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2014 Oklahoma Research Day


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## **Abstracts from the 2014 Oklahoma Research Day**

**Held at the University of Central Oklahoma**

### **05. Mathematics and Science**

#### **02. Animal Science**

##### **05.02.01 Effects of Levels of Boer Goats and Dorper Sheep on Feed Intake, Digestibility, Growth, and Slaughter Characteristics in the Central Highlands of Ethiopia**

**Arthur, Goetsch , Girma Abebe, Kefele Kefelegn, T Mekonnen**

*Langston University*

Objectives were to compare feed intake, digestibility, growth performance, and slaughter characteristics of local genotypes of small ruminants in the central highlands of Ethiopia with Boer goat (B) and Dorper sheep (D) blood levels of 0, 25, and 50%. Male goats (27; 6-9 months of age) and sheep (27; 3-5 months) were housed individually in confinement during 90-day experiments. Grass hay (6% crude protein and 64% or 67% neutral detergent fiber) was consumed ad libitum together with concentrate (46% noug seed cake, 28% wheat bran, 24% sorghum grain, and 2% salt) supplemented at 2% of body weight. Initial body weight was 18.1, 20.8, and 24.9 kg for Local, 25% B, and 50% B, respectively, and 14.8, 20.3, and 17.9 kg for Local, 25% D, and 50% D, respectively. Total dry matter (DM) intake by goats ranked Local < 25% B < 50% B, and hay intake was greatest for 50% B. Intake of hay and total DM by sheep ranked Local < 50% D < 25% D. Average daily gain by goats was greatest for 50% B and by sheep was least for Local. Empty body weight of goats at slaughter and carcass weights ranked Local < 25% B < 50% B. Body and carcass weights of sheep were lowest for Local. In addition to the difference between 25% B and Local goats, these results clearly show potential for greater meat yield with the 50% than 25% level of B. The findings also depict considerable opportunity to increase meat production by crossbreeding with D, although greater benefit was not realized with 50 than 25% D.

## **05.02.02 Effects of Stocking Rate and Physiological State of Meat Goats Grazing Grass/Forb Pastures on Forage Intake, Selection, and Digestion, Grazing Behavior, and Performance**

**Arthur, Goetsch , Ahmed Askar, Ryszard Puchala, Terry GipsonTilahun Sahlu**

*Langston University*

Boer goat does with 2 kids (D; 1 mo after kidding), growing wethers (G; 4 mo initial age), and yearling wethers (Y; 14 mo initial age) grazed 0.4-ha grass/forb pastures, with 1 animal per type in each pasture for a low stocking rate (SR) and 2 for a high SR. The study started in late spring and was 114 d with 4 periods (P1-4). Forage mass was 2,517, 2,433, 2,506, and 2,452 kg/ha for the low SR and 2,680, 1,932, 1,595, and 1,393 kg/ha for the high SR in P1, P2, P3, and P4, respectively. Diet botanical composition based on n-alkanes was similar among animal types. Likewise, chemical composition of forage samples did not differ between animal types, with averages of 11% CP and 53% NDF. Intake of ME was 1,015, 855, and 692 kJ/kg BW<sup>0.75</sup> for D, G, and Y, respectively (SE = 57.4) and greater for the low than high SR in P1 (1,204, 789, 682, and 445 for high SR and 1,732, 767, 683, and 531 kJ/kg BW<sup>0.75</sup> for low SR in P1, P2, P3, and P4, respectively; SE = 93.5). There was an interaction between animal type and period in ADG (13, -12, -44, -8, 83, 25, -28, 73, 127, 51, -43, and -7 g; SE = 21.5) and time spent grazing (7.5, 5.3, 7.4, 8.6, 78.6, 5.6, 10.0, 9.1, 4.8, 5.9, 8.4, and 9.5 h/d for D-P1, D-P2, D-P3, D-P4, G-P1, G-P2, G-P3, G-P4, Y-P1, Y-P2, Y-P3, and Y-P4, respectively; SE = 0.88). With this forage of moderate nutritive value, there were no findings suggesting that levels of forage mass above 1,400 kg/ha would improve performance of meat goats of different physiological states.

## **05.02.03 Effects of Conditions between Periods of Studies to Evaluate Electric Fence Additions to Barb Wire Fence for Goat Containment**

**Arthur, Goetsch , Ryszard Puchala, Terry Gipson, Tilahun SahluYoko Tsukahara**

*Langston University*

Forty Boer (B) and 40 Spanish (S) does were used to evaluate effects of treatments between periods (IT) of a Latin square (LS) on behavior when exposed to barb wire fence and different electric fence strand additions. Evaluation pens had 1 side of barb wire strands at 30, 56, 81, 107, and 132 cm from the ground. Fence treatments (FT) were electrified strands (6 kV) at 15 and 43 (LH), 15 and 23 (LM), 15 (L), 23 (M), and 43 cm (H). For adaptation, there was weekly short-term exposure to test pens with different electric fence strand additions (B: wk 1 - no electric strands (NES), wk 2 - NES, wk 3 - 1 strand at 0 kV, wk 4 - 1 strand at 2.5 kV, wk 5 - NES; S: wk 1 - NES, wk 2 - 1 strand at 0 kV, wk 3 - 1 strand at 3 kV, wk 4 - 1 strand at 4 kV). Behavior was assessed 1 h every 2 wk in the 5 × 5 LS with different FT. In the week between measurements, 1 set of each breed was exposed to a NES test pen (IT-Y) and other sets were not (IT-N). There were interactions in pen exit between IT and period (28, 38, 18, 0, and 18% with IT-Y and 45, 13, 0, 0, and 0% with IT-N in period 1, 2, 3, 4, and 5, respectively; SE = 4.9) and fence treatment (5, 8, 15, 40, and 33% with IT-Y and 5, 3, 18, 23, and 10% with IT-N for LH, LM, L, H, and M, respectively; SE = 4.9). In conclusion, exposing goats to barb wire fence without electric strands between measurement periods did have some desirable effects but, overall, was not adequate for use of a LS design.

#### **05.02.04 Effects of Adaptation and Meat Goat Breed in a Method to Evaluate Electric Fence Additions to Barb Wire Fence for Goat Containment**

**Arthur, Goetsch , Ryszard Puchala, Terry Gipson, Tilahun SahluYoko  
Tsukahara**

*Langston University*

Forty Boer (B) wethers, 40 B doelings, 33 Spanish (S) wethers, and 42 S doelings were used to investigate effects of adaptation treatment (AT) on behavior when exposed to barb wire fence with different electric strand treatments. Five evaluation pens had 1 side with barb wire strands at 30, 56, 81, 107, and 132 cm from the ground. Fence treatments (FT) were electrified strands (6 kV) at 15 and 43 (LH), 15 and 23 (LM), 15 (L), 23 (M), and 43 cm (H). After exit from pens without electric strands (NES), AT of different modifications with electric fence strands were imposed 1 time each week for < 30 min: wk 1-1 strand at 0 kV, wk 2-LH, wk 3-LH, and wk 4-NES for 1 set of each breed (BC and SC); wk 1-NES, wk 2-1 strand at 0 kV, wk 3-L, and wk 4-NES for the other set of B (BU); wk 1-1 strand at 0 kV, wk 2-LH, wk 3-LH, and wk 4-LH for the other set of S (SU). After AT, each group was exposed to 1 FT for 1 h in period 1 and 7 wk later in period 2. The % of animals exiting pens differed among AT (5.5, 39.9, 60.6, and 0.0% for BC, BU, SC, and SU, respectively; SE=1.18) and FT (9.1, 2.8, 15.4, 62.4, and 22.6% for LH, LM, L, H, and M, respectively; SE=1.39). In conclusion, use of the same AT for B and S resulted in different behavior when later exposed to FT and BU affected pen exit as anticipated. However, SU was highly prohibitive to exit and would not be suitable for a method of evaluating different electric fence strand modifications of barb wire fence for goat containment.

#### **05.02.05 Effect of a Cellulase Enzyme Additive on Hay Intake and Fiber Digestion in Goats**

**Arthur, Goetsch , Steven Hart**

*Langston University*

Thirty-six Spanish, Boer, and Boer × Spanish wethers were used to test the effect of a cellulase/hemicellulase enzyme additive on intake and fiber digestion. Wethers were fed a low quality grass hay (4.8% CP, 48.4 ADF, and 75.3 NDF) at 115% of previous intake. Two pens of goats were offered a supplement containing the enzymes and two were offered a control supplement. Supplement was composed of 5% of a mineral mix containing trace minerals, 8% liquid molasses, 43% soybean meal, and 44% ground corn. The enzyme preparation (69% distillers dried grains, 30% urea, and 1% enzymes) was incorporated into the supplement at 2%. The supplement was fed at 5.5 g/kg BW, resulting in 8.8 g of enzyme preparation/100 kg BW. Blood and ruminal fluid were sampled prior to the morning feeding after wk 4. Following the 12-wk, intake was reduced in half the pens to 80% of intake in week 12, fecal bags were fitted on animals, and fecal and ort samples were collected 5 days. Rumen ammonia and blood urea nitrogen were similar for control and enzyme treatments. Hay intake was similar for control and enzyme treatments (2.63 vs. 2.83% BW). Dry matter digestibility and protein digestibility were similar (52.8 vs. 53.5%; 79.4 vs. 78.44%). Neutral detergent fiber digestibility and acid detergent digestibility also were similar (49.8 vs. 50.6%; 20; 26.9 vs. 25.5%). The cellulase and hemicellulase additive did not improve intake of low quality grass hay or increase fiber digestibility in goats.

## **05.02.06 Effects of Level and Length of Supplementation on Carcass Amounts and Percentages of Ash, N, Water, Total Fat, and Energy**

**Arthur, Goetsch , Roger Merkel, Terry Gipson, Zaisen Wang**

*Langston University*

Growing Spanish (S) and Boer (B) wethers were used to determine effects of level and length of supplementation on carcass amounts and concentrations of ash, N, water, fat and energy. The experiment had 110 and 108 d periods (PR). Wethers resided on pastures with free-choice access to alfalfa hay and supplementation (SL) with 0.5 or 1.5% BW (DM basis; L and H, respectively) of a pelleted diet (16% CP and 60% TDN). On a carcass basis B goats had a lower level of water (51.3 and 55.2%) but more energy than S goats (13.6 and 12.2 MJ/kg). H goats had greater ash (0.97 and 0.87 kg), protein (4.1 and 3.5 kg), and water (12.7 and 11.5 kg) than L goats. H goats in PR2 had greatest amounts of fat (4.04, 3.65, 6.31, and 4.19 kg) and energy (255, 227, 340, and 243 MJ for 1H, 1L, 2H, and 2L, respectively), with corresponding differences in % carcass fat and energy/kg carcass. B goats had greater amounts of ash (1.03 and 0.80 kg), water (13.7 and 10.5 kg), fat (5.79 and 3.32 kg), and energy (327 and 206 MJ) than S goats. Carcass protein was greater in B goats in PR1 than PR2 and greater than amounts in S goats (4.58, 4.01, 3.37, and 3.17 kg for 1B, 2B, 2S, and 1S, respectively). Carcass protein percentage was lowest for H goats in PR2 (20.1, 18.8, 16.0, and 16.9%, for 1B, 1S, 2B, and 2S, respectively). In summary, SL and PR led to increased weights of carcass components and B goats appeared to accumulate fat in the carcass to a greater extent than S goats.

## **05.02.07 GIS Hot-Spot Analysis of Pasture Utilization of Two Separate Herds of Goats over Time**

**Arthur, Goetsch , Richard Heinemann, Steven Hart, Terry Gipson**

*Langston University*

The objective was to characterize pasture utilization by two separate herds of goats in different years. The 14.1-ha pasture primarily contained grasses, but was reverting to a wooded area with sapling-size trees. In year 1 (Y1), 10 of 36 Spanish goats were fitted with GPS collars that recorded a fix every 5 min in the first 2 wk. In year 2 (Y2), 19 of 58 Spanish goats had GPS collars. An average nearest neighbor analysis yielded a z score of -150.2 for Y1 and -150.1 for Y2, indicating highly clustered events for both years. A GIS point-in-polygon analysis was conducted for each year using the same grid (1,792 10 × 10 m squares) for each year and with unique grid identifiers. Based on z-scores from hot-spot analysis, each square was classified as very low (VL), low (L), moderate (M), high (H), and very high (VH) usage. Y1 had greater ( $\chi^2 = 13.89$ ,  $P < 0.01$ ) VL and lower VH squares (82% and 1%, respectively) compared with Y2 (80% and 3%, respectively). Hot-spot analysis revealed two areas of H and VH usage for both years. One area was a small grove of trees that had almost a 100% overlay for both years. The degree of similarity in pasture usage was high as indicated by a Spearman's rank correlation coefficient (0.76;  $P < 0.01$ ) of the square z-scores for Y1 and Y2. Even though the two herds of goats never interacted and were separated by time, their pasture utilization was strikingly similar.

#### **05.02.08 Validation of New SNAP® Beta-Lactam Antibiotic Residue Test Kit for Goat Milk Screening**

**MiC, Ahrasbrak , Eva Vasquez, Italo Portugal, Kesete TestfiTerry Watson III**

*Langston University*

Experiments of antibiotic-fortified goat milk and antibiotic-incurred lactating goats were conducted following FDA-CVM's protocols to validate New SNAP® Beta-Lactam Test Kit (SNAP NBL) for screening antibiotic residues in goat milk for human consumption. Results indicate that the SNAP® NBL Test Kit did not show any positive readings (i.e., 100% specificity) in unfortified and uncontaminated fresh or frozen goat milk. This test kit had 100% sensitivity in detecting antibiotic residues in fortified goat milk with Ampicillin, Amoxicillin, Cephapirin and Penicillin G at their respective tolerance and/or safe levels set forth by FDA for cow milk. It must be noted that this test might be more sensitive for goat milk than for cow milk with detection below the tolerance and/or safe levels of the drugs, leading to possible sub-violative positive results. The SNAP® NBL Test Kit was also effective in screening for antibiotic residues in milk throughout lactation after goats were treated with antibiotic drugs. The clearance time of antibiotic residues from the mammary glands to tolerance levels and detection levels of the SNAP test depended on the drugs used and the amounts applied. In conclusion, the SNAP® NBL Test Kit was effective in screening antibiotic residues in goat milk and is recommended for use in dairy goats.

#### **05.02.09 Performance of Steers Wintered on Bermudagrass Fed Liquid or Dry Protein Supplement**

**Jefferson, Sutton , William Phillips**

*Redlands Community College*

During the winter grazing period, stocker calves grazing dormant warm-season grasses are deficient in dietary protein and require supplemental protein to meet the daily protein needs for positive weight gain. Protein supplements are available in different physical forms, but intake must be controlled to avoid overconsumption. Intake of a pelletized supplement is controlled by limit feeding, but liquid supplements are self-fed which reduces labor cost. The objective of this research was to compare performance of stocker steers grazing dormant Bermudagrass pastures and limit fed a pelletized supplement or allowed ad libitum access to a liquid supplement. One hundred and fifty steers (average body weight 219 kg) were randomly assigned to one of eight groups. Each group grazed a 3.2-ha dormant Bermudagrass pasture and four groups were fed a pelletized supplement (20% CP) and four groups were fed a liquid supplement (24% CP). The amount of pelletized was adjusted to equalize CP intake (0.3 kg/d). Average daily gain for the 98-d winter stocker period was 0.45 kg and was not different between steers fed pelletized or liquid supplements. Steers consumed 1.5 kg of pelletized supplement and 1.4 kg of liquid daily. Liquid supplements cost more per unit of weight than compared pelletized supplements, but liquid supplements are self-fed, which reduces labor cost. Stocker operators must balance feed cost and labor cost to find the most economical way of providing supplemental protein steer

## **05.02.10 Stocker and Feedlot Performance of Angus, Brahman and Romosinuano Steers**

**William, Phillips , Makayla Leslie, Sam Coleman**

*Redlands Community College*

Cattle producers desire to match breed type with the optimum production environment. The US beef cattle production system is segment and each production point can have a differing environments. Therefore, breeds must be evaluated under conditions found at each production point. Beef producers in the southern US select cattle that are adapted to hot and tropical climates. However, the next production point can be in the central plains under a cold climate. The objective of this study was to compare the stocker and feedlot performance of the Angus, Brahman and Romosinuano steers born in Florida (Brooksville, FL), but shipped to a temperate environment for growth and development (El Reno, OK). During the stocker phase, Angus steers (temperate breed) had greater ADG ( $p < 0.001$ ) than Brahman steers (tropical breed; 1.0 vs 0.7 kg). Romosinuano steers, a temperate breed that is tropically adapted, had ADG of 0.8 kg. During feedlot phase, Angus (1.17 kg), Brahman (1.04 kg) and Romosinuano (1.12 kg) steers had similar ( $P = 0.72$ ) ADG. Purebred Romosinuano steers performed better than Brahman as stockers, similar to Angus steers as feeders and may be a suitable substitution for Brahman as a tropically adapted breed.

## **05.02.11 Determining Stocker Performance in an Extended Grazing Season Using a Combination of Fescue and Wheat Pastures**

**William, Phillips , Brian Northup, Jordan Jett**

*Redlands Community College*

Winter wheat pasture is a major forage resource in Oklahoma for grazing stocker cattle. Wheat is an annual crop that has a defined potential grazing season. Fescue is a perennial cool-season grass that is available for grazing earlier in the fall and later in the spring than wheat. The objective of this research was to determine stocker performance in a grazing scheme that extended the grazing season by sequentially grazing fescue-wheat-fescue. Two varieties of fescue were established in six 2-ha pastures. Fescue pastures were grazed in the fall and spring for 29 d. In between the fall and spring fescue grazing period, winter wheat was grazed for 136 d. Stocking rate was adjusted to match available forage density. Initial BW of the steers used was 249 kg. Steers gained 20 kg grazing fall fescue, 120 kg grazing winter wheat, and 32 kg grazing spring fescue for total BW gain of 173 kg and a final BW of 421 kg. Adding fescue as a forage resource to a typical Oklahoma winter wheat stocker operation can increase the amount of BW gain, final BW and length of the grazing season.

## **05.02.12 The Effect of Long-Term Diet-Induced Hyperglycemia and Hyperlipidemia on Oxidative Balance in Mouse Heart.**

**Abby, McKisson , Asitha Silva, Pamela Lloyd**

*Southwestern Oklahoma State University*

Oxidative stress, a disruption in cellular oxidative balance, inhibits various cardiovascular functions including arteriogenesis. Hyperglycemia and hyperlipidemia are associated with oxidative stress. Therefore, we studied gene expression of NADPH oxidases 2 and 4 (Nox2, Nox4) and heme oxygenase 1 (HO1) in hearts of C57BL/6 and ApoE<sup>-/-</sup> mice. These enzymes function as either antioxidants or pro-oxidants. We hypothesized that hyperglycemia and hyperlipidemia changes the expression of these genes. To model hyperlipidemia and hyperglycemia, mice were fed either a high-fat diet (42% Cal) or a low-fat diet (13% Cal). After 6 months, hearts and blood were collected for analysis. Plasma insulin, glucose, and cholesterol assays confirmed high-fat diet-induced hyperglycemia, insulin resistance, and moderate hyperlipidemia in C57BL/6 mice, while ApoE<sup>-/-</sup> mice displayed extreme hyperlipidemia without glucose intolerance. High-fat diet increased plasma isoprostane, demonstrating oxidative stress. Gene expression was analyzed using RT-PCR and normalized to b-actin. Nox2 mRNA tended to decrease with the high-fat diet, although differences were non-significant. Nox4 was significantly decreased in ApoE<sup>-/-</sup> males by the high-fat diet, but inconsistent results were obtained from the other groups. HO1 expression tended to be increased by the high-fat diet, although the trend was only significant in C57BL/6 females and was not observed in C57BL/6 males. Overall, a compensatory response is suggested.

## **05.02.13 Implications of Sexual Differences in Space Use and Seasonal Variation in Movements on Core Area Conservation in Sonoran Mud Turtles**

**Sean, Laverty , Paul Stone**

*University of Central Oklahoma*

Successful conservation of semi-aquatic species requires protection of core areas that often include multiple bodies of water and intervening expanses of land. In order to delineate biologically meaningful core areas, data on space use and behavior for focal species must be available. Our capture-mark-recapture data, with 1712 captures of 692 individuals between 1994-2012, provides a unique opportunity to elucidate core area requirements and explore sex differences in space use of Sonoran mud turtles inhabiting intermittent aquatic habitats. Analyzing data for 201 turtles (those with at least two captures) with generalized linear mixed models, we document sex-specific and seasonal biases in turtle movement probabilities between key habitat types in the study area. Wet season movement probabilities in each sex were nearly ten times higher from an intermittent impoundment to ephemeral canyon pools than in the reverse direction. Understanding of the spatiotemporal variation in space use and movement, made possible through such analyses of large and long-term datasets, will facilitate measurement of core area requirements and thus inform conservation efforts.