). Animals that consumed 67.66 % barley straw without any treatment had lowest lamb birth weight (3.76kg) and DMI. Differences among treatments in the case of DMI and feed conversion ratio (FCR) were not statistically significant. TMRs containing 40% UTBS and 0.2% ES had highest in vitro digestibility of dry matter and organic matter.

Results showed that sulfur supplemented urea treated barley straw improved lamb birth weight and DM and OM digestibility values.

**Table 1. Differences of LBW and IVDMD, between dietary treatments**

	1	2	3	4	5	6	7	8	9
LBW	3.7 <sup>a</sup>	4.0 <sup>ab</sup>	3.9 <sup>a</sup>	4.0 <sup>a</sup>	4.3 <sup>abc</sup>	4.7 <sup>c</sup>	4.2 <sup>ab</sup>	4.7 <sup>bc</sup>	4.8 <sup>c</sup>
IVDMD	61.0 <sup>a</sup>	66.0 <sup>b</sup>	67.5 <sup>bc</sup>	65.9 <sup>b</sup>	69.8 <sup>cd</sup>	70.9 <sup>d</sup>	71.8 <sup>d</sup>	74.8 <sup>e</sup>	75.4 <sup>e</sup>

1: 0% UTBS, 0% ES, 2: 0% UTBS, 0.1% ES, 3: 0% UTBS, 0.2% ES, 4: 20% UTBS, 0% ES, 5: 20% UTBS, 0.1% ES, 6: 20% UTBS, 0.2% ES, 7: 40% UTBS, 0% ES, 8: 40% UTBS, 0.1% ES, 9: 40% UTBS, 0.2% ES. Means within a row with different superscripts differ. ( $p < 0.05$ ).

**Key Words:** Barley Straw, Urea, Sulfur

**TH287 Effects of urea treated barely straw and inorganic sulfur inclusion on in vitro digestibility of TMR and performance of fattening Varanini lambs.** K. RezaYazdi\*, N. Vahdani, and H. Khalilvandi, *University of Tehran, Karaj, Tehran, Iran.*

Winter small grains, especially wheat and barley, are an important part of the typical crop rotation system. Providing N requirement of ruminants partly with NPN sources, leading to increase in sulfur requirements for maximizing microbial protein synthesis. It is anticipated that sulfur addition in rations contain different level of urea treated barely straw (UTBS), improved ruminant productivity. An experiment carried out to study effects of different levels of UTBS (5% solution) and elemental sulfur (ES) in fattening lambs, using 72 Varamini lambs (38.38±3.91), in 3×3 factorial method in a CRD. (First factor: 3 levels of UTBS 0, 15 and 30 percent and second factor 3 levels of ES 0, 0.1 and 0.2 percent). The lambs were fed 9 isocaloric and isonitrogenous diets for 90 days according to NRC recommendations. Method of Tilley and Terry was used for In vitro digestibility. The results showed significant ( $p < 0.05$ ) differences among lambs in daily live weight gain, DMI, and feed conversion ratio. The lambs received diets containing 30 % UTBS supplemented with 0.2 % ES, had highest live weight gain (LWG), while control group that consumed 21 % untreated barely straw had lowest LWG (173.3 g/d vs. 126.5 g/d, respectively). No statistically significant interaction among dietary levels of UTBS and ES was observed. Results of In vitro digestibility trial showed that total mixed rations contained 30% UTBS and 0.2 % ES had highest dry matter and organic matter digestibility values than other treatments.

As results showed, dietary levels of 30% UTBS supplemented with 0.2% ES can be used in order to improve live weight gains in lambs.

**Key Words:** Barley Straw, Urea, Sulfur

**TH288 Effects of protein sources on performance and carcass characteristics of feedlot lambs and Small Ruminant Nutrition System estimates evaluation.** M. A. A. Queiroz, I. Susin, A. V. Pires, C. Q. Mendes\*, O. C. Almeida, R. S. Gentil, R. C. Amaral, A. L. Gastaldello Jr., and G. H. Rodrigues, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*

Mathematical models have been developed to assess sheep nutritional requirements; however, the challenge in these systems has been to accurately predict dry matter intake. Twenty-eight Santa Ines ram lambs (initial BW 20 ± 2 kg and 75 ± 5 d old) were used to determine the effects of protein sources in high grain diets on performance and carcass characteristics and to evaluate the Small Ruminant Nutrition System (SRNS) performance data estimates. Lambs were assigned to a complete randomized block design according to body weight and age at beginning of the trial and were penned individually. Lambs were fed an isonitrogen, total mixed ration, composed by 90% concentrate and 10% coarcestross hay (*Cynodon* spp) during 56 days. Experimental diets were formulated according to the Small Ruminant Nutrition System (version 1.8.1) and differed on protein source: soybean meal (SM), peanut meal (PM), canola meal (CM) or cottonseed meal (CSM), corresponding to the experimental treatments SM, PM, CM and CSM, respectively. There were no differences ( $P > 0.05$ ) among treatments for dry matter intake (DMI), average daily gain (ADG) and feed conversion (FC). Daily DMI averaged 1.2, 1.1, 1.0 and 1.2 kg, ADG results were 330, 316, 284 and 311 g and FC were 3.5, 3.4, 3.7 and 3.8 kg MS/kg gain for the SM, PM, CM and CSM, respectively. In addition, carcass characteristics were not affected ( $P > 0.05$ ) by protein source. SRNS predicted values for daily

DMI (1.3, 1.2, 1.0 and 1.3 kg) were greater ( $P < 0.01$ ) than observed values. However, ADG estimates (319, 313, 280 and 304 g) were similar ( $P > 0.05$ ) compared to observed experimental data. SRNS evaluation for feedlot lambs, based in these experimental data, showed good estimates for ADG and overestimated values for DMI.

**Key Words:** Canola, Cottonseed, Peanut

**TH289 Total replacement of soybean meal by urea in high grain diets for feedlot lambs.** C. Q. Mendes\*, I. Susin, A. V. Pires, M. A. A. Queiroz, F. S. Urano, G. H. Rodrigues, R. S. Gentil, E. M. Ferreira, and M. V. Biehl, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*

Dietary crude protein source for animals fed high grain diets influences ruminal nitrogen and energy utilization as well as small intestine flow of nutrients. Twenty-eight Santa Ines ram lambs (initial BW  $21.7 \pm 3.0$  kg and  $93 \pm 4.0$  d old) were used to evaluate the effects of replacing soybean meal by urea in high grain diets on performance and carcass characteristics. Lambs were assigned to a complete randomized block design according to BW and age at beginning of the trial and were penned individually. Lambs were fed a TMR composed by 90% concentrate and 10% coastcross hay during 56 d. Soybean meal in the control diet (UR0) was replaced by urea at 0.7; 1.4 and 2.1% on a DM basis, corresponding to the experimental treatments UR0.7; UR1.4 and UR2.1, respectively. A 9 d adaptation period was used at the beginning of the feedlot to gradually adjust lambs to the experimental diets with high level of urea. When the final targeted weight (40kg) was attained, lambs were slaughtered and carcass characteristics were recorded. There were no differences ( $P > 0.05$ ) among treatments for dry matter intake (1.11, 1.11, 0.96 and 1.05 kg/d for the UR0, UR0.7, UR1.4 and UR2.1, respectively). However, ADG ( $P < 0.02$ ) and feed efficiency ( $P < 0.06$ ) decreased linearly with higher levels of urea (ADG: 0.296, 0.303, 0.246 and 0.257 g and G:F: 0.27, 0.27, 0.25 and 0.24 for the UR0, UR0.7, UR1.4 and UR2.1, respectively). Carcass parameters (dressing percentage, chilling losses, cooking losses, back fat depth, Longissimus muscle area and shear force) were not affected ( $P > 0.10$ ) when urea was added to the diet. Replacing soybean meal by urea in high grain diets fed to feedlot lambs decreased ADG and G:F with no change on dry matter intake. Although total replacement of soybean meal by urea decreased ADG by 14.3%, its inclusion in the diet provided satisfactory feedlot lamb performance and carcass characteristic.

**Key Words:** Hair Sheep, NPN, Urea

**TH290 Effects of replacing corn by soybean hulls on apparent digestibility of nutrients and ruminal parameters in lambs.** E. M. Ferreira, A. V. Pires, I. Susin, C. Q. Mendes\*, R. C. Araujo, M. A. A. Queiroz, F. S. Urano, R. S. Gentil, R. C. Amaral, and S. Gilaverte, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*

Soybean hulls (SH) are an alternative feed source for ruminants and, due to its high level of digestible fiber and energy value, it can partly or totally replace forages or energetic ingredients. Sixteen Santa Ines ram lambs (BW  $44.0 \pm 5.0$  kg), housed in individual metabolism crates were used to evaluate the effects of partial replacement of corn by SH

on apparent digestibility of nutrients and ruminal parameters. Lambs were assigned to one of four treatments in a complete randomized block design. The control treatment (SH0) was a diet containing 70% of corn on a DM basis. On the others diets, corn was replaced by SH at 15, 30 and 45%, corresponding to the experimental treatments SH15, SH30 and SH45, respectively. All diets were isonitrogen, containing 90% of concentrate and 10% coastcross hay (*Cynodon* spp). There was no effect on apparent digestibility of DM, NFC, CP, EE, ruminal ammonia and total VFA concentrations. However, NDF digestibility (55.5; 62.5; 66.6 and 68.1%), acetate concentration (26.0; 30.4; 37.1 and 41.9 mM) and ruminal pH (6.0; 6.0; 6.1 and 6.2) increased linearly ( $P < 0.10$ ), while TDN values (84.5; 83.4; 80.2 and 78.9 % of DM) and digestible energy concentration (3.72; 3.68; 3.54 and 3.48 Mcal/kg of DM) reduced linearly ( $P < 0.10$ ) for the SH0, SH15, SH30 and SH45 treatments, respectively. Propionate concentration (21.9; 29.4; 16.0 and 7.6 mM) showed a quadratic response ( $P < 0.05$ ) for the SH0, SH15, SH30 and SH45 treatments, respectively. Soybean hulls added at 31.5% on DM basis (SH45) improved NDF digestibility, acetate production and ruminal pH. In addition, soybean hulls may reduce ruminal acidosis occurrence in high grain diets for lambs.

**Key Words:** By-Products, High Grain Diet, Hair Sheep

**TH291 Performance and carcass characteristics of lambs fed wet low pectin citrus pulp in partial replacement of dried citrus pulp.** G. H. Rodrigues, I. Susin, A. V. Pires, L. G. Nussio, C. Q. Mendes\*, R. S. Gentil, E. M. Ferreira, M. V. Biehl, and F. S. Urano, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*

Dried citrus pulp (DCP) is a co-product with a high pectin concentration. Pectin is used as a gelling and thickening agent and can be obtained by partial extraction from citrus peels. This partial extraction results in a residue containing: 15% DM, 7.5% CP, 69% NDF, and 22% pectin and, in this trial, it was named wet low pectin citrus pulp (WLPCP). The objective of this study was to evaluate the effects of partial replacement of DCP by wet low pectin citrus pulp (WLPCP), wet low pectin citrus pulp silage (WLPCPS) or wet low pectin citrus pulp silage with sodium benzoate (WLPCPS+B) on performance and carcass characteristics of Santa Ines ram lambs. Sixty-four lambs (initial BW  $17 \pm 2$  kg and  $75 \pm 5$  d old) were used to determine average daily gain (ADG), dry matter intake (DMI), gain:feed (G:F). Lambs were allotted in a complete randomized block design according to BW and age at beginning of the trial. Lambs were fed 95% concentrate and 5% sugarcane bagasse diets with 16% CP for 56 days. The control diet contained 69.5% DCP while in the other treatments fresh or ensiled WLPCP replaced DCP by 30% on a DM basis. Diets were fed once a day as a TMR. At the end of the performance trial, 40 animals were slaughtered (BW  $36 \pm 1.6$  kg) to evaluate carcass characteristics. There were no differences ( $P > 0.05$ ) in daily DMI (960, 828, 880, and 889 g) and ADG (226, 216, 218, and 224 g) for DCP, WLPCP, WLPCPS and WLPCPS+B, respectively. However, G:F was greater for lambs fed WLPCP compared to lambs fed DCP (0.265 vs 0.235,  $P = 0.03$ ). Dressing percentage, chilling losses, back fat depth and Longissimus muscle area averaged 49%, 3.7%, 1.7 mm and  $13.4 \text{ cm}^2$ , respectively and were unaffected ( $P > 0.05$ ) by experimental diets. Partial replacement of dried citrus pulp by wet low pectin citrus pulp residue can be an interesting alternative for feedlot lambs, without affecting carcass characteristics.

**Key Words:** Hair Sheep, Pectin, Co-Product

**TH292 Apparent digestibility and ruminal parameters of diets containing sugarcane silage with or without additives or fresh sugarcane fed to lambs.** R. C. Amaral, A. V. Pires, I. Susin, C. Q. Mendes\*, E. M. Ferreira, R. S. Gentil, M. V. Biehl, M. A. A. Queiroz, and G. H. Rodrigues, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*

Objectives of this experiment were to evaluate the effects of chemical additives in sugarcane silage on dry matter intake, apparent digestibility, and ruminal parameters of cannulated ram lambs fed diets containing experimental silages (50% dietary dry matter). A diet containing fresh sugarcane was also assessed. Sixteen Santa Ines ram lambs, kept in metabolism crates, were distributed in a complete randomized block design. The experimental period was 15 days. Lambs were adapted to the experimental diets for 10 days and feces were sampled in the next 4 days. Ruminal fluid samples were taken at 0,2,4,6,8,10 and 12 hours after feeding in the last day of experimental period. Four experimental diets were used: fresh sugarcane, sugarcane silage without additive, sugarcane silage containing calcium oxide (1% on as-fed basis), and sugarcane silage containing limestone (1% on as-fed basis). There was no difference ( $P>0.05$ ) among treatments for dry matter intake (mean DMI = 0.85 kg/day). Differences ( $P<0.05$ ) were observed for dry matter digestibility, with the highest value (74.6%) observed for diets containing fresh sugarcane. Differences ( $P<0.05$ ) also were observed for digestible NDF intake and the highest value (0.12 kg/day) was observed for diets containing 1% calcium oxide treated silage. There were no differences for treatment, hour after feeding, and treatment x hour interaction ( $P>0.05$ ) effects on total volatile fatty acids, acetate and propionate concentrations, with mean values of 74.4, 42.6 and 18.6 mM, respectively. Butyrate concentration (11.9 mM) was highest for animals fed 1% calcium oxide treated silage. Mean acetate:propionate ratio was 2.4. Ruminal pH was not affected ( $P>0.05$ ) by treatment, with mean value of 6.3. Addition of 1% of calcium oxide and limestone during sugarcane ensilage did not affect intake and digestibilities of diets fed to ram lambs when compared with the diet containing the non-treated silage. Sugarcane silages showed similar ruminal fermentation compared to fresh sugarcane.

**Key Words:** Calcium Oxide, Limestone, Hair Sheep

**TH293 Effects of monensin, sodium bicarbonate and limestone sources on nutrient digestibilities in high grain diets fed to lambs.** A. L. Gastaldello Jr., A. V. Pires, I. Susin, C. Q. Mendes\*, G. H. Rodrigues, F. S. Urano, M. V. Biehl, R. S. Gentil, and G. B. Mourão, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP), Piracicaba, SP, Brazil.*

This trial was performed to evaluate the apparent digestibility and ruminal parameters (pH, total volatile fatty acids and N-NH<sub>3</sub>) of diets containing two sources of limestone and sodium bicarbonate (NaHCO<sub>3</sub>), with or without monensin (30 mg/kg on a DM basis). Twenty-four lambs were assigned to a complete randomized block design in a 3 x 2 factorial arrangement. Treatments were: L=1.3% limestone; FL = 1.3% Filler limestone; L + SB = 1.3% limestone + 1% NaHCO<sub>3</sub>; with or without monensin. Diets contained 90% concentrate and 10% coastercross hay (*Cynodon* spp). FL treatments had greater ( $P<0.05$ ) dry matter (DM=82.6%), organic matter (OM=83.2%) and crude protein

(CP=72.8%) digestibilities compared to the other buffers average (DM=76.9; OM=77.6 and CP=63.4%). Neutral detergent fiber digestibility was higher (59.2%) for monensin treatments compared to treatments without monensin (34.4%). There were no differences ( $P>0.05$ ) in nitrogen metabolism, ruminal pH, water intake, acetate:propionate ratio and butyrate concentration among treatments. There was an interaction between FL and monensin. When monensin was added, there was a reduction of 45.4; 25.8; 19.4 and 34.3% for N-NH<sub>3</sub>, total volatile fatty acid, acetate and propionate concentrations, respectively. There was also interaction between L + SB and monensin showing an increase in total volatile fatty acids (18.5%), acetate (16.1%) and propionate (27.9%) concentration. FL did not show benefits on ruminal parameters, however increased DM and CP digestibility and in combination with monensin there was an associative negative effect on ruminal parameters. Sodium bicarbonate showed positive associations in presence of monensin, increasing ruminal total volatile fatty acids concentration, however, had no detrimental effects on nutrient digestibility.

**Key Words:** Buffer, Ionophor, Hair Sheep

**TH294 Use of salt for limiting supplement intake for hair sheep fed buffel grass (*Cenchrus ciliaris* L.).** H. Morales-Treviño<sup>\*1</sup>, M. Mireles<sup>1</sup>, E. Gutierrez-Ornelas<sup>1,2</sup>, H. Bernal-Barragan<sup>1</sup>, J. Colin-Negrete<sup>1</sup>, F. Sanchez-Dávila<sup>1</sup>, and C. Rodriguez-Alvarado<sup>3</sup>, <sup>1</sup>Facultad de Agronomía, Universidad Autónoma de Nuevo León, Marín, Nuevo León, México., <sup>2</sup>Consortio Técnico del Noreste de México, Guadalupe, Nuevo León, México, <sup>3</sup>Instituto Tecnológico de Altamira, Altamira, Tamaulipas, México.

Intake regulation of supplement by sheep can be a useful practice for semi-intensive production systems. The objective of this study was to estimate the maximum amount of salt intake by hair sheep feed with buffel grass. Five levels of salt in concentrate (1, 6, 11, 16 and 21%) were used in order to allow sheep to consume up to 600 g/d of supplement. Twenty five Saint Croix ewes (BW: 23.6 ± 1.7 kg) were individually fed with ground buffel grass hay (8 cm long) during 63 d. Intake of salt+supplement and buffel hay were recorded daily. Changes in live body weight and daily water consumption were estimated every 14 d. A regression analysis was performed to describe the maximum intake of salt by sheep, and the effect of treatments was analyzed by ANOVA using a completely random design. A substitution effect for DMI was found ( $P<0.05$ ) when lower levels of salt were included in the concentrate. Highest ( $P<0.05$ ) DMI from buffel grass (318.5 g/day) was registered when ewes received supplements with 21% of salt, whereas the least DMI of buffel grass (176.0 g/day) was obtained by 1% salt in the supplement. Dry matter supplement intake (DMSI) and salt intake (SI) were quadratically affected ( $P<0.05$ ;  $r^2=0.86$  and  $r^2=0.93$ , respectively) by salt level (SL), with prediction equations as follows: DMSI,  $g = 514.8 - 10.29SL - 0.968SL^2$ ; SI,  $g = -7.75 + 10.17SL - 0.261SL^2$ . Maximum daily salt intake in hair sheep was predicted as 91.3 g when salt is included as 19% of the supplement. Ewes receiving supplements added with up to 16% salt had similar ( $P>0.05$ ) ADG (89.6 g) but different ( $P<0.05$ ) than those consuming supplement with 21% salt (37.0 g). Daily water intake was not affected ( $P>0.05$ ) by SL. Hair sheep limited their daily supplement intake when salt consumption was 91.3 g.

**Key Words:** Salt, Hair Sheep, Buffel Grass