681 Fabricated carcass measurements in terminally sired F_1 lambs. M. R. Mousel*[1], D. R. Notter[2], T. D. Leeds[3], H. N. Zerby[4], S. J. Moeller[4], and G. S. Lewis[1], *[1]USDA, ARS, U.S. Sheep Experiment Station, Dubois, ID, [2]Virginia Tech, Blacksburg, [3]USDA, ARS, National Center for Cool and Cold Water Aquaculture, Kearneysville, WV, [4]The Ohio State University, Columbus.*

Scientific data for carcass traits of terminal-sire sheep breeds can be used to improve the value of market lambs, but information is lacking for modern terminal-sire breeds in the United States. Thus, the effects of terminal-sire breed on 14 fabricated carcass measurements were determined in F_1 wether lambs. Columbia, USMARC-Composite (Composite), Suffolk, and Texel rams were mated with mature Rambouillet ewes over 3 yr. From weaning until harvest each year, F_1 lambs (n = 518) were fed a step-up finishing diet and harvested in 3 groups at targeted mean BW of 54.5, 61.4, or 68.2 kg. Carcasses were fabricated according to Style A of Institutional Meat Purchase Specifications. Weights were collected for the following carcass subprimal cuts: neck, foreshank, breast, square-cut shoulder (SCShoulder), rack, roast ready rack (RRR), loin, trimmed loin (TLoin), sirloin, boneless sirloin (BSirloin), flank, leg, boneless leg (BLeg), and hindshank. All traits were analyzed individually with a mixed model that included fixed effects of sire breed, year of harvest (YR), harvest group (HG), weight-on-test deviation from the breed mean, and random effects of sire and maternal grandsire. The YR and HG were significant ($P < 0.01$) in all models. Sire breed was significant ($P < 0.01$) for all traits except flank ($P = 0.05$). Suffolk-sired lambs had the heaviest neck (0.86 kg), breast (4.1 kg), SCShoulder (6.5 kg), rack (3.4 kg), RRR (1.5 kg), loin (3.2 kg), sirloin (3.1 kg), leg (10.6 kg), and BLeg (4.6 kg) compared with the other F_1 lambs. Suffolk-sired lambs had the heaviest foreshanks (1.7 kg) and TLoin (2.7 kg); then Columbia-sired, 1.5 and 2.6 kg, respectively; and Texel-sired lambs had the lightest, 1.4 and 2.4 kg, respectively. Suffolk-sired lambs had heavier BSirloin (1.7 kg) than Composite-sired lambs (1.5 kg), but Suffolk- and Composite- did not differ from Texel- (1.6 kg) or Columbia-sired (1.6 kg) lambs. Columbia- and Suffolk-sired lambs had heavier hindshanks than Texel-sired lambs, 0.94, 0.97, and 0.88 kg, respectively. Producers can use data such as these to select a terminal-sire breed of sheep that will improve the carcass value of market lambs.

Key Words: lamb, terminal sire, carcass

682 Awassi sheep productivity in central Anatolia region of Turkey. H. Üstüner* and M. Ogan, *Uludag University, Faculty of Veterinary Medicine, Department of Animal Science, Bursa, Turkey.*

The objective of this study was to investigate the reproductive and production performance of Awassi sheep in central Anatolia region of Turkey. A total 147 ewe production and reproductive performance records between January 2003 and December 2005 were used for this experiment. The data consisted of parity, birth type and year for reproductive and production performance, and birth type, birth date, sex and weight of lamb for growth performance. Growth and milk yield were recorded fortnightly. Average live weight of Awassi lambs at birth, 30th, 60th (weaning), 90th, and 120thday were found 4.5 ± 0.2, 9.9 ± 0.2, 17.3 ± 0.4, 23.3 ± 0.5, and 29.1 ± 0.7 kg, respectively. Average live weights of female Awassi lambs at d 150 and 180 were 32.8 ± 0.5 and 38.1 ± 0.7 kg, respectively. The effects of parity, birth year, sex, birth type (single or twin) and all interactions on growth performance were investigated using PROC MIXED of SAS. The birth weight was affected by sex ($P < 0.01$) and birth type ($P < 0.01$) but the effects of parity and year were not significant ($P > 0.05$). The average survival to weaning was 88.3%, representing a loss of 18 lambs. Lactation milk yield was found to be 196.5 ± 5.6 kg in 184.3 ± 2.1 d. The effects of year and parity and all interactions on milk yield were investigated using PROC MIXED of SAS. The effects of year and parity were found statistically significant ($P < 0.01$). Greasy wool production and mating weight of Awassi ewes were found 2543.0 ± 59.6 g and 58.8 ± 0.7 kg, respectively. General mortality rate was found 8.2% throughout research period. Greasy wool production was affected by year (first or second research year; $P < 0.001$) but not by parity ($P > 0.05$). The effects of parity and mating year on ewes' mating weight were highly significant ($P < 0.001$). As a result of this study, Awassi sheep can be successfully raised under central Anatolia conditions.

Key Words: Awassi, lactation yield, environment

683 Effect of lithium chloride for mid-term conditioned aversion to olive tree leaves in penned and grazing goats. C. L. Manuelian, E. Albanell, M. Rovai,* A. A. K. Salama, and G. Caja, *Grup de Recerca en Remugants (G2R), Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain.*

With the aim of allowing the selective grazing of goats in olive tree fields, conditioned aversion was created by using 2 doses of lithium chloride (LiCl). Treatments were C (water blank), AV1 (175 mg LiCl/kg BW) and AV2 (200 mg LiCl/kg BW). Fifteen dry Murciano-Granadina does were randomly assigned to the 3 treatments, in which voluntary intake of olive leaves (used as novel feed) was individually measured after 1 h of allowance during the aversion induction period (d 1 to 3). A single dose of LiCl was orally administered by a drenching gun. Repeated exposure to the olive leaves for memory evaluation was performed in double-choice feeding (Italian rye-grass and olive leaves) tests of 60 min (d 4 to 8) and 30 min (d 16, 24, 31, 38 and 53). On d 9 a new dose of LiCl was administered to does consuming > 10 g/d olive leaves. No more LiCl was administered during the memory evaluation period. Thereafter, all groups were exposed (d 59, 90, 121 and 182) to simulated olive trees, placed in a rye-grass prairie for 30 min. Moreover, C and AV2 groups grazed (d 146, 211 and 363) on a commercial olive tree field with natural weeds for 30 min. Olive leave intake slightly increased during the memory evaluation period being greater on d 53 in the C does (99 ± 1 g; $P < 0.05$) than in the averted does (AV1, 42 ± 14 g; AV2, 34 ± 16 g) which did not differ. Four AV1 does needed a new LiCl dose to re-establishing the aversion. In addition AV1 does spent more time eating olive leaves under simulated field conditions than AV2 (333 ± 53 s and 149 ± 60 s; $P > 0.05$). A year after the induced aversion, AV2 does still presented greater preference (approaching, eating and climbing) for olive leaves than C does, when grazing in the commercial field. In conclusion, 200 mg LiCl/kg BW was the preferred dose for inducing an effective mid-term (12 mo) conditioned aversion in goats. The use of LiCl was considered as a useful tool for selective grazing and use in ecological bio-agriculture system.

Key Words: aversion, lithium chloride, goats

684 Milk production losses in early lactating dairy goats under heat stress. S. Hamzaoui, A. A. K. Salama,* G. Caja, E. Albanell, C. Flores, and X. Such, *Group de Recerca en Remugants (G2R), Universitat Autònoma de Barcelona, Bellaterra, barcelona, Spain.*

In a previous work we observed that heat-stressed goats at late lactation suffered no reductions in milk yield and milk fat, despite the lower milk

protein. However, this response during early lactation remains unclear. Eight multiparous Murciano-Granadina dairy goats (43.3 ± 1.6 kg BW; 81 ± 3 DIM) were used. Goats were kept in metabolic cages and randomly assigned to 2 climatic treatments according to a crossover design (35 d periods). Treatments were (temperature, °C; humidity, %; THI, Thorn heat index):1) thermal neutral (TN, 15 to 20°C; 35 to 45%; THI = 59 to 64), and 2) heat stress (HS, 12 h/d at 37°C and 45%, and 12 h/d at 30°C and 45%, THI = 86 and 77, respectively). Goats received TMR and water ad libitum. Feed intake and milk yield were recorded daily. Milk, blood, and urine samples were collected weekly for the osmolality measurements. Additionally, blood samples were taken at d 7 and 28 of each period for the creatinine analysis. Urine uric acid concentration was used as an index (uric acid:creatinine × $BW^{0.75}$) of microbial protein synthesis. Feces and urine for digestibility and N balance (d 31 to 35) were also collected in each period. Compared with TN, HS goats had lower ($P < 0.01$) feed intake (1.75 vs. 2.47 kg/d), milk yield (1.53 vs. 1.68 L/d), milk fat (3.76 vs. 4.26%), and milk protein (3.26 vs. 3.74%). Osmolality (mosm/kg) of blood plasma (334) and urine (1449) was similar in both groups, but milk of HS had lower ($P < 0.05$) osmolality than TN (309 vs. 321). Creatinine concentration in blood was greater ($P < 0.05$) in HS than TN (0.81 vs. 0.62 mg/dL), which might indicate muscle degradation under HS conditions. The HS goats had lower ($P < 0.05$) microbial protein synthesis index (6.5 vs. 10.0). Digestibility of DM, OM, ADF, and NDF did not differ between TN and HS. Moreover, both TN and HS retained similar ($P = 0.557$) amount of N (19.3 g/d). In conclusion, early lactating dairy goats under HS suffer losses in milk yield, milk fat and protein contents. The reduced milk protein content under HS might be related to the lower microbial protein synthesis.

Key Words: heat stress, digestibility, dairy goat

685 Long-term effects of intrauterine rivalry on the reproductive performances of co-twin ewe-lambs. J. Casellas and G. Caja,* *Grup de Recerca en Remugants (G2R), Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain.*

Intrauterine environment may permanently alter the genome expression through fetal programming. We hypothesized that the birth weight difference (BWD) between co-twins may be a representative measure of their experienced rivalry. With this regard, we tested the effect of variations in the BWD of co-twin ewes on their further average litter size. Data analyses were performed on 1,449 lambing records from 331 Ripollesa breed ewes averaging 1.502 ± 0.01 lambs per litter (singletons, 51.8%; twins, 46.2%; triplets, 2.0%). Ewes born as twins were classified in groups using BWD = 200 g as a discriminating threshold; i.e., equal twins (T0, BWD ≤ 200 g), and heavier (TH) and lighter (TL) co-twins of litters with BWD > 200 g. Ewes born as singletons were grouped in an additional control category (S). A mixed linear model accounting for BWD, ewe age (<3, 3, 4, 5 and > 5 yr), year of lambing (21 yr) and the random permanent effect of each ewe, was implemented with the Mixed procedure of SAS (SAS Institute, Inc., Cary, NC). Both the effects of birth weight and co-twin sex (male or female) were discarded ($P > 0.1$), whereas remaining effects reached statistical significance ($P < 0.05$). Singleton (n = 94; 1.49 ± 0.03 lambs), T0 (n = 73; 1.509 ± 0.03 lambs) and TH (n = 64; 1.52 ± 0.032 lambs) ewes showed similar reproductive performances ($P > 0.05$) whereas litter size decreased ($P < 0.05$) for TL ewes (n = 100; 1.40 ± 0.03 lambs). Indeed, TL ewes experienced a 6 to 8% reduction in the realized litter size along their whole productive life. Although physiological pathways underlying these reproductive departures were not elucidated, current knowledge on fetal programming postulates permanent alterations in the hypothalamic-pituitary-adrenal axis as the causal mechanism. In conclusion, fetal programming due to intrauterine competition is a fact that must be dealt with in sheep, with relevant economic consequences in the ovine sector worldwide.

Key Words: fetal programming, litter size, sheep

686 Fixed-time laparoscopic AI with frozen-thawed goat semen in progesterone and PMSG supplemented Cosynch protocol. Z. Nur[1], B. Üstüner*[1], Y. Nak[2], S. Alcay[1], Y. Yaman[3], and H. Sagirkaya[1], *[1]Department of Reproduction and Artificial Insemination, Uludag University, Faculty of Veterinary Medicine, Gorukle, Bursa, Turkey, [2]Department of Obstetrics & Gynecology, Uludag University, Faculty of Veterinary Medicine, Gorukle, Bursa, Turkey, [3]Marmara Animal Breeding Research Institute, Bandirma, Balikesir, Turkey.*

The effects of progesterone and PMSG supplemented Cosynch (GnRH on d 0, PGF2α on d 7, with GnRH and timed AI (TAI) on d 9) on the estrus synchronization, follicular development and pregnancy rates (PR) after TAI were evaluated during the breeding season. The multiparous Saanen does (>40 kg BW) were used and assigned to 4 synchronization treatments. In group I, II and IV; all does received Cosynch plus intravaginal sponges on d 0 (choronogest) for 7 d. For the Groups I (n = 18) and III (n = 15) all does were received PMSG at PGF2α injection. The Groups I and II (n = 20) were laparoscopically and the Groups III and IV (n = 19) were intracervically inseminated with 50 × 10^6 motile spermatozoa after 2nd GnRH injection. The onset of estrus was determined with teaser bucks at 12-h interval for 30 min during 72h. Follicular development was monitored at d 7 and 9 by transvaginal ultrasonography (US) with 4–8 MHz endocavity array transducer. The data were subjected to Fisher′s exact test and the 95% significance level was noted. The mean time of the estrus onset, the mean of observed estrus, the biggest follicle diameters and follicle numbers (>0.3 cm) at the sponge removal and at the 2nd GnRH injection were 28.5h, 89%, 0.6cm, 2.6, 0.8cm, 2.2; 28.2h, 85% 0.8cm, 3.1, 0.8cm, 1.3; 24.0h, 27%, 0.7cm, 2.8, 0.7cm, 3.3 and 29.3h, 84%, 0.8cm, 2.2, 0.7cm, 2.9 for the Groups I, II, III and IV, respectively. Cosynch plus PMSG (Group III) was not successful to induce estrus ($P < 0.001$). There were no significant difference between evaluations for the follicle diameters ($P > 0.05$). The follicle numbers of the Group II were lower at the 2nd GnRH injection than at sponge removal ($P < 0.001$). PR were ultrasonographically determined as 56, 41, 0, and 33% for Groups I, II, III, and IV on d 35, respectively. The PR of Group III was the lowest ($P < 0.05$). Although, there was no difference between insemination protocols for PR of Groups II and IV; the laparocopically inseminated groups was higher than the intracervically inseminated groups. Choronogest supplementation of Cosynch improved the reproductive parameters.

Key Words: Cosynch, goat, laparoscopic AI

687 Pregnancy diagnosis in sheep using fecal near infrared reflectance spectroscopy. M. A. D. Bomfim*[1,2], S. Prince[2], J. Angerer[2], O. Faco[1], J. de L. Gonçalves[3,1], R. T. De Souza[3,1], F. E. P. Fernandes[1], A. M. F. Fernandes[3,1], and M. Ponciano[1], *[1]Embrapa Goats and Sheep, Sobral, Ceara, Brazil, [2]Blackland Research Center/Texas A&M University, Temple, [3]State University of Acarau Valley, Sobral, Ceara, Brazil.*

The development of quick and accurate methods for early pregnancy diagnosis is a key factor for livestock exploitation. Fecal near infrared reflectance spectroscopy has shown potential to be used to identify pregnancy in cattle. One hundred ten Brazilian

Somalis and 100 Morada Nova ewes' fecal spectra were used to evaluate the fecal NIRS for pregnancy identification in sheep. Fecal spectra were

collect from the same animals in two different physiological stages: 67 ± 7 days of pregnancy and 30 days after weaning. Discriminant analysis with PCA/MDR algorithm coupled to Mahalanobis distance (MD), were used to identify pregnancy through spectra similarity, assuming three or more as dissimilar spectra. Spectra of pregnant or non-pregnant ewes from one breed were not consistently similar to other breed in the same reproductive stage, with a range of 33 to 89% of prediction accuracy in the spectral match. Greater breed effect was observed for pregnant ones, probably reflecting prolificacy differences. Spectra from pregnant animals were different from non-pregnant ones and vice versa (98 to 100% of prediction accuracy), regardless of the breed, suggesting they may be used to classify animals based on pregnancy. To minimize breed effect, all spectra were pooled to create two databases (pregnant and non-pregnant). From these data sets, a randomized subset of 42 fecal spectra, not used to equation calibration, were selected and used for validation of procedure. Both pregnant and non-pregnant discriminant equations were able to identify and classify the animals according to pregnancy with 100% of accuracy, confirming the potential of fecal NIRS to identify pregnancy in livestock. However, a statistical significant difference was observed for diet CP and organic matter digestibility (OMD) between pregnant and non-pregnant ewes (T-test, P <0,001), reflecting changes in pasture quality during data collection. Thus, the potential effect of season on pregnancy-related spectral differences remains to be investigated and also a larger database need be evaluated before this technique is recommended for early pregnancy diagnosis in sheep.

Key Words: discriminant analysis, gestation, NIRS

688 Ability to culture of cells from postmortem goat skin tissues stored at room temperature for different time intervals. M. Singh* and X. Ma, *Fort Valley State University, Fort Valley, GA.*

Animal cloning technology has renewed the interest in postmortem tissue storage, since these tissues can be used to reintroduce the lost genes back into the breeding pool in animal agriculture, preserve the genetic diversity, and revive endangered species. Several studies have demonstrated that cell survival decreases with increasing postmortem tissue storage. However, the limits of time interval within which live cells can be recovered from dead animals is not adequately studied. Cell viability and their potential to in vitro culture ensure nuclear integrity, a requirement for successful cloning of animals. To test the postmortem storage limits of animal tissues, 2–3 mm^2 skin pieces (n = 70) from ears of 3 breeds of goats (n = 7) were cultured after 0, 2, 4 and 6 d of postmortem storage at 24°C. After 10 d of culture, outgrowth of fibroblast-like cells (>10 cells) around the explants was scored. All the explants irrespective of breed displayed outgrowth of cells on the dish containing fresh tissues (d 0). However, the number of explants exhibiting outgrowth reduced with increasing time interval. Only 53.8% explants displayed outgrowth after 2 d of tissue storage. The number of explants displaying outgrowth was much smaller after 4 d (16.7%) and 6 d (13.3%) of storage. In general, the number of outgrowing cells per explant, on a given day, also decreased with increasing postmortem storage time interval. To test the differences between cell cultures, obtained from postmortem fresh and stored tissues, secondary cultures were established from one of the goats exhibiting outgrowth of cells after 6 d of tissue storage. Comparison of both the cell lines revealed similar cell morphology and growth curves, and had doubling times of 23.0 h and 22.6 h, respectively. These results suggest that live cells can be recovered from skin tissues of goats and perhaps other animals even after 6 d of their death with comparable growth profiles.

Key Words: fibroblasts, postmortem tissue storage, goat skin