

Small Ruminant: Carcass, Genetics, Management, and Reproduction

W404 Carcass evaluations of sheep supplemented with brewer waste (ensiled and dried) grazing under the rainy season in tropics. F. P. Portilho^{*1,2}, S. L. S. Cabral Filho¹, H. Louvandini¹, A. M. Menezes¹, and B. S. L. Dallago¹, ¹University of Brasilia, Brasilia, DF, Brazil, ²Agrodefesa, Rio Verde, GO, Brazil.

At reduced costs, industrial wastes enable usage of protein and mineral mixtures as ingredients in the formulation to improve the productive capacity. The aims of this study were to evaluate the carcass parameters of finishing sheep in pasture during the rainy season and to evaluate the effect of replacement of traditional protein source (soybean meal) by sources of low degradability in the rumen like cotton meal and brewery waste (dried and ensiled). We used 40 male sheep of Santa Inês breed, with average weight of 22.0 ± 3.14 kg, grazing on Aruana grass (*Panicum maximum*), receiving supplementation of 100 g/animal/d for 4 treatments, plus a control without supplementation. Treatments were represented by supplementation offered for sheep grazing at the end of the rainy season during 30 d (between March and April). The treatments were composed as follows: T1– mostly of dried brewer grain (DBG), T2– silage of brewer grain (SBG), T3– cotton meal (CM), T4– soybean meal (SBM) and T5– without supplement (control–C). The experiment was designed with randomized blocks, with 2 blocks (n = 20), 4 repetitions by treatment. Differences were not observed for carcass among the treatments evaluated ($P > 0.1$) with respect to pH of the carcass (5.14 ± 0.77), weight of thoracic organs (1.44 ± 0.31 kg), carcass length (55.5 ± 2.96 cm), body condition (2.52 ± 1.03), skin thickness (0.40 ± 0.09 cm), length of ham (50.9 ± 2.21 cm), ham weight (1.72 ± 0.35 kg), leg circumference (33.1 ± 2.15 cm), loin weight (0.32 ± 0.091 kg), palette (0.90 ± 0.23 kg), rib (1.33 ± 0.39 kg), neck (0.49 ± 0.10 kg) and diaphragm (0.19 ± 0.54 kg), water loss (16.1 ± 2.61 mL), tenderness (2.79 ± 0.95 kgf). The hot and cold carcass weight varied among the treatments ($P < 0.05$) comparing the supplemented and control. They were 12.3 and 11.9 kg (DBG), 10.6 and 10.4 kg (SBG), 8.5 and 8.2 kg (CM), 9 and 8.7 kg (SBM), 11.5 and 11.2 kg (C), respectively. The carcass weight had better trend for DBG and the worst one for the CM treated animals. Therefore the usage of brewer waste showed that it can be employed to replace protein sources without disparity in the carcass parameters.

Key words: brewer grains, supplementation, sheep

W405 Feed efficiency and carcass traits in crossbred Katahdin lambs supplemented with hydroponic green wheat. M. Guerrero-Cervantes^{*1,4}, M. A. Cerrillo-Soto^{1,4}, F. G. Rios-Rincón^{2,4}, A. Estrada-Angulo^{2,4}, A. S. Juárez-Reyes^{1,4}, and H. Bernal-Barragán^{3,4}, ¹Universidad Juárez del Estado de Durango, Durango, Durango, México, ²Universidad Autónoma de Sinaloa, Culiacán, Sinaloa, México, ³Universidad Autónoma de Nuevo León, Monterrey, Nuevo León, México, ⁴Red Internacional de Nutrición y Alimentación en Rumiantes, Durango, Durango, México.

Hydroponic green fodder is considered an important alternative to conventional protein sources in semiarid regions. This study was carried out to determine the effect of supplementing hydroponic green wheat (HGW) on feed efficiency and carcass traits in crossbred Katahdin lambs fed an oat-straw based diet. Thirty lambs (120 ± 15 d of age; 17.7 ± 0.250 kg BW) were fed during 13 weeks, placed in individual pens and separated in 3 groups of 10 lambs each. The animals received

1 of 3 oat straw-based diets supplemented with 3 levels of HGW (T I 23% HGW; T II 19% HGW and T III 13% HGW), which substituted corn grain and soybean meal of the diet. Experimental diets were isonitrogenous (13% CP). Data of daily weight gain, dry matter intake, feed efficiency and carcass traits were analyzed by ANOVA according to a completely randomized block design, using the initial body weight as covariate. No differences in the studied variables ($P > 0.05$) were determined; however, numerical increments were registered in daily weight gain, carcass yield, muscle percentage and feed efficiency in animals fed T I. Animals fed T II had a higher fat percentage than their counterparts. Lambs receiving T III had slightly larger ($P > 0.05$) rib eye area. It is concluded that the utilization of HGW might improve feed efficiency and be cost-effective in growing lamb nutrition practices.

Table 1. Daily weight gain, feed efficiency and carcass traits

Item	Treatments			Mean
	T I	T II	T III	
Daily weight gain (g)	150±12	136±12	124±12	138±38
Daily DM intake (g)	1076±10	1091±10	1021±10	1063±60
Feed efficiency*	7.4±0.7	8.5±0.7	8.6±0.7	8.9±2.2
Carcass yield (%)	64.8±2.2	64.2±2.2	63.5±2.2	64.2±4.9
Rib eye area (cm ²)	13.0±1.0	12.8±0.9	13.7±0.9	13.2±2.1
Fat (%)	11.9±1.8	12.8±1.7	12.1±1.7	12.3±3.8
Muscle (%)	64.5±1.2	64.3±1.26	63.7±1.2	64.2±2.5
Bone (%)	23.6±1.2	22.9±1.2	24.2±1.2	23.5±2.6
Total feed cost (Dls)	17.4	18.7	20.7	

*DM intake/weight gain.

Key words: lambs, hydroponic green wheat, carcass traits

W406 Effect of diet and finishing weight on performance and carcass traits of meat goat kids. A. Gaesser^{*1}, G. Rentfrow², T. K. Hutchens², J. Schoonmaker¹, K. Andries³, J. E. Tower¹, M. E. Einstein¹, and M. K. Neary¹, ¹Purdue University, West Lafayette IN, ²University of Kentucky, Lexington, ³Kentucky State University, Frankfort.

The objective of this study was to evaluate 2 diets differing in starch and fiber content fed to 2 different target finishing weights (TW) on growth performance and carcass traits of meat goat kids. Diets were isocaloric (0.9 Mcal/kg NEg) and isonitrogenous (15% CP) and differed in the primary energy source (corn (C) vs. soybean hulls (SH)). The TW of kids were 27 kg and 34 kg. Intact male crossbred (n = 32) kids that had been weaned (initial weight of 22 ± 0.7 kg) for 30 d were individually fed and housed until reaching the TW. Kids were randomly assigned to one of 4 2 × 2 factorially arranged treatments of C, SH, and TW of 27 and 34 kg and data were analyzed by a linear ANOVA model that included diet (C vs SH), target weight (27 vs 34 kg) and the interaction. There was no ($P > 0.05$) interaction between diet and TW for any of the goat response variables. Goats fed SH based diets had higher ($P < 0.05$) ADG (0.162 vs 0.119 ± 0.01 kg), higher ($P < 0.01$) feed intake (1.26 vs 1.02 ± 0.05 kg/d), and tended ($P = 0.07$) to have higher Gain to feed (G:F) (0.14 vs 0.12 ± 0.01 kg) than goats fed C. Dressing percent did not ($P > 0.05$) differ between goats fed SH ($51 \pm 0.5\%$) or C ($50.3 \pm 0.5\%$), but HCW was higher ($P < 0.05$) for

SH (15.8 ± 0.34 kg) than C (14.7 ± 0.34 kg) fed goats. Goats fed to a TW of 27 kg had higher ($P < 0.05$) G:F (0.14 vs 0.11 ± 0.002 kg) and tended ($P = 0.09$) to have higher ADG (0.152 vs 0.129 ± 0.009 kg) than goats fed to 34 kg. Dressing percent was higher ($P < 0.05$) when goats were fed to 34 kg ($51.5 \pm 0.49\%$) as compared with 27 kg ($49.8 \pm 0.49\%$). The quality grade and fat score were not ($P > 0.05$) influenced by feeding C or SH or finished weights of 27 or 34 kg. These results show that feeding SH as the primary dietary energy source resulted in higher growth performance than C, with no effect on carcass traits. Feeding goats to 34 kg as compared with 27 kg resulted in higher dressing percentage, with lower G:F.

Key words: goat, finishing weight, carcass

W407 Feedlot productive performance and carcass traits by hybrid lambs. M. T. Espinoza¹, M. A. Cerrillo-Soto^{2,3}, A. Estrada-Angulo^{1,3}, J. F. Obregon^{1,3}, J. J. Portillo^{1,3}, and F. G. Rios^{*1,3}, ¹FMVZ-UAS, Culiacan, Sinaloa, Mexico, ²FMVZ-UJED, Durango, Durango, Mexico, ³Red Internacional de Alimentacion y Nutricion de Ruminantes, Durango, Durango, México.

Genetic diversity by lambs should be considered when looking for diet optimization. To determinate productive response and carcass traits in hybrid lambs, a 70 d feedlot trial was conducted using 54 lambs (27 males and 27 females) with 73 ± 7 d initial age; and 15.7 ± 3.0 kg initial BW, from each genotype Pelibuey (100PB), Dorper \times Pelibuey (50DR \times 50PB) and Dorper \times F1 dams Katahdin \times Pelibuey (50DR \times 25KT \times 25PB) fed a 17% CP, 3.4 Mcal/kg DE (growth) and 15% CP, 3.4 Mcal/kg DE (finishing), concentrate-based diet. At slaughter carcass traits only from males were recorded. Data of growth performance were analyzed using ANOVA with repeated measures and means comparisons were performed using orthogonal contrasts. Carcass traits were analyzed using slaughter weight as covariate, and adjusted averages compared with Tukey-Kramer test. Average daily gain (ADG) throughout the experiment was 18.4% higher ($P < 0.01$) in hybrid lambs at d 28. ADG was higher ($P < 0.01$) for hybrid 50DR \times 25KT \times 25PB (301 g), than for F1 50DR \times 50PB (276 g) and 100PB (236 g). Weight gain was 31% higher in males ($P < 0.01$) at d 28, 56 and 70 than female lambs. No differences among racial groups ($P > 0.05$) were observed in feed intake throughout the feeding periods. However males ate more feed than their counterparts (1146 ± 38 vs. 1018 ± 31 g/d). There were no differences in carcass characteristics among the evaluated racial groups. According to our data, it is concluded that growth performance and carcass characteristics of hybrid lambs, 50DR \times 25KT \times 25PB are similar than F1 50DR \times 50PB.

Key words: crossed hair sheep, feed conversion, carcass yield

W408 Evaluation of carcass characteristics of feedlot lambs receiving repeated doses of zeranol. L. Carlos-Valdez*, A. Grado-Ahüir, G. Corral-Flores, L. González-Aguilera, L. Barron-Limón, G. Villalobos-Villalobos, D. Dominguez-Diaz, and I. Anguiano-Cardona, Universidad Autónoma de Chihuahua, Facultad de Zootecnia y Ecología, Chihuahua, Chih., México.

The objective of this study was to evaluate the effect of repeated doses of zeranol implant in carcass characteristics and dressing percentage. We used ($n = 20$) crossbred finishing male lambs (average 54.5 ± 3.6 kg) from a 70 d performance trial. During the trial the lambs were randomly allocated into 3 treatments: no implant (0ze, $n = 6$), 12 mg

of zeranol (Ralgro, Schering-Plough) on d 0 (12ze, $n = 7$), and 12 mg of zeranol on d 0 with a second implant at d 28 (24ze, $n = 7$). The lambs were harvested at the Universidad Autonoma de Chihuahua slaughterhouse following the slaughter Mexican Government regulation NOM-006-200-1996. The carcasses were cut in half and put in a cold room (4°C) for 24 h, then were transferred and stored in a freezing room (-24°C), until processed. Chilled right halves were cut into primary cuts and weighed. Rib eye area and fat depth were determined; all variables were analyzed adjusting a linear model with treatment as the fixed effect. Lambs 24ze had greater dressing percentage ($P < 0.05$; $53.6 \pm 0.55\%$) compared with 0ze and 12ze (50.33 ± 0.60 and $51.91 \pm 0.55\%$, respectively). The hot carcasses and cold carcasses were heavier for 24ze ($P < 0.05$; 29.22 ± 0.69 and 28.8 ± 0.67 kg, respectively), compared with 0ze (27.17 ± 0.74 and 26.73 ± 0.72 kg, respectively), but there was no difference ($P > 0.05$) between 24z and 12ze. Leg weight expressed as a percentage of carcass weight was also greatest for 24ze ($P < 0.01$; $7.4 \pm 0.19\%$), compared with 0ze and 12ze (6.6 ± 0.20 and $6.3 \pm 0.19\%$, respectively). The rib eye area was greater for 24ze ($P < 0.04$; 7.96 ± 0.35) compared with 12ze (6.86 ± 0.35 cm²). Back fat deposition was greater for 24ze ($P < 0.02$; 4.17 ± 0.67 mm) and 12ze ($P < 0.01$; 4.42 ± 0.62 mm) compared with 0ze (1.83 ± 0.67 mm). There were no differences ($P > 0.05$) among treatments for loin, rack, shoulder and ribs weights. We concluded that repeated doses of zeranol implants have an advantage over non implanted and single implant doses, increasing dressing percentage and economical carcass characteristics such as leg muscle accretion and rib eye area, while back fat deposition was significantly greater for both implant treatments.

Key words: lambs, zeranol, carcass characteristics

W409 Performance and carcass characteristics of lambs fed with diets including protected fat and vitamin E. A. P. P. Pinto¹, I. F. Furusho-Garcia^{*2}, I. Leopoldino Junior², J. R. O. Pérez², V. A. A. Reis², S. P. Greca², N. G. Alves², and I. G. Pereira¹, ¹Universidade Federal dos Vales do Jequitinhonha e Mucuri, Diamantina, Minas Gerais, Brasil, ²Universidade Federal de Lavras, Lavras, Minas Gerais, Brasil.

The experiment was conducted at the Federal University of Lavras to evaluate the effect of the use of protected fat, with presence or absence of vitamin E on the performance and carcass characteristics of lambs in confinement with different weights. Thirty-two of Santa Ines lambs fed roughage: concentrate ratio of 40:60%, ad libitum, with the absence or presence of protected fat (calcium soaps) totaling 6% ether extract in the complete diet; and presence or absence of vitamin E (α -tocopherol acetate DL), resulting in 4 experimental diets. The 2 live weights at start confinement: lightweight (23.05 kg \pm 1.62) and heavy (32.63 kg \pm 1.72). All animals were slaughtered at 84 d of confinement. The experimental design was completely randomized in a $2 \times 2 \times 2$ (2 levels of protected fat (0 and 4%), 2 levels of vitamin E (0 and 0.05%) and 2 live weight). Data were analyzed by General Linear Methods Procedure (Proc GLM) of SAS (Statistical Analysis System); and means compared by *t*-test at 5% probability. The daily weight gain was not influenced by the factors evaluated ($P > 0.05$). The feed conversion of lambs lighter was worse ($P < 0.05$) for lambs fed diet containing no fat protected as shown in the table. The inclusion of vitamin E improved ($P < 0.05$) carcass dressing percentage (52.29%) compared with animals that were fed vitamin E (49.00%). Lighter lambs had lower ($P < 0.05$) carcass dressing percentage (48.13%)

compared with the heaviest lambs (52.29%). The addition of fat in the diet reduced ($P < 0.05$) dry matter intake and increased ($P < 0.05$) ether extract intake. The average weights of intestinal contents were higher ($P < 0.05$) in the absence of dietary fat (7.87 kg) compared with lambs fed fat (6.93 kg), this may be due to increased consumption of diets that contained no protected fat. In conclusion, lambs that start in the feedlot heavier weights have better performance and carcass characteristics, the use of protected fat improves the performance of lambs, and vitamin E improves carcass yield.

Table 1. Mean feed conversion due to the interaction between experimental weight and the presence of protected fat in diet

Experimental weight	Protected fat in diet		Mean
	0%	4%	
30-35 kg	4.487 ^{A,b}	4.725 ^{A,a}	4.606 ^a
20-25 kg	5.918 ^{A,a}	4.163 ^{B,a}	5.041 ^a
Mean	5.203 ^A	4.444 ^A	

Means followed by different letters, uppercase letters in rows and lowercase in columns, differ statistically by *t* test ($P < 0.05$).

Key words: lipids, nutrition, sheep

W410 Feeding system and breed affect goat kid growth and carcass composition. M.-E. Brassard^{*1}, L. Tessier¹, R. Gervais¹, E. Pouliot¹, C. Gariépy², G. F. Tremblay³, R. Berthiaume⁴, P. Y. Chouinard¹, and D. Cinq-Mars¹, ¹Département des sciences animales, Université Laval, Québec, QC, Canada, ²AAFC, Food Research and Development Centre, Saint-Hyacinthe, QC, Canada, ³AAFC, Soils and Crops Research and Development Centre, Québec, QC, Canada, ⁴AAFC, Dairy and Swine Research and Development Centre, Sherbrooke, QC, Canada.

Forty weaned male goat kids (25.9 ± 1.4 kg) from meat (Boer) and dairy (mostly Alpine and Saanen) breeds were used to evaluate the effects of 2 feeding systems on growth and carcass composition. Twenty kids from each breed were blocked according to body weight in 10 groups and kids were randomly allotted to an intensive pasture system or a concentrate-based diet. Grazing kids from each breed were raised in group and had access to a mineral supplement. Kids receiving concentrates (corn, soybean meal, and vitamin and mineral premix) and grass hay were reared indoors in individual pens. Kids were slaughtered when they reached 44.5 ± 0.6 kg live weight. Weight for carcasses and body components were recorded and the left side of each carcass was cut into 7 commercial joints (foreshank, neck, shoulder, flank, rib, loin, and leg). Each joint was weighed and dissected into fat, muscle and bone. No interaction was observed between feeding system and breed unless specified otherwise. Average daily gain was greater for meat than dairy kids (156 vs. 116 g/d; $P < 0.01$). Kids fed the concentrate-based diet attained slaughter weight in 131 d while those fed intensive pasture required 149 d ($P < 0.05$). Breed and feeding system did not affect dressing percentage ($48 \pm 3\%$). Meat kids ($P < 0.01$) and kids fed concentrate-based diet ($P < 0.05$) showed greater values for fat weight and percentage in neck, foreshank, rib and leg. Concentrate feeding also increased fat values for shoulder, loin and flank especially when fed to meat kids (Feeding \times Breed: $P < 0.05$). Muscle weight for loin and leg were greater for meat than dairy kids whereas the opposite was observed for neck and shoulder joints ($P < 0.05$). Pasture-fed kids had greater muscle percentage in shoulder and

neck ($P < 0.05$). Feeding pasture also increased muscle percentage in loin and rib specifically when fed to meat kids (Feeding \times Breed: $P < 0.05$). Dairy breed kids had higher bone percentage and weight for foreshank, leg, loin, and rib than meat breed kids ($P < 0.01$). Results from this study showed that breed and feeding system influence carcass quality in growing kids.

Key words: goat kid, carcass composition, commercial cuts

W411 Molecular survey of *Trypanosoma vivax* infection in Nigerian goats. T. Sanni¹, A. Yakubu^{*2}, M. A. Adefenwa³, B. O. Agaviezor⁴, C. O. N. Ikeobi¹, M. Wheto¹, M. Okpeku⁵, M. I. Takeet⁶, M. De Donato⁷, and I. G. Imumorin⁷, ¹Dept of Animal Breeding and Genetics, University of Agriculture, Abeokuta, Nigeria, ²Dept of Animal Science, Nasarawa State University, Lafia, Nigeria, ³Dept of Cell Biology and Genetics, University of Lagos, Lagos, Nigeria, ⁴Dept of Animal Science and Fisheries, University of Port Harcourt, Port-Harcourt, Nigeria, ⁵Dept of Livestock Production, Niger Delta University, Amassoma, Nigeria, ⁶Dept of Veterinary Microbiology and Parasitology, University of Agriculture, Abeokuta, Nigeria, ⁷Dept of Animal Science, Cornell University, Ithaca, NY.

Trypanosomiasis is a major protozoan parasitic disease that is endemic in Nigeria and much of Sub-Saharan Africa. To gain better understanding of the distribution of this disease in goats, a cross-sectional study was conducted in 3 geopolitical zones of Nigeria to determine the prevalence of trypanosomiasis in the 3 indigenous breeds of goats. Blood samples and some physiological parameters (rectal temperature, body temperature, respiratory rate and pulse rate) were collected from a total of 205 randomly selected animals from across the country. *Trypanosoma vivax* detection was carried out using *T. vivax*-specific polymerase chain reaction (PCR) primers that amplifies 400 bp of the trypanosome genome. Results showed that 71.22% of the total goats were infected with *T. vivax*, comprising 19.51% males and 51.71% females, respectively. Among the breeds examined, 21.46%, 42.44% and 7.32% of West African Dwarf, Red Sokoto and Sahel goats respectively were found to be infected with this parasite species. The prevalence rate was 30.73%, 20.00% and 20.49% in the northeastern, northwestern and southwestern parts of the country respectively. Breed-sex-zone interaction effect was significant ($P < 0.05$) for *T. vivax* score; indicating the separate rankings of the 3 genotypes under the 2 sexes and 3 zones investigated. The logistic regression analysis revealed that among the physiological indices, respiratory rate was the trait of utmost importance in predicting the presence of *T. vivax* with Hosmer-Lemeshow goodness-of-fit. The present information could aid management and conservation strategies toward attenuating the rate of trypanosomiasis prevalence in Nigerian goats.

Key words: *Trypanosoma vivax*, Nigeria, goats

W412 Gene expression changes in goat testes during development and in sperm during the breeding and nonbreeding seasons. A. N. Faucette^{*2}, P. K. Riggs², D. W. Forrest², L. Nuti¹, G. R. Newton¹, and N. H. Ing², ¹Prairie View A&M University, Cooperative Agriculture Research Center, Prairie View, TX, ²Texas AgriLife Research, College Station.

Current clinical tests to screen for fertility include analyses of sperm number, morphology, motility, chromatin quality, and acrosomal integrity in semen. These endpoints fluctuate due to many factors unrelated

to overall fertility. Our working hypothesis is that regulated genes involved in spermatogenesis may be useful predictors of male fertility. Our goals were to analyze alterations in gene expression in the goat testes during development and analyze alterations in gene products in sperm from mature bucks between breeding and non-breeding seasons. For the former, testes were harvested from 5 Alpine bucks at 0, 2, 4, 6, and 8 mo of age. Northern blotting and in situ hybridization indicated that the largest changes in gene expression during testes development happen in the first 4 mo in the goat. Sertoli cell marker Sex determining region Y-box 9 (SOX9) mRNA peaked at 2 mo of age then declined. At 4 mo, expression of Stimulated by Retinoic Acid gene 8 (STRA8) and Protamine 1 genes was strongly upregulated in early and maturing germ cells, respectively. RNA from ejaculated sperm collected from 3 mature Alpine bucks in October (peak breeding season) and April (not peak breeding) was interrogated for 44,000 gene products on Bovine Gene Expression Microarrays (Agilent). 43 gene products were expressed 3-fold or more highly in peak breeding season, while concentrations of 12 mRNAs decreased 3-fold or more ($P < 0.01$). Discovery of 5-fold greater levels of glycerol kinase 2 (GK2) mRNA in sperm from the peak breeding season and 6-fold lower levels of Sperm Adhesion Molecule 1 (SPAM1) mRNA are being confirmed and extended to more Alpine and Boer goat sperm samples with real time PCR. Results of these experiments may be useful in developing novel fertility tests based on mRNA levels in testes and ejaculated sperm that will assist improving reproductive efficiencies in animal production systems. USDA 2009-34136-119794 to GRN.

Key words: goat, sperm mRNA, fertility

W413 Feeding management affect the occurrence of self-suckling in dairy goats. J. Martínez-de la Puente, I. Moreno-Indias*, A. Morales-delaNuez, L. E. Hernández-Castellano, M. D. Ruíz-Díaz, N. Castro, and A. Argüello, *Universidad de las Palmas de Gran Canaria, Arucas, Las Palmas, Spain.*

Self-suckling, an animal suckling on its own teats, is an abnormal behavior observed in dairy livestock. To investigate the effect of feeding management on self-suckling, the occurrence of this behavior was recorded in 21 dairy goats during periods of 20 min at 3 different times per day (immediately after milking and the first feed (10:30), immediately after the second feed (13:30) and in the afternoon (17:00)) along 3 consecutive experimental periods of 9 d each. During the first (PRE) and the third (POST) periods goats were fed with corn, soy 44, dehydrated lucerne, dehydrated beetroot, lucerne hay and a vitamin-mineral corrector. During the second period goats were supplemented ad libitum with wheat straw in addition to their ordinary diet. Statistical analyses were conducted using Wilcoxon Matched Pairs Tests and a Friedman ANOVA (a nonparametric alternative to one-way repeated measures ANOVA). During each 20 min period, an average of 6.9 ± 2.5 , 5.1 ± 1.9 and 7.5 ± 2.9 goats suckled on their own teats during the PRE, ad libitum and POST periods respectively. During each 20 min period, a lower number of self-suckling goats were observed during ad libitum than during both PRE ($Z = 3.26$; $P = 0.001$) and POST periods ($Z = 3.74$; $P < 0.001$). Moreover, during PRE, ad libitum and POST experimental periods, each goat suckled on their own teats at least one time during an average of 8.9 ± 8.7 , 6.6 ± 7.4 and 9.6 ± 8.6 20 min periods respectively. These differences reached significance ($n = 21$; Chi Sqr. = 9.34; d.f. = 2; $P < 0.01$) with a lower self-suckling frequency during ad libitum than during POST period ($Z = 2.66$; $P < 0.01$). The same trend was found comparing PRE and ad libitum peri-

ods ($Z = 1.91$; $P = 0.06$). Overall, this study strongly supports the role of feeding management as a major factor affecting the occurrence of self-suckling in dairy goats.

Key words: behavior, feeding management, self-suckling

W414 Withdrawn

W415 Finishing performance of lambs fed fresh or dehydrated spineless cactus (*Opuntia ficus-indica*). M. I. Aguilar-Yañez¹, O. Hernandez-Mendo¹, G. Aranda-Osorio*², J. E. Ramirez-Bribiesca¹, S. S. Gonzalez-Muñoz¹, and M. M. Crosby-Galvan¹, ¹*Colegio de Post-graduados, Montecillos, Estado de Mexico, Mexico,* ²*Universidad Autonoma Chapingo, Chapingo, Estado de Mexico, Mexico.*

The objective of this study was to evaluate the effect of cactus (*Opuntia ficus-indica*) supplementation on finishing lambs performance, during an 11-week period. For this purpose, 27 male commercial crossbred lambs were used, with initial body weight (BW) mean of 21.4 ± 2.18 kg. They were distributed homogeneously into 3 groups of 9 each (each lamb being an experimental unit), and randomly assigned to the following treatments: (T1) control diet (representative lambs finishing diet for the central region of Mexico), (T2) diet with 17% dehydrated cactus (dry basis), and (T3) diet with 17% fresh cactus (dry basis). Variables were in situ dry matter digestibility (ISDMD), dry matter intake (DMI), average daily gain (ADG), feed:gain ratio (F:G) and gain:feed ratio (G:F), backfat depth (BFD), hot and cold carcass yield (HCY and CCY), biological hot and cold carcass yield (BHCY and BCCY), and carcass pH at slaughtering and 24 h post mortem. The experimental design was completely randomized, analyzed under the Proc GLM of SAS, and means were compared with Tukey test ($P \leq 0.05$). There ISDMD was higher (42.0%) for T1 at 6 h and for the T3 (88.6%) at 48 h ($P \leq 0.001$). No differences ($P \geq 0.05$) were found between treatments for average final BW (37.7 ± 1.21 kg). Backfat (BFD) was lower ($P \leq 0.001$) in lambs fed dehydrated (4.1 mm) or fresh (3.3 mm) cactus diets, compared with those fed the control diet (7.8 mm). Average values for hot and cold carcass yield, biological hot and cold carcass yield, and carcass pH at slaughtering and 24 h post mortem, were 50.6 and 47.0%, 55.4 and 49.5%, and 6.6 and 5.8, respectively ($P \geq 0.05$). Feeding lambs a diet including cactus seems to be a viable alternative for finishing systems in Mexico where cactus is readily available all around the year at a low cost. Besides, cactus could have a beneficial effect on meat traits.

Key words: cactus, sheep, productivity

W416 Finishing performance of Pelibuey sheep fed with different levels of alfalfa. V. Resendiz-Cruz¹, O. Hernandez-Mendo¹, J. Gallegos-Sanchez¹, P. A. Martinez-Hernandez², G. Aranda-Osorio*², C. Sanchez-Del Real², and S. S. Gonzalez-Muñoz¹, ¹*Colegio de Post-graduados, Montecillos, Estado de Mexico, Mexico,* ²*Universidad Autonoma Chapingo, Chapingo, Estado de Mexico, Mexico.*

The objective of this study was to evaluate the effect of feeding different levels of alfalfa to sheep on animal performance, during a period of 11 weeks. For this purpose, 36 Pelibuey male sheep were used indoors, with initial body weight (BW) mean of 22.3 ± 0.3 kg. They were distributed homogeneously into 4 groups of 3 each, with 3 replicates per group, and then randomly assigned to each of the following treatments:

0, 20, 30 and 40% alfalfa (dry basis). Dry matter intake (DMI), average daily gain (ADG), feed:gain ratio (F:G) and gain:feed ratio (G:F), hot and cold carcass yield (HCY and CCY), biological hot and cold carcass yield (BHCY and BCCY), and carcass pH at slaughtering and 24 h post mortem, and in situ dry matter digestibility (ISDMD), were evaluated. A completely random design under Proc GLM of SAS was used, and a mean comparison using the Tukey test was done. There were no differences ($P \geq 0.05$) between treatments on animal performance, except on dry matter intake, which increased ($P \leq 0.05$) from 1.2 to 1.4 kg DM per animal when increasing alfalfa level from 20 to 40%, even though diets including alfalfa had less ($P \leq 0.05$) digestibility compared with the control one. ADG, F:G and G:F averaged 271 g animal⁻¹ d⁻¹, 4.7 and 0.212, respectively ($P \geq 0.05$). The average for hot and cold carcass weight, and hot and cold carcass yield, were 19.3 and 18.8 kg, and 54.4% and 53.0%, respectively ($P \geq 0.05$). Including alfalfa to sheep diets offers no benefits on animal performance; however, including up to 40% of it, could be a viable feeding strategy, since it increases dry matter intake, which in a way, could have a positive effect if alfalfa is fed as meal or whole plant.

Key words: lambs, alfalfa, productivity

W417 Evaluation of feedlot male lamb performance receiving repeated doses of Zeranol. L. Carlos-Valdez*, A. Grado-Ahüir, L. González-Aguilera, D. Barron-Limón, P. García-Montoya, G. Villalobos-Villalobos, and D. Domínguez-Díaz, *Universidad Autónoma de Chihuahua, Facultad de Zootecnia y Ecología, Chihuahua, Chih., México.*

The objective of this study was to evaluate the effect of repeated doses of zeranol implant on the performance of male lambs. Fifty 5, post-weaning Charollais crossbred male lambs (BW = 25.2 ± 5.42 kg) were randomly allocated into 3 treatments: no implant (0ze, n = 15), 12 mg of zeranol (Ralgro, Schering-Plough) on d 0 (12ze, n = 15), and 12 mg of zeranol on d 0 with a second implant at d 28 (24ze, n = 15). The lambs had a 10 d acclimation period to a new diet and individual pens. During this time they were also vaccinated (Bobact-8, Intervet) and de-wormed (Baymec 1% Hidrofilico, Bayer). The diet was formulated to equal or exceed the nutrient requirements (NRC Sheep, 1985). The lambs were fed ad libitum twice a day (0800 and 1300h) with a TMR (85:15, concentrate:forage) that contained 2.9 Mcal/kg of ME and 13.7%CP, with free access to fresh water all day. Offered feed and refusals were weighed and recorded daily to estimate feed consumption. The lambs were weighed every 14 d for 70 d. All data was analyzed adjusting a linear model with treatment as the fixed effect. There were no differences found among treatments for final weight and DM intake ($P = 0.8$). However, numerically, 24ze had the greatest final weight (51.5kg). The ADG was greater for 24ze ($P < 0.03$; 0.37 ± 0.023kg) compared with 0ze and 12ze lambs (0.31 ± 0.020, 0.31 ± 0.020kg, respectively). For G:F 24ze lambs were more efficient ($P < 0.05$; 0.34 ± 0.02) compared with 0ze lambs (0.28 ± 0.03) but not different from 12ze lambs. These results show that repeated doses of zeranol implant increase the feed efficiency and ADG in male lambs post-weaning.

Key words: zeranol, lamb, performance

W418 Effect of using different performance traits to estimate residual feed intake. R. R. Cockrum*, R. H. Stobart, S. L. Lake, and K. M. Cammack, *University of Wyoming, Laramie.*

Predictive models for residual feed intake (RFI) have used ADG, feed intake, ME, mid-body weight (MWT), metabolic mid-body weight (MMWT^{0.75}), and various carcass traits. For RFI to become adopted by producers as an indicator of feed efficiency, relevant performance traits should be incorporated into the model to increase accuracy. Carcass traits typically measured in a ram performance test include back fat (BF) and loin eye area (LEA); scrotal circumference (SC) is another typical measurement that is indicative of growth. We hypothesized that incorporation of these biological measures into the prediction model would provide a more accurate measurement of feed efficiency in sheep. Our aim was to determine if the use of BF, LEA, and SC in the predictive equation affected RFI ranking. Individual feed intake measurements were collected on rams submitted to the University of Wyoming Western Whiteface Ram Test (n = 62) for 140 d using the GrowSafe System, an automated system that collects individual feed intake data from group-housed animals. Feed samples were collected and analyzed for DM, ADF, and IVDMD to determine ME, a measurement often preferred over actual feed intake as it accounts for individual digestibility. Using the GLM procedure in SAS, predictive equations were generated to estimate RFI, and the CORR procedure was used to evaluate relationships among these alternative predictive equations. An α of 0.05 was assumed. The base model used was $Y = \beta_0 + X_1\beta_1 + X_2\beta_2 + e$ where $Y = \text{ME}$, $X_1 = \text{ADG}$, and $X_2 = \text{MMWT}^{0.75}$ or MWT . An R^2 of 0.43 was generated for this equation regardless of use of MMWT^{0.75} or MWT. Further analyses used only MWT for estimating RFI. When BF and LEA predictors were added to the equation, R^2 increased to 0.45, and SC further increased R^2 to 0.46. Additional performance traits in the model had no effect ($P = 0.985$) on individual RFI ranking, and the predictive equations analyzed were highly and positively correlated ($P < 0.001$). Adding performance data to the RFI predictive equation had limited effect on accuracy, and did not produce rankings different from the base model.

Key words: efficiency, predictive models, residual feed intake

W419 Increased nutritional level positively influences the onset of the breeding season and the reproductive performance of native male goats in northern Mexico. A. Olán-Sánchez¹, E. Carrillo², L. M. Tejeda¹, J. M. Guillén-Muñoz¹, P. A. Robles-Trillo¹, C. A. Meza-Herrera³, F. G. Véliz¹, R. Rodríguez-Martínez*¹, and M. Mellado⁴, ¹Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, ²Instituto Tecnológico de Torreón, Torreón, Coahuila, México, ³Universidad Autónoma Chapingo, Unidad Regional de Zonas Áridas, Bermejillo, Dgo., México, ⁴Universidad Autónoma Agraria Antonio Narro, Buenavista, Saltillo, Coahuila, México.

To determine whether feeding influences the onset of sexual activity in native bucks in northern Mexico (26° N), adults native bucks (n = 10) were divided into 2 homogeneous groups in relation their body condition (1.5, scale 1–4) and body weight (27 kg). Before the trial, bucks were kept in an extensive production system with predominant native vegetation consisting of *Prosopis glandulosa*, *Acacia farnesiana*, *Atriplex acantocarpa*, *Agave scabra*, *Mimosa biuncifera*, *Helianthus ciliaris*, *Salsola kali*, *Solanum elaeagnolium* as well as *Chloris virgata*, *Setaria verticillata*, *Eragrostis pectinacea*, *Bouteloua curtipendula*, *Aristida purpurea* and *Bouteloua barbata*. Sometimes, bucks had available some agricultural crop residues such as sorghum (*Sorghum vulgare*) and corn (*Zea mays*), among others. On May 19, 2010, a group of males (Well fed, n = 5) received a diet to cover 150% of their nutritional requirements for maintenance, while another group of males (Control, n = 5) was fed a maintenance diet. At the end of the

trial (June 19) a sexual behavior test was carried-out, in which males of both groups were exposed to 2 females in estrus during 15 min, for 2 consecutive days. Percentage of anogenital sniffing, nudging, mounting attempts, and complete mounts were compared with Chi-squared test, while the ejaculation latency time was compared with a Student *t*-test. All the tests were performed by means of the statistical package SYSTAL 12. Well-fed bucks had more anogenital sniffing, nudging, mounting attempts, and full mount than controls (Table). In addition, ejaculation latency time in well-fed bucks was shorter (57.8 ± 7.1 s) than Control bucks (419 ± 116 s). These results show that feed supplementation of range mixed-breed goat bucks in spring elicits a strong sexual behavior.

Table 1. Sexual behavior of native bucks, well and poorly fed, exposed to estrogenized females for two days during 15 min, at the onset of sexual activity season in northern Mexico (26° N)

Groups	Anogenital sniffing	Nudging	Mounting attempts	Complete mounts
Poorly fed	69 ^a	258 ^a	13 ^a	27 ^a
Well fed	102 ^a	378 ^b	22 ^a	65 ^b

Different superscripts within column indicate statistical differences ($P < 0.05$).

Key words: goats, feeding, sexual behavior

W420 Response of sexually inactive French Alpine bucks to the stimulus of estrous goats. L. M. Tejada*¹, E. Carrillo², R. Rivas-Muñoz², M. Guillén-Muñoz¹, C. A. Meza-Herrera³, G. Arellano-Rodríguez¹, M. Mellado¹, and F. G. Véliz¹, ¹Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, ²Instituto Tecnológico de Torreón, Torreón, Coahuila, México, ³Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Áridas, Bermejillo, Durango, México.

This study was designed to investigate whether sexually inactive French Alpine bucks stimulated with estrous does are capable to induce estrus and ovulation in anestrus does. Two goats were subcutaneously injected, every 2 d, with 2 mg estradiol cypionate (Estradiol, Qro., México) in 1 mL vegetable oil. These goats in permanent estrus were placed with 2 sexually inactive bucks (stimulated) in May and another 2 bucks in June, during 3 weeks before breeding. Fifty-nine adult anestrus French Alpine goats were randomly assigned to one of 4 treatment groups: exposure to stimulated ($n = 14$) or nonstimulated ($n = 15$) bucks in March, or with stimulated ($n = 15$) or nonstimulated ($n = 15$) bucks in June. All goats received a single I.M. injection of 25 mg progesterone (Progestas E, Qro., Mexico) before the buck exposure. Does were considered in estrus when copulation occurred. Once bred, goats were removed from the breeding pens and pregnancy was diagnosed by transrectal ultrasonography using a 5.0 MHz transducer (Supply, Inc., Tequesta, FL) 50 d after mating. Additionally, the sexual behavior exhibited by bucks in contact with penned does was recorded during 2 consecutive observation sessions lasting one h each. The estrus response was 79 and 100% for goats exposed to stimulated bucks in March and June, but none of the goats joined with the non-stimulated bucks showed estrus in both breeding seasons. Pregnancy rate based on ultrasonography 50 d post copulation was lower ($P < 0.01$) in goats joined to stimulated bucks in March (50%) compared with goats bred in June (80%). For both breeding seasons none of the goats joined to nonstimulated bucks kidded. Interval to estrus was shorter (68 ± 2 vs 141 ± 13 h) and more synchronized in goats exposed

to stimulated bucks in June than goats exposed to bucks in March. Frequency of flehmen, nosing, and approaches were higher ($P < 0.01$) for simulated bucks than nonstimulated bucks. It was concluded that the exposure of sexually inactive bucks to estrous goats is an inexpensive, practical and efficient way to elicit sexual active in bucks, which subsequently triggers breeding activity of anestrus goats.

Key words: male effect, goat, estrous goats

W421 Contact with estrogenized female goats influences the end of sexual activity of young bucks but not adult bucks in northern Mexico. A. Olán-Sánchez*¹, E. Carrillo², R. Rivas-Muñoz², L. M. Tejada¹, J. M. Guillén-Muñoz¹, R. Rodríguez-Martínez¹, P. A. Robles¹, C. A. Meza-Herrera³, F. G. Véliz¹, and G. Arellano-Rodríguez¹, ¹Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, ²Instituto Tecnológico de Torreón, Torreón, Coahuila, México, ³Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Áridas, Bermejillo, Durango, México.

In the present study it was determined if the contact of estrogenized female goats with bucks promotes the end of sexual activity of young or adult Alpine bucks in northern Mexico (26° N). Alpine adult ($n = 8$, 4-yr-old) and young bucks ($n = 10$, 1-yr-old) were divided into 2 homogeneous groups regarding their body condition score and body weight. All animals were reared in an intensive system and had free access to alfalfa hay and 200 g commercial concentrate (14% CP). On January 15, 2010, a first group of adult bucks (Experimental-Adult, $n = 4$) was daily exposed during 4 weeks to 2 goats permanently in estrus (does received 2 mg estradiol cypionate every 3 d). During this period, another group of adult bucks (Control-Adult, $n = 4$) had no contact with estrogenized does. A third group of young bucks (Experimental-Young, $n = 5$) was daily exposed during 4 weeks to 2 estrogenized does. A fourth group of young bucks (Control-Young, $n = 5$) did not have contact with does in estrus. At the end of the study (16 February, 2010) a sexual behavior test was carried out; males of both groups were exposed to 2 females in estrus for 15 min, for 2 consecutive days. Percentage of anogenital sniffing, nudging, mounting attempts, and complete mounts were compared with the Chi-squared test, whereas latency to ejaculation was compared with a Students *t*-test. All statistical tests were performed with the statistical package SYSTAL 12. The results of sexual behavior tests are indicated in Table 1. These results indicate that exposure of young bucks to estrogenized does elicited a strong sexual response in these animals; on the other hand, non-stimulated adult bucks displayed the same sexual performance as that showed by adult bucks in contact with estrogenized does.

Table 1. Sexual behavior of adult or young French Alpine bucks, previously isolated or exposed to goats permanently in estrus during two evaluations at the end of the breeding season

Groups	Anogenital sniffing	Nudging	Mounting attempts	Complete mounts	Latency to ejaculate	Aggression
Control-Young	28 ^a	18 ^a	1 ^a	0 ^a	901 ^a	16 ^a
Experimental-Young	66 ^b	47 ^b	23 ^b	7 ^{a,b}	484 ^b	2 ^b
Control-Adult	35 ^a	37 ^{a,b}	0 ^a	9 ^b	15 ^c	0 ^b
Experimental-Adult	38 ^a	23 ^a	1 ^a	9 ^b	26 ^c	0 ^b

^{a,b}Different superscripts within columns, indicate statistical differences ($P < 0.05$).

Key words: bucks, females in estrus, breeding season

W422 NCSynch: A protocol for ovulation synchronization and timed artificial insemination in goats. E. C. Bowdridge*, W. B. Knox, C. S. Whisnant, and C. E. Farin, *North Carolina State University, Raleigh.*

The study objective was to compare overall pregnancy rates achieved using a combined ovulation synchronization-timed artificial insemination protocol (NCSynch-TAI) with those obtained using estrus synchronization and artificial insemination (AI). Multiparous Boer and Boer-cross does ($n = 132$) were randomly assigned within age (Year 1) or parity (Years 2, 3) to one of 2 treatments. Control does received 15 mg prostaglandin F (PGF; Lutalyse®) on Days 1 and 10 of treatment. Estrus onset was checked twice daily with separately penned, intact bucks (Year 1) or a vasectomized buck penned with the does (Years 2, 3). Controls were bred by AI 12 h after estrus onset using frozen semen. NCSynch-TAI does received 15 mg PGF on Day 1 of treatment. On Day 8, does received 50 µg GnRH (Cystorelin®) and on Day 15, 15 mg PGF was given. On Day 18, NCSynch-TAI does were appointment bred (TAI) using frozen semen and received 50 µg GnRH at breeding. All AI/TAI procedures were performed in late September by experienced inseminators using a transcervical technique. Pregnancy was monitored by transabdominal ultrasonography at 50 and 85 d after insemination. In Year 1, 13 of 15 control does (87%) were detected in estrus with 8 pregnant to AI (53% overall pregnancy rate). For NCSynch-TAI, 15 does were bred and 11 (73%) became pregnant. In Year 2, 24 of 26 controls (92%) were detected in estrus with 19 pregnant to AI (73% overall pregnancy rate). For NCSynch-TAI, 26 does were bred and 20 (77%) became pregnant. In Year 3, 21 of 25 controls (84%) were detected in estrus with 8 pregnant to AI (32% overall pregnancy rate). For NCSynch-TAI, 25 does were bred and 14 (56%) became pregnant. Across Years 1–3, the overall pregnancy rate for NCSynch-TAI does (45/66, 68%) did not differ ($P = 0.075$, $\text{Chi}^2 \text{ df} = 1$) compared with controls (35/66; 53%). In summary, overall pregnancy rates using NCSynch-TAI were comparable to those for does bred by AI based on estrus detection. Use of NCSynch-TAI eliminates the need for heat checking before AI and allows breeding to be scheduled on a predetermined date. Supported by NC Ag Research Service.

Key words: ovulation synchronization, estrus synchronization, timed artificial insemination

W423 Comparison of two ovulation synchronization methods for timed artificial insemination in goats. N. C. Whitley*¹, C. E. Farin², W. B. Knox², L. Townsend³, J. R. Horton³, K. Moulton¹, and S. Nusz⁴, ¹North Carolina A&T State University, Greensboro, ²North Carolina State University, Raleigh, ³NCDA, UMRS, Laurel Springs, NC, ⁴Redlands Community College, El Reno, OK.

The objective of this experiment was to compare 2 potential estrus and ovulation synchronization protocols for timed artificial insemination (TAI) in goats. Thirty-eight mixed parity meat goat does (Spanish and Boer-crossbred) were used at 3.4 ± 0.3 years of age and 47.4 ± 1.3 kg body weight. Half of the does underwent the “NCSynch” protocol in which does were injected with 15 mg dinoprost tromethamine (3 mL Lutalyse) im on d 0, or start of the protocols, and d 14 and 50 µg gonadorelin diacetate tetrahydrate (1 mL Cystorelin) im on d 7 as well as on d 17 at TAI. Remaining does were administered a CIDR protocol in which sheep CIDRs were inserted on d 4 and removed on d 15. The CIDR group received 3 mL Lutalyse and a combination of 200 IU eCG and 100 IU hCG (2.5 mL PG600) im at CIDR removal; TAI occurred on d 17. Does were housed together throughout the study and were allowed fence-line access to an intact buck on d 15. Trans-cervical

insemination was conducted by 2 experienced technicians alternating between groups such that equal numbers of does from each treatment were inseminated by each technician. One doe from the CIDR group was removed at insemination due to an unknown physical problem making it impossible to penetrate the cervix. An intact buck wearing a marking harness was introduced at 21 d after TAI. Blood samples were collected via jugular vein puncture at 31 d after insemination to determine pregnancy status (bioPRYN®; BioTracking, LLC). Pregnancy rates were higher ($P < 0.009$) for animals treated with the CIDR protocol (50%) than the NC-Synch protocol (10.5%) based on Chi-Square analysis. However, bioPRYN levels for one of the CIDR treated does was indicative of an early pregnancy loss and the doe was later marked by the buck. The buck marked more ($P < 0.005$) NCSynch treated does than CIDR-treated does (84% vs 39%, respectively). Previous use of the NCSynch protocol with the same inseminators resulted in higher pregnancy rates than seen with either protocol in this study; however, because both protocols are costly and labor intensive to use, more research will be required.

Key words: estrus synchronization, goat, timed artificial insemination

W424 Effect of flushing and (or) exposure to estrogenized does upon reproductive performance of anovulatory range goats exposed to male effect. M. A. De Santiago-Miramontes*¹, J. R. Luna-Orozco¹, F. G. Véliz-Deras¹, R. Rodríguez-Martínez¹, P. A. Robles-Trillo¹, C. A. Meza-Herrera¹, and M. Mellado¹, ¹Universidad Autónoma Agraria Antonio Narro, ²Centro de Bachillerato Tecnológico Agropecuario N° 1, ³Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Áridas.

The objective is to determine if flushing around mating or the stimulus of estrogenized goats is necessary to achieve a high reproductive response in anestrus mixed-breed rangeland goats (arid region of Mexico; 26°N). On May 21, 78 goats grazing on natural rangeland (1.6 ± 0.2 points, BCS, 1–4 scale) were randomly assigned to 1 of 4 experimental groups: (1) Flushed (F; $n = 20$) does received nutritional supplementation 1 week prior joining and 2 weeks after, receiving 1.0 kg of alfalfa hay (17% CP), 310 g rolled corn grain (8.5% CP) and 220 g soybean meal (48% CP) per animal. (2) Stimulated (S; $n = 20$) does was exposed to 4 estrogenized females. (3) Stimulated-Flushed (S-F; $n = 20$) does was supplemented and stimulated as mentioned. (4) Control (C; $n = 18$) does only grazed on the rangeland. All the does were exposed to 2 bucks/group. Regardless of treatment, 100% of does showed luteal activity. S and S-F groups depicted estrus during the first 5 d of joining (45 and 60%, respectively) compared with C or F group (11 and 5%, respectively; $P < 0.05$). Hours to estrus was greater ($P < 0.01$) in C (225 ± 18 h) and F (271 ± 19 h) groups than in S (130 ± 22 h) and S-F group (104 ± 16 h). Pregnancy rate did not differ at d-70 post-breeding among groups ($P > 0.05$; C, 72%; F, 80%; S, 70%; S-F 65%). However, kidding rates were lower ($P < 0.05$) in F and S-F groups, (40% and 35% respectively) compared with C (67%) and S (55%) groups. These results demonstrate that the presence of estrogenized does shortens the interval to estrus induced by the male effect. Nonetheless, the short-term nutritional supplementation around joining promoted the fertilization-implantation, did not improve the reproductive performance because of the failure to maintain gestation, probably due to the adverse nutritional conditions in the rangeland after the 2/3 of gestation. Therefore, alternative food resources must be offered to those supplemented-goats showing an increased ovulatory outcome around breeding once these females arrive to the 2/3 and 3/3 of gestation, if abortions or stillbirths is tried to be avoided.

Key words: feed supplementation, rangeland, kidding rate

W425 Exposure of does in estrus to bucks subsequently induces estrus in anestrus females. S. Marcelino-León^{*1}, J. R. Luna-Orozco¹, F. G. Véliz-Deras¹, L. Gaytán-Alemán¹, C. A. Meza-Herrera¹, R. Rodríguez-Martínez¹, M. Mellado¹, and M. A. De Santiago-Miramontes¹, ¹Universidad Autónoma Agraria Antonio Narro, ²Centro de Bachillerato Tecnológico Agropecuario No 1, ³Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Áridas.

The objective of the present study was to determine if the stimulus exerted by the exposure of estrogenized does to bucks would stimulate the estrous behavior in mixed-bred anovulatory goats in the arid region of northern Mexico, also, determine if an increased percentage of estrogenized does would modify such response. A total of 93 pluriparus anovulatory goats were divided in 3 experimental groups (n = 31, each) and exposed to 2 males per group. Thereafter, one group was also exposed to 6 estrogenized does (G20%), a second group was exposed to 3 estrogenized does (G10%), and the third group was exposed to 6 non-estrogenized does (G0%). Proportions of does in estrus were analyzed with chi-squared test while hours to estrus was compared with a Student *t*-test. Systat 12 statistical package was used. The proportion of does displaying estrous behavior during the study was similar in both the G10% and G20% groups (93%, 90%, respectively; $P > 0.05$), although different in the G0%, where no female demonstrated estrous behavior ($P < 0.01$). In addition, hr to estrus was greater in G10% (167.8 ± 17 h) than in G20% (142 ± 20 h; $P < 0.001$). These results indicate that estrogenized does exposed to “effected” male goats positively affected the percentage of goats depicting estrous behavior of anovulatory goats exposed to the male effect. In addition, an increased percentage of anovulatory goats depicting estrous behavior of female goats during the anestrus season.

Key words: female effect, seasonal anestrus, sexual activity

W426 Influence of sexually inactive bucks subjected to either long photoperiod or testosterone upon the induction of estrus in anovulatory goats. J. M. Guillén-Muñoz^{*1}, J. R. Luna-Orozco², L. M. Tejada-Ugarte¹, M. A. De Santiago-Miramontes¹, M. Mellado¹, F. G. Véliz¹, R. Rodríguez-Martínez¹, and C. A. Meza-Herrera³, ¹Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, ²Centro de Bachillerato Tecnológico Agropecuario No 1, Torreón, Coahuila, México, ³Universidad Autónoma Chapingo, Unidad Regional de Zonas Áridas, Bermejillo, Dgo., México.

The objective of this study was to evaluate the efficacy of exposing sexually inactive bucks to either artificial long photoperiod or testosterone upon the induction of estrus of anovulatory goats under rangeland conditions. Multiparous mixed breed anestrus goats (n = 91) were randomly assigned to one of 3 treatment groups: I. Joining with bucks subjected to 2.5 mo of artificial long days (16 h of light/d; PHOTO; n = 31), II. Joining with testosterone-treated bucks (TESTO; n = 30), and III. Joining with untreated bucks (CONTROL; n = 30). Two bucks were assigned to each treatment group. The breeding season was from August to February and estrus response was measured twice a day (0800 to 1000 and 1800 to 2000 h). Percentages of goats in estrus and conception rates were analyzed with the Fisher exact test, interval to estrus was analyzed by PROC-GLM, and buck sexual behavior was analyzed with the Fisher exact test. While no differences were observed ($P > 0.05$) between the light-treated (100%)

and testosterone-treated (93%) bucks in their ability to induce estrus of anovulatory does, none of the goats exposed to the CONTROL-buck exhibited estrus behavior ($P < 0.05$). The interval from the onset of mating to estrus was shorter ($P < 0.05$) in those goats exposed to the light-treated bucks (37.9 ± 4.8 h) as compared with those exposed to the TESTO-treated bucks (58.3 ± 8.7 h). Overall pregnancy rate in goats joined to PHOTO, TESTO and CONTROL bucks was 84, 77, and 0%, respectively, with no differences ($P > 0.05$) between the first 2 groups. Ano-genital sniffing, approaches, mounting attempts and mounts were highest ($P < 0.01$) in the PHOTO-group and lowest in CONTROL-group. Both PHOTO and TESTO treated bucks were equally effective in synchronizing estrus in anovulatory goats and resulted in similar levels of fertility under rangeland-extensive conditions.

Key words: male effect, photoperiod, reproductive outcomes

W427 Nutritional supplementation before or after the breeding season does not improve the productive and reproductive response of goats managed under a marginal production system in Northern Mexico. C. G. Orta-Castillón¹, C. A. Meza-Herrera², G. Arellano-Rodríguez¹, P. A. Robles-Trillo¹, M. A. De Santiago-Miramontes¹, R. Rodríguez-Martínez¹, M. Mellado³, and F. G. Véliz^{*1}, ¹Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, ²Universidad Autónoma Chapingo, Unidad Regional Universitaria de Zonas Áridas, Bermejillo, Durango, México, ³Universidad Autónoma Agraria Antonio Narro, Saltillo, Coahuila, México.

The aim of this study was to determine if feed supplementation before or after the breeding season improves both productive and reproductive performance of mixed-breed goats under rangeland conditions in northern Mexico. Three groups of goats grazed (11:00 to 17:00 h) on rangeland and field crop residues. Goats in one group were offered feed supplement 5 d before and 20 d after breeding (SS, n = 37; 2.2 ± 0.1 , CC scale 1.4, and 39.7 ± 1.2 , kg BW), other group (SS-After, n = 40; 2.2 ± 0.1 , CC and 39.9 ± 1.0 kg) received feed supplement only 5 d before breeding. Both groups were fed a ration which provided 75% of their energy and protein requirements for maintenance. The control group (n = 24; 2.3 ± 0.4 , CC and 39.5 ± 0.9 kg BW) received no feed supplementation during the experimental period. On March 20th 2010, experimental groups were exposed to 4 bucks which were induced to an intense sexual activity by means of a photoperiodic treatment of 2.5 mo of long day photoperiod scheme (16 h light/day) starting on November first. Differences in the proportion of does showing estrus activity and diagnosed pregnant were detected by using the exact probability test of Fisher. Differences in litter size were compared with the Kruskal-Wallis test. The statistical analyses were carried out with the Systat 10 program (Evanston, IL, USA). The results are shown in Table 1. Overall 83% of goats showed estrus during the experimental period with no difference between groups ($P > 0.05$). Percentage of pregnancy (mean 70% across groups) and ovulatory rates (1.5 ± 0.1 across groups) were similar between groups ($P > 0.05$). These results suggest that mixed-breed multiparous goats in good body condition under extensive-range production systems in northern Mexico, did not benefit from feed supplementation before or after breeding in spring.

Table 1. Reproductive performance of mixed-breed goats supplemented before or after breeding¹

Goats	Estrus activity (%)	Pregnancy rate (%) ²	Kidding rate (%)	Litter size (mean±SD)
CG	(88) 38/43	(70) 30/43	(63) 27/43	1.4 ± 0.1
SS-After	(85) 33/39	(74) 29/39	(69) 27/39	1.4 ± 0.1
SS	(79) 33/42	(67) 28/42	(60) 25/42	1.6 ± 0.1

¹For all variables no statistical differences were detected among groups ($P > 0.05$).

²Pregnancy rate at 50 days after the last copulation.

Key words: nutritional supplementation, goat, reproduction