

The objective of this study was to evaluate the residual herbage mass on the sward structure of a rotational tropical pasture (*Panicum maximum* Jacq), grazed by F1 Boer x Saanen goats. The area was divided into 12 paddocks of 990 m² each, allocated in six blocks. Each paddock was divided into two identical plots (treatments, TRT) with high residual (HR) and low residual (LR) green mass (GM). Each plot was grazed for three consecutive d before animals were rotated. Sward height and herbage samples were taken in the morning on day 1, 2, 3 of grazing and on residual mass (D1, D2, D3 and D4). For each sampling, two quadrates of 50 x 50 cm were randomly cast within the plot. Herbage mass (HM) was cut down to the ground level within the quadrates, weighed, divided into three parts: green leaves mass, stem mass and dead herbage mass, and dried at 65°C. Measurements were conducted during three consecutive grazing cycles of 36 d. The HM, GM, leaf proportion and sward height decreased from D1 to R. In contrast stem:leaf ratio (S:L) increased from D1 to R (Table). Sward height was higher for HR than in LR, even though both treatments had similar HM, GM and S:L values in the first grazing day (D1) of the paddock. Our findings suggested that green leaf might be the principal component that dictates intake in tropical pastures, even when herbage allowances are low. ^aSponsored by FAPESP and CNPq, Brazil

Table 1.

Item	TRT	D1	D2	D3	D4
Herbage mass (t/ha)	HR	7.0 ^a	6.4 ^{ab}	5.8 ^{bc}	5.2 ^c
	LR	6.8 ^a	5.8 ^b	5.1 ^b	4.1 ^c
Green mass (t/ha)	HR	4.5 ^a	4.0 ^b	3.5 ^c	3.1 ^d
	LR	4.3 ^a	3.3 ^b	2.7 ^c	2.0 ^d
Stem:Leaf	HR	0.6 ^c	0.7 ^c	1.0 ^b	1.2 ^a
	LR	0.6 ^d	0.9 ^c	1.4 ^b	2.2 ^a
Leaf proportion (%)	HR	43.6 ^a	37.2 ^b	29.5 ^c	26.2 ^c
	LR	40.2 ^a	30.4 ^b	21.2 ^c	14.2 ^d
Sward height (cm)	HR	61.7 ^a	50.9 ^b	40.7 ^c	36.8 ^d
	LR	57.1 ^a	40.0 ^b	29.7 ^c	25.8 ^d

^{A,B}Distinct letters in the same row differ at P < 0.05 by least square means. ^{a,b}Distinct letters in the same column differ at P < 0.05 by least square means

Key Words: Plant structure, *Panicum*, Residual mass

Goat Species: Product Quality and Reproductive Performance of Goats

W77 Comparison of quality characteristics of chevon and lamb. K. R. Eega*, J. H. Lee, G. Kannan, B. Kouakou, and W. R. Getz, *Fort Valley State University, Fort Valley, GA.*

Chevon (goat meat) has been reported to be inferior in palatability compared to other traditional red meats, although it has lower fat and healthier fatty acid profiles compared to lamb. The objective of this study was to determine whether the quality characteristics of chevon differ from those of lamb. Sheep (n = 16) and goats (n = 16) raised under similar situations were slaughtered using standard procedures. After 24 h of cooler storage (4°C), the carcasses were fabricated into primal cuts. Loin chops *Longissimus dorsi* were used for color (CIE L* a* b*), Warner-Bratzler shear force values, cooking loss, percent metmyoglobin, and thiobarbituric acid reactive substances (TBARS) determination at 24 h postmortem. The chops were placed on aluminum pans and covered with aluminum foil, cooked in a convection oven to an internal temperature on 71 °C, cooled at 2 °C for 24 h, and then 1 cm cores were removed for shear value determinations. Analysis of

W76 Defoliation effects on root and rhizome development of kura clover. B. W. Kim*¹ and K. A. Albrecht², ¹Kangwon National University, Chunchon, Kangwon-Do, South-Korea, ²University of Wisconsin, Madison.

There is limited information on relationship between defoliation and root and rhizome development of kura clover (*Trifolium ambiguum* M. Bieb.). To determine the effects of defoliation severity on root and rhizome growth of young kura clover plant (seedling about 8 wk old), this research was conducted in 2002 (Experiment 1) and 2003 (Experiment 2) in a glasshouse on the University of Wisconsin-Madison. Four kura clover entries were used in this experiment: two were started from seed materials (ARS-2678 and 'Rhizo') and two were clones from mature, field grown Rhizo kura clover plant. Three defoliation frequencies (2-, 4- and 6-wk intervals) and two defoliation intensities (complete and partial defoliation) were imposed on each of the four kura clover entries. Root, rhizome, and leaf dry matter (DM) generally increased with less frequent defoliation, however, the increase in rhizome DM was not significant between 4- or 6-wk defoliation periods. The root and leaf DM under complete defoliation (CD) were significantly lower than under partial defoliation (PD). In Exp. 1, rhizome DM was not significantly different between CD and PD; it was significantly lower under CD in Exp. 2. ARS-2678 showed excellent root development characteristics, however, its rhizome DM was significantly lower than Rhizo clones. The rhizome development from Rhizo clones was greater than that from seed materials. If maximum root and rhizome growth are expected from young kura clover plant, the intensity and frequency of defoliation should be minimized or defoliation should be avoided.

Key Words: Kura clover, Defoliation, Rhizome

data as a Completely Randomized Design showed that Warner-Bratzler shear force values were significantly lower (P ≤ 0.01) in lamb chops compared with chevon chops. The mean (± SEM) shear values were 2.12 ± 0.21 and 1.3 ± 0.21 kg in chevon and lamb chops, respectively. The L* values (lightness) were not different between chevon and lamb chops; however, a* values (redness) of lamb chops were higher (P ≤ 0.01) compared with chevon chops. The mean (± SEM) a* values were 12.2 ± 0.37 and 14.2 ± 0.37, respectively, in chevon and lamb chops. Percent metmyoglobin and TBARS were not different among the chops, indicating that levels of pigment and lipid oxidation were not different between lamb and chevon at 24 h postmortem. Cooking loss was also not influenced by species. The results indicate that lamb may have better tenderness properties compared with chevon, although several other quality characteristics studied were not different.

Key Words: Chevon, Lamb, Tenderness

W78 Effect of fat supplementation on the performance of meat goats fed eastern gamagrass. A. White*, J. Bartlett, and E. Rhoden, *Tuskegee University, Tuskegee, AL.*

Eastern gamagrass (EGG) is a native bunch grass that has excellent potential as forage for ruminants. The objective of this study was to evaluate the performance and carcass characteristics of meat goats fed EGG supplemented with fat (peanut oil). Twenty four intact male Boer crosses (4 mon old) were assigned to one of 4 treatments: diet A, control, no added fat and diets B, C and D with 1.6, 3.2 and 4.8% added fat, respectively. Goats were fed a 60:40 (EGG: Concentrate) ration twice daily for 12 wk and water and mineral block were offered ad libitum. Refusals and intake were monitored daily and BW were recorded weekly. Goats were slaughtered at the end of the study and hot (HCW) and cold carcass weights (CCW) were recorded. No significant difference ($P > 0.05$) was observed among treatments for initial BW, final BW, fasted BW, HCW and CCW. Total BW gain was 8.47, 8.39, 7.64 and 6.20 kg for diets A, C, B and D, respectively. Average daily gain showed no significant differences ($P > 0.05$) among treatments. Goats in diet A had higher ($P < 0.05$) ADFI than those in diets C and D, with an average of 827.78 g/day. Specialty cuts were also evaluated as a percentage of CCW and included the leg, shoulder, loin, neck, and ribs. Diet D showed the largest mean leg percentage (32.79 %), which was higher ($P < 0.05$) than diet B (30.74%). There were no differences observed for the other cuts. Feeding supplemental fat in the diet of goats did not seem to significantly impact their performance except for ADFI. However, the effect of fat supplement on the quality of the meat is being further evaluated.

Key Words: Eastern gamagrass, Goats, Peanut oil

W79 Effects of diet on chemical composition and quality of meat in goats. J. H. Lee*, B. Kouakou, K. R. Eega, and G. Kannan, *Fort Valley State University, Fort Valley, GA.*

Thirty-six Boer x Spanish kids (BW = 20 ± 0.6 kg) were used to determine the effects of diet on the chemical composition and quality of chevon (goat meat). Animals were divided into three groups and randomly assigned to one of three dietary treatments: 18% CP concentrate for 90 d (CC-diet); alfalfa (*Medicago sativa*) hay cubes for the first 45 d followed by concentrate for 45 d (HC-diet); or alfalfa hay diet for 90 d (HH-diet). Goats were slaughtered and the intramuscular and subcutaneous fat samples were obtained from each carcass for analysis of fatty acid composition. Loin chops (*Longissimus dorsi*, LD) were used to determine proximate composition, color (CIE $L^* a^* b^*$), cooking loss, and Warner-Bratzler shear force values. No significant differences were found in protein and ash percentages among the LD muscles of goat carcasses from the three treatments. Goats from the HH-diet group had higher ($P \leq 0.05$) level of moisture (77.1 vs. 74.7%), and lower ($P \leq 0.05$) level of fat (1.32 vs. 2.67%) in LD muscles compared with those from the CC-diet, while the HC-diet group had intermediate levels of moisture and fat. Compared to HH-diet group, the CC-diet group had a higher ($P \leq 0.05$) level of oleic acid (C18:1n9; 43.8 vs. 38.7%), and a lower ($P \leq 0.05$) level of linolenic acid (C18:3n3; 0.12 vs. 0.46%) in the intramuscular fat. The CC-diet group also had a higher ($P \leq 0.05$) level of linoleic acid (C18:2n6; 4.27 vs. 3.11%), and lower ($P \leq 0.05$) levels of decanoic acid (C10:0), myristic acid (C14:0), and C18:3n3 (0.44 vs. 0.76%) in the subcutaneous fat than the HH-diet group. The L^* (lightness) values of loin chops from the HH-diet group were higher ($P \leq 0.05$) than the CC-diet group; however, the a^* values (redness) were not different among the three treatment groups. Warner-Bratzler shear force values

and cooking losses were also not influenced by the diets. Although dietary treatments did not influence meat quality characteristics in this study, chevon from hay-fed goats may have healthier nutritional properties compared to that from concentrate-fed goats.

Key Words: Goats, Diet, Chevon

W80 Reduction of skin and carcass *E. coli* contamination in goats by dietary brown seaweed extract supplementation and skin wash. G. Kannan*, K. R. Eega, J. H. Lee, B. Kouakou, and T. H. Terrill, *Fort Valley State University, Fort Valley, GA.*

Dietary supplementation of brown seaweed extract (*Ascophyllum nodosum*) reduces *E. coli* counts in beef cattle, although the mechanism of action is not clear. This experiment was conducted to determine the effects of seaweed extract supplementation and chlorinated skin wash on skin and carcass microbial contamination in goats. In a Completely Randomized Design with split-plot, thirty-two Boer x Spanish bucks (8 mo of age) were fed a diet containing alfalfa pellets (60%) and Tasco feed supplement (40%) with (4 pens) or without (4 pens) seaweed extract ($n = 16$ goats/treatment) for 14 days. At the end of the feeding trial, two bucks from each pen were spray washed with chlorinated water (50 ppm) after stunning, and the other two bucks were processed as unwashed controls. Skin swab samples were made on the hind legs (5 x 5 cm area) prior to overnight holding, after holding, and after spray washing. Immediately after evisceration, carcass swab samples were taken to assess contamination levels. The pH of rumen and large intestinal contents and concentrations of rumen volatile fatty acids were not different between dietary treatments. Microbial counts in feces were also not different between dietary treatments. However, *E. coli* counts of rumen contents decreased ($P \leq 0.05$) due to seaweed extract supplementation. The main effect of chlorine wash on aerobic plate counts on skin was significant ($P \leq 0.05$), with mean (\pm SEM) counts of 3.65 ± 0.19 and $4.30 \pm 0.19 \log_{10}$ CFU/cm², respectively, in washed and unwashed groups. The goats subjected to seaweed extract dietary treatment plus chlorine wash had the lowest skin *E. coli* counts. Carcass microbial counts were not influenced by any of the factors. The results indicate the seaweed extract supplementation for two weeks prior to slaughter, combined with spray wash during processing, can be used as a viable decontamination strategy in goat processing.

Key Words: Goats, Brown seaweed extract, *E. coli* counts

W81 Effect of initial body condition of Boer x Spanish yearling wethers and level of nutrient intake on body composition. A. Ngwa¹, L. Dawson², R. Puchala¹, G. Detweiler¹, R. Merkel^{*1}, I. Tovar-Luna¹, T. Sahlu¹, C. Ferrell³, and A. Goetsch¹, ¹American Institute for Goat Research, Langston University, Langston, OK, ²Oklahoma State University, Stillwater, ³US Meat Animal Research Center, Clay Center, NE.

Yearling Boer x Spanish wethers were used to assess effects of initial body condition and level of feed intake on body composition. Before the experiment, 27 wethers were fed to achieve high body condition score (BCS; 1 to 5, with 1 = extremely thin and 5 = extremely fat) and BW (I-F) and 27 were fed for low BCS and BW (I-T). During experiments, I-F wethers were fed low amounts of a pelletized diet and I-T wethers received high amounts. In Exp. 1, harvest measures were determined at wk 0, 12, and 24 ($n = 7$). In Exp. 2, other animals ($n = 6$) were used to determine energy expenditure (EE) at three times (wk 1-3, 11-13, and 22-24 for Early, Middle, and Late, respectively). BCS in Exp. 1 was 3.8, 3.2, 2.6, 1.9, 2.8, and 3.5 (SE = 0.11) and live BW

was 53.3, 46.2, 42.4, 36.6, 40.1, and 48.2 kg (SE = 2.03) for I-F:wk 0, I-F:wk 12, I-F:wk 24, I-T:wk 0, I-T:wk 1, and I-T:wk 2, respectively. Changes in carcass mass of protein (-5.9, -5.3, 7.0, and 5.8 g/d) and fat (-1.9, 0.2, 21.4, and 26.6 g/d) were greater ($P < 0.05$) for I-T vs I-F, as was also true for non-carcass protein (6.1, 0.0, 14.5, and 6.3 g/d) and fat (-16.3, -10.4, 13.6, and 26.3 g/d for I-F:wk 1-12, I-F:wk 1-24, I-T:wk 1-12, and I-T:wk 1-24, respectively). Based on energy concentrations in empty body tissue lost or gained in wk 1-12 and 1-24 (14.8, 12.1, 19.9, and 26.4 MJ/kg for I-F:wk 1-12, I-F:wk 1-24, I-T:wk 1-12, and I-T:wk 1-24, respectively; SE = 2.13), the energy concentration in wk 13-24 was 9.4 and 32.9 MJ/kg for I-F and I-T, respectively. In Exp. 2, fasting (5.05, 4.37, 3.16, 4.44, 4.28, and 4.54 MJ/d; SE = 0.34) and fed EE (6.48, 5.97, 4.45, 7.39, 8.44, and 8.47 MJ/d for I-F:Early, I-F:Middle, I-F:Late, I-T:Early, I-T:Middle, and I-T:Late, respectively; SE = 0.58) were influenced by initial body condition x time interactions ($P < 0.05$). In conclusion, the energy concentration in tissue mobilized or accreted by yearling meat goats within certain body condition ranges may not necessarily be the same and appears influenced by initial animal characteristics and subsequent feeding conditions. This project was supported by USDA Project No. 2003-38814-13923.

Key Words: Body composition, Energy, Goats

W82 Urea space and body condition score to predict body composition of meat goats. A. Ngwa¹, L. Dawson², R. Puchala¹, G. Detweiler¹, R. Merkel¹, I. Tovar-Luna¹, T. Sahl¹, C. Ferrell³, and A. Goetsch*¹, ¹American Institute for Goat Research, Langston University, Langston, OK, ²Oklahoma State University, Stillwater, ³US Meat Animal Research Center, Clay Center, NE.

Yearling Boer x Spanish wethers (n=40) were used to develop and compare body composition prediction equations for mature meat goats based on urea space (US) and body condition score (BCS). Before the experiment, one-half of the animals were managed to have high BW and BCS (1-5, with 1 being extremely thin and 5 very fat) and the others were managed to have low BW and BCS. During the 24-wk experiment, initially fat wethers were fed to lose BW and BCS and initially thin wethers were fed to increase BW and BCS. BCS, US, and whole body chemical composition were determined after 0, 12, and 24 wk. Mean, minimum, and maximum values were 42.1 (SE = 1.12), 24.5, and 59.0 kg for shrunk BW; 3.0 (SE = 0.11), 1.5, and 4.0 for BCS; 61.3 (SE = 1.01), 53.7, and 76.5% for water; 20.2 (SE = 1.11), 4.7, and 29.7% for fat; 15.6 (SE = 0.19), 13.3, and 18.1% for protein; and 2.9 (SE = 0.062), 2.2, and 3.7% for ash, respectively. For water, fat, and ash concentrations and mass, simplest equations explaining greatest variability (with independent variables of US, BCS, and/or shrunk BW) based on BCS accounted for more variation than ones based on US, although in some cases differences were not large (i.e., water and ash concentrations and mass). Neither US nor BCS explained variability in protein concentration. Equations to predict protein mass based on shrunk BW and US or BCS were nearly identical in R^2 and the root mean square error. A 1-unit change in BCS corresponded to change in full BW of 8.9 kg (full BW, kg = 17.902 + (8.9087 × BCS); $R^2 = 0.653$), fat concentration of 7.54% (% fat = -5.076 + (7.5361 × BCS); $R^2 = 0.612$), and energy concentration of 3.01 MJ/kg (energy, MJ/kg = 0.971 + (3.0059 × BCS); $R^2 = 0.615$). In summary, BCS may be used as or more effectively to predict body composition of meat goats than US. The primary determinant of BCS, within the range of BCS observed in this experiment, was

body fat content. This project was supported by USDA Project No. 2003-38814-13923.

Key Words: Body composition, Goats

W83 Efficacy of melengestrol acetate feeding to advance breeding in hair sheep and meat goats managed in an accelerated mating system. S. Wildeus* and J. R. Collins, Virginia State University, Petersburg.

The experiment evaluated the use of melengestrol acetate (MGA), alone or in combination with PG-600® (PG), to synchronize and advance the onset of breeding in a mixed species herd (n=100) of meat goats (Boer cross, Myotonic, and Spanish) and hair sheep (Barbados Blackbelly, Katahdin, and St. Croix) mated under an accelerated mating system in November, July and March. Animals were allocated to 3 treatment groups stratified by breed-type within species: (1) a corn/soybean supplement (16% CP; fed at 1% BW for 14 d), (2) supplement with MGA (1.13 µg/kg BW/d), or (3) MGA supplement with PG (2.5 ml; 200 IU eCG/100 IU hCG; im) at the end of feeding. Females were mated in two single sire mating groups per breed and males fitted with marking harnesses to aid in estrus detection. Estrus was recorded in 8-h intervals for 4 d, and daily for the remainder of each 30 d mating period. Pregnancy was determined by transrectal ultrasound at the end of, and 25 d after, mating. Litter size was recorded at kidding/lambing. Data were analyzed for effects of treatment, breeding season, and species on incidence and timing of estrus, pregnancy rate and litter size. Time to first estrus after male introduction was shorter ($P < 0.05$) in both MGA groups than the control group (3.4 vs. 7.5 d), while time to conception was shorter ($P < 0.05$) for MGA (4.4 d) than for MGA+PG (6.4 d), which was shorter ($P < 0.05$) than control (9.0 d). This response was similar for both species, however, litter size was reduced ($P < 0.05$) with MGA feeding in sheep (control: 1.91; MGA: 1.58; MGA+PG: 1.76), whereas litter size increased ($P < 0.05$) in goats (control: 1.83; MGA: 2.17; MGA+PG: 2.24). Pregnancy (83.5 to 86.0%) and kidding and lambing rate (76.3 to 81.0%) were not different ($P > 0.1$) between treatment groups, but the incidence of return to estrus was higher ($P < 0.05$) in MGA+PG (17.3%) compared to control (7.1%) and MGA (6.5%). Data indicate that MGA did advance onset of breeding by 4 d, but had no significant effect on pregnancy and kidding/lambing rate. The inclusion of PG reduced fertility of the synchronized estrus.

Key Words: Goats, Hair sheep, Melengestrol acetate

W84 Effect of alternative forages on reproductive performance of meat goats. Y. A. Markley*, E. G. Rhoden, and J. R. Bartlett, Tuskegee University, Tuskegee, AL.

Goats are used as a source of meat, milk and fiber. Bermudagrass (BG) is a warm-season perennial that is used as the standard grass in the southeast. Endophyte infected fescue (EIF) is a cool-season perennial grass that contains a toxic endophyte that is known to cause a decline in reproductive performance of horses and cattle. Eastern gamagrass (EGG) is a native, warm-season, perennial grass. There is little reported evidence on the effects of EIF and EGG on reproductive performance of goats. The objective of this study was to determine the effects of these forages on the reproductive performance of meat goats. Thirty Boer x Spanish female goats (2 to 4 yr of age) were randomly assigned to one of three forages (hay) from d 1 of the study to parturition

for a total study period of 157 d. Goats were fed at libitum a 70:30 hay:concentrate ration. Water and mineral block were provided. Estrus was synchronized using 2 i.m. injections of prostaglandin F2 α (Lutylase) at a dose of 0.5 mg/animal on d 1 and d 11. Does were then exposed to bucks for 60 d. Ultrasounds were done on all does on d 61 and d 90 by rectal ultrasonography. Confirmed pregnancies for treatment groups were EIF (10/10 does), EGG (10/10 does) and BG (10/10 does) resulting in a 100% conception rate for all treatment groups. Mean total kid birth weight/doe was highest ($P < 0.05$) for BG (7.36 \pm 0.58 kg), followed by EGG (6.65 \pm 0.30 kg), with EIF significantly ($P < 0.05$) lower (5.51 \pm 0.60 kg) than BG. These results show that the three forages had no negative impact on conception rates. However, it can be inferred that the EIF contributed to the low birth weights of kids.

Key Words: Alternative forages, Conception rate, Goats

W85 Comparison of pure and crossbred goats on multiple births in a crossbreeding program in Sri Lanka. C. M. B. Dematawewa^{*1}, L. P. Silva¹, and A. S. Premasundara², ¹University of Peradeniya, Peradeniya, Sri Lanka, ²Dept. of Animal Production and Health, Getambe, Peradeniya, Sri Lanka.

A crossbreeding program (using Boer, Jamunapari and local breeds) was carried out in a goat breeding herd located in the dry zone of Sri Lanka (with annual mean temperature, relative humidity and rainfall values of 27.8°C, 80 % and 1400mm, respectively) to evaluate various genotypes for crossbreeding. Percentages of single versus multiple (twin, triplet and quadruplet) births (alive or dead) of dams of five genotypes measured during a 3-yr period were compared in this study. The genotypes included Kottukachchiya (KO), the only recognized local breed with a small body and a uniform black coat; Jamunapari (JM); Jamunapari x Boer F1 cross (BJ50); Boer x Kottukachchiya F1 cross (BK50); and Boer x BK50 backcross (BK75). Management practices included feeding (9 hr of grazing supplemented by concentrates and fodder) and vaccination. A total of 932 kidding records were used in Chi-square analysis to find the association of frequencies of multiple births (FMB) with the genotypes, parities, birth years and seasons (1=Mar-Aug and 2=Sept-Feb). In overall, single, twin, triplet and quadruplet birth percentages were 55.9, 41.6, 2.3 and 0.2, respectively. Only the genotype was significantly associated with FMB ($P < 0.05$). Kottukachchiya breed and BK50 cross recorded the significantly highest ($P < 0.05$) FMB values (61.29% and 58.45% , respectively) when pairwise comparisons were made (with Chi-square analysis using two genotypes at a time). The BK75 crossbred dams was the second highest in FMB value (48.67%). Dams of both JM and BJ50 genotypes recorded the significantly lowest ($P < 0.05$) FMB values (33.61% and 31.39%, respectively). Percentages of triplets born were 3.23, 0, 1.28, 0.80, and 0.71, for KO, BK50, BK75, JM, and BJ50, respectively. One incident of quadruplets (with 2 alive) was reported by BK75. The potential of the local breed for twinning should be considered in designing future genetic improvement programs.

Key Words: Cross breeding, Kidding, Sri Lanka

W86 Effects of extended storage on microbiological quality, somatic cell count and composition of Grade-A goat milk. S. Zeng^{*1}, S. Chen^{1,2}, and B. Bah¹, ¹Langston University, Langston, OK, ²China Agricultural University, Beijing, China.

As specified in the Pasteurized Milk Ordinance, Grade-A goat milk must contain few than 1.0x10⁵ cfu/ml bacteria count and must be

processed within 4 d. However, dairy goat producers in the U.S. are small scale, scattered around and distant from processing facilities. It is not cost-effective to collect goat milk every 2 d as it is with cow milk. Some goat milk is collected only once a week. This study was conducted to determine the effect of extended storage time up to 7 d over a lactation on composition, somatic cell count (SCC), pH and microbiological quality of goat milk in the refrigerated storage tank (4 \pm 1°C) on the farm. Duplicate milk samples were taken daily from the farm tank after the morning milking and analyzed immediately. Results indicated that there were no significant changes ($P > 0.05$) detected in milk fat, protein, lactose, solids-non-fat, SCC and pH during the extended storage, but significant variations ($P < 0.05$) were observed at different stages of lactation. Mean standard plate count (SPC) in goat milk increased ($P < 0.05$) to 1.8x10⁵ cfu/ml on the 6th d of the extended storage, exceeding the Grade-A limit (1.0x10⁵ cfu/ml). Mean psychotropic bacteria count increased ($P < 0.05$) steadily to 1.5x10⁵ cfu/ml within 6 d of storage. Mean coliform count was approximately 500 cfu/ml for the first 3 d and fewer than 2,500 cfu/ml throughout the 7 d storage. In conclusion, when stored under refrigerated and sanitary conditions, goat milk within 5 d could meet the Grade-A limits but would exceed the SPC limit thereafter. Data also indicated that care should be taken when goat milk was stored in the bulk tank during summer months.

Key Words: Extended storage, Goat milk, Microbiological quality

W87 Effects of CLA supplementation on goat milk composition and texture profile of semi-hard goat cheese. S. Chen^{*1,2}, S. Zeng¹, M. Rovai¹, T. Gipson¹, D. Bauman³, A. Lock³, B. Bah¹, and A. Goetsch¹, ¹E (Kika) de la Garza American Institute for Goat Research, Langston University, Langston, OK, ²China Agricultural University, Beijing, China, ³Cornell University, Ithaca, NY.

Thirty Alpine does (BW 50 \pm 7.4 kg) were randomly assigned into three groups to study effects of *t-10, c-12* conjugated linoleic acid (CLA) dietary supplementation on composition of milk and texture profile of semi-hard goat cheese. The trial consisted of three periods (two-wk in length with a 14-d interval) with CLA supplemented at 0, 3 and 6 g/d per doe for treatments 1, 2, and 3, respectively, using a 3x3 Latin Square design. In the first and last three d (E and L, respectively) of each period, milk was collected for cheese manufacture and sampled for analyses of fat, protein, lactose, total solid (TS), pH and somatic cell count (SCC). Cheese texture profile (hardness, springiness, cohesiveness, gumminess and adhesiveness) was determined using an Instron textural analyzer on d 1 and 60 after manufacture. Milk protein, lactose, TS, pH and SCC were similar ($P > 0.05$) among treatments. Cheeses made from milk collected at E had similar texture profiles ($P > 0.05$) d 1 after manufacture. However, after 60 d of aging at 8°C, only treatment 3 showed higher springiness (8.02 mm, $P < 0.05$) than treatments 1 (6.78 mm) and 2 (6.85 mm). For cheeses made from milk collected at L, hardness, cohesiveness and gumminess differed ($P < 0.01$) among treatments on the first d after manufacture. After 60 d of aging, differences ($P < 0.01$) were found for all texture characteristics except adhesiveness. In conclusion, two-wk dietary CLA supplementation to dairy goats did not affect milk composition at the beginning of experimental period but induced changes in texture profiles of semi-hard goat cheese after 60 d of aging.

Key Words: CLA supplementation, Semi-hard goat cheese, Texture profile

W88 Development of a web-based goat producer education program. S. Hart*, T. Gipson, R. Merkel, and T. Sahu, *Langston University, Langston, OK*.

The objective was to develop a web-based goat producer education program for the certification of goat producers conceptually similar to other master farmer programs. In addition, the information was to be available for browsing by the public. Such program is needed to fill the knowledge vacuum and combat disinformation. A collaborative group of goat specialists from 1890 Institutions and major goat industry associations met and identified subject areas that needed to be included in a producer education program. The subject areas were assembled into 22 modules. A core set of modules was identified as having critical information for goat production (such as animal management and breeding modules) with the remaining modules as providing information to meet special needs (such as disaster preparedness and managing guard dogs). Authors were identified and contracted for writing the modules. The modules were reviewed by outside reviewers,

both academic and producers and revised by the authors. Behavioral objectives and test questions were formulated for each module. Pictures for the modules were identified and added. Each module was converted to HTML for the web site. A grading system using Perl was used to keep track of grades from pre- and post-test to document learning. To earn certification, producers must complete the nine core modules with a minimum score of 70% on each one. A producer who makes over 85% on the pre-test is given credit for that module. A number of goat associations have agreed to identify or designate their members who have earned their certification in this course. The producer education course can be accessed online at <http://WWW2.luresext.edu>. In the first month 38 producers have completed 46 modules and improved their knowledge by an average of 25.1 points between the pre- and post-test. In addition, producers have tested out of a total of 67 modules. This producer education system is a valuable training resource for goat producers, extensionists, and scientists alike and provides a valid source for goat information.

Key Words: Education, Extension, Goat

Horse Species: Equine Sciences

W89 Equine muscle Glut-4 expression and glycogen content are altered by dietary energy source and physical conditioning. L. Stewart-Hunt, R. Geor*, and J. McCutcheon, *University of Guelph, Guelph, Ontario, Canada*.

Physical activity is one factor that may modify the effects of diet on mechanisms of glucose utilization in muscle. The objective of this study was to characterize the effects of dietary energy source and physical conditioning on skeletal muscle Glut-4 and glycogen content (GLY) and the activities of hexokinase (HK) and glycogen synthase (GS) in horses. Fourteen mature paddock-rested Standardbred horses completed the following 3 phases: 1) a 3-week baseline phase (Phase 1) in which horses were fed only grass hay cubes; 2) a 6-week adaptation (Phase 2) to a concentrate high in either starch and sugar (HiCHO; 53% nonstructural [NSC] carbohydrate, 2.3% fat, 12.9% CP on a DM basis) or fat (LoCHO; 10% NSC, 14% fat, 12.8% CP on a DM basis), fed in a 1:1 ratio with the hay cubes (6.2% NSC); and 3) a subsequent 7-week period of physical conditioning during which horses remained on previously assigned diets (Phase 3). Middle gluteal muscle biopsies to assess GLY, HK and GS activity, and Glut-4 protein expression were obtained at the end of each phase. Dietary groups were compared by repeated measures ANOVA. Data are presented as mean \pm SD. GS fractional velocity, calculated as active GS divided by total GS, was unchanged in HiCHO and LoCHO in Phases 2 and 3 when compared to Phase 1. HK was also unchanged in both groups at the end of Phases 2 and 3. GLY was unchanged in both treatment groups after Phase 2, but after Phase 3 GLY was increased ($P < 0.01$) in HiCHO (658 ± 37 mmol/kg dm) when compared to LoCHO (533 ± 41 mmol/kg dm). There was no change in Glut-4 throughout the study in LoCHO whereas Glut-4 was increased ($P < 0.01$) in HiCHO after Phases 2 and 3 when compared to Phase 1 such that there was a significant difference ($P = 0.002$) in Glut-4 expression between HiCHO (1.1 ± 0.1 arbitrary units) and LoCHO (0.6 ± 0.05 arbitrary units) following physical conditioning. This study indicated that dietary energy source affects exercise training-associated alterations in glycogen storage and Glut-4 expression in equine skeletal muscle.

Key Words: Horse, Exercise training, Glucose metabolism

W90 Temporal variables of the trot of the hunter pleasure Arabian performance horse. M. Nicodemus* and K. Slater, *Mississippi State University, Mississippi State*.

The Arabian Horse is the oldest pure bred and considered the foundation breed for all other breeds, yet research concerning the Arabian horse gait is lacking. Most of the kinematic research of the trot focuses on the European dressage horse, which has proven to be helpful in both performance and clinical applications. Therefore, the objective of this study was to define the trot of the hunter pleasure Arabian performance horse using temporal variable measurements. 4 registered Arabian horses with championship bloodlines actively showing and placing at the national level of breed recognized shows in the hunter pleasure division were recorded at 60 Hz by a single camcorder placed perpendicular to the horse's plane of travel, at a height level with the horse's topline, and at a distance that allowed for recording of one full stride. Horses were ridden at a trot by a nationally ranked Arabian trainer on a packed, dirt surface where all hooves could be seen clearly. Frame-by-frame analysis determined hoof contact and lift-off. Horses had a velocity of 2.36 ± 0.07 m/s with a stride duration of 718 ± 16 ms and stride length of 1.70 ± 0.04 m. The trot was a leaping (Suspension: $16 \pm 3\%$ of stride) gait with the majority of the stride spent in swing (Stance: fore- $40 \pm 3\%$, hind- $44 \pm 1\%$). Paired t-tests confirmed gait symmetry, as there was no significant differences ($P > 0.05$) found between the left and right limbs during the stance phase. The limbs moved as diagonal pairs (Diagonal advanced placement: $0 \pm 0\%$, Diagonal advanced lift-off: $0 \pm 0\%$, Lateral advanced placement: $53 \pm 1\%$, Lateral advanced lift-off: $50 \pm 2\%$) with the body being supported by diagonal limb pairs ($84 \pm 3\%$) while not in flight. Research subjects were limited to nationally ranked horses in which further studies may find differences in hunter performance based on training level as was found in earlier studies on the European dressage horse. Comparison of the hunter pleasure Arabian performance horse trot with earlier kinematic studies of the European dressage horse find apparent differences between breeds and between performance types suggesting further kinematic research is needed.

Key Words: Arabian Horse, Hunter pleasure, Temporal variables