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02. Animal Science

Northeastern State University

Abstracts from the 2016 Oklahoma Research Day

Held at Northeastern State University

05. Mathematics and Science

02. Animal Science

05.02.01 Multi-Scale Straightness Index Analysis of Goat Behavior

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Multi-scale straightness index (MSSI) has been proposed for determining behavioral states in wildlife. The objective of this study was to apply MSSI to grazing goats. 13 mature Boer-cross females were fitted with GPS collars that recorded a fix every 5 min for 3 days. The study area was a 40-ha unimproved hill pasture. Only fixes within a boundary and buffer shape-files were used to calculate MSSI using granularity (g) from 1 to 12 and window (w) from 1 to 36 with the constraint that w/g must be an integer. Within daytime (D) and nighttime (N) periods, MSSI were calculated for each g-w combination. A linear-linear-linear grafted polynomial analysis was conducted to ascertain ridge points for g-w combinations. The first linear segment before the first break point for both D and N was always when g = w for a g/w ratio of 1 and accounted for 11% of the MSSI. The last linear segment representing highly tortuous travel, most probably grazing or resting, was 81 and 85% of the MSSI with an average MSSI of 0.17 $\pm$ 0.083 and 0.08 $\pm$ 0.050 for D and N, respectively. The middle linear segment, representing targeted travel, accounted for 8 and 4% of the MSSI with an average MSSI of 0.53 $\pm$ 0.108 and 0.41 $\pm$ 0.119 for D and N, respectively. For targeted travel, g averaged 1 for both D and N and w averaged 5 and 3 for D and N, respectively. Even in a herd of goats familiar with the terrain, targeted travel account for a small percentage of behavior and was only for

05.02.02 Effects of Restricted Diet Access on Intake and Performance by Dairy Goats in Mid- to Late Lactation

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Restricting dietary access of lactating dairy goats could influence level or efficiency of production and offer different management options. Therefore, objectives were to determine effects of offering feed at different times and for various lengths on intake and milk yield and composition of 50 Alpines (125 days-in-milk). A 40% forage diet was given free-choice in Calan gate feeders during a 12-wk experiment. Treatments were feed access continuously (C), during the day for 8 h (D) or night for 16 h (N), and for 2 or 4 h/d with equal lengths after milking in the morning and afternoon (2H and 4H, respectively). Neither dry matter intake (DMI) (2.05, 1.87, 2.08, 1.91, and 1.87 kg/d) nor milk yield (1.77, 1.75, 1.67, 1.64, and 1.68 kg/d for C, D, N, 2H, and 4H, respectively) were influenced by treatment (P>0.05), with milk yield (1.83, 1.84, 1.60, and 1.54 kg/d in periods 1, 2, 3, and 4, respectively) but not DMI differing among periods. Treatment also did not influence average daily gain (32, 22, 49, 9, and 20 g). Energy-corrected milk (3.5% fat, 3.2% protein) in kg/d (1.70, 1.66, 1.58, 1.53, and 1.52 kg/d) and relative to DMI (0.79, 0.84, 0.78, 0.81, and 0.81 kg/kg for C, D, N, 2H, and 4H, respectively) were similar among treatments. In conclusion, dairy goats in mid- and late lactation possess considerable flexibility in eating behavior that may allow for incorporation of limited feed access regimes in management systems for most efficient facility utilization.

05.02.03 Effects of High Heat Load on Body Weight, Dry Matter Intake, Rectal Temperature, and Respiration Rate of Katahdin Sheep and Boer and Spanish Goat Wethers

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Yearling Katahdin sheep (K) and Boer (B) and Spanish (S) goat wethers were used to determine conditions to evaluate differences in resilience to high heat load index (HLI). Target HLI were 70, 80, 90, 95, and 100 during day and 70, 70, 77, 81, and 85 at night in periods 1 (3 wk) and 2 to 5 (each 1 wk). Actual values averaged 66, 80, 92, 97, and 101 during daytime and 66, 75, 84, 86, and 89 at night in periods 1-5, respectively. Hay intake was generally similar to the baseline (95.0, 72.4, 93.6, and 96.4% in periods 2-5, respectively). Rectal temperature at 0600, 1300, and 1700 h was lowest for Katahdin in periods 3 (39.4, 39.2, and 39.6°C) and 4 (39.9, 39.6, and 40.0°C for Boer, Katahdin, and Spanish, respectively). There was an interaction in respiration rate between animal type and period (71, 105, and 105 in period 2, 93, 101, and 104 in period 3, 121, 139, and 129 in period 4, and 105, 126, and 109 breaths/min in period 5 for B, K, and S, respectively). Rectal temperature and respiration rate were much lower at 0600 (38.7, 38.9, and 38.8°C and 34, 77, and 56 breaths/min) than at 1300 (39.7, 39.6, and 39.9°C and 127, 137, and 135 breaths/min) and 1700 h (40.1, 39.7, and 40.2°C, and 131, 139, and 144 breaths/min for B, K, and S, respectively). In conclusion, K generally exhibited greater ability than B and S to increase respiration rate and minimize rectal temperature at high HLI and periods longer than 1 wk are required for evaluating variables su

05.02.04 Effects of Two Heart Rate-Based Methods of Estimating the Grazing Activity Energy Cost of Boer Goat Wethers

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Methods of estimating the grazing activity energy cost (GAEC) of ruminants were compared. Boer goat wethers consumed Sudangrass while grazing a 0.8-ha pasture or confined. Heart rate (HR) measured over 24 h in 5-min intervals and the ratio of heat energy (HE) to HR for each animal with a stationary calorimetry system for 24 h while consuming grass hay was used to estimate HE. A GPS collar and leg activity monitor were used when HR was measured to determine HE when resting-lying (L), resting-standing (S), grazing (G), and walking (W); behavior in confinement was L or S. The grazing activity method (GAM) was based on time in different activities multiplied by corresponding HE, with GAEC the sum of differences between S, G, and W relative to L. The confinement method (COM) entailed subtracting total HE while confined from that when grazing. There were differences ($P<0.01$) in % of the day spent in the 4 activities (34, 54, 11, and 1%) and the associated daily HE (241, 322, 75, and 6 kJ/kg BW0.75). Total daily HE (642 and 482 kJ/kg BW0.75) and HE while lying (598 and 450 kJ/kg BW0.75) were greater when grazing than confined ($P<0.01$). Daily GAEC was greater ($P<0.01$) for COM vs. GAM expressed in kJ/kg BW0.75 (165 and 46) and relative to HE when confined for COM and of L on a daily basis for GAM (35 and 8%). In conclusion, method of estimation can have substantial impact on GAEC. Greater L HE per unit time when grazing than confined may contribute to lower GAEC for GAM than for COM.

05.02.05 Determination of the Grazing Activity Energy Cost in Boer Goat Wethers Using a Portable Indirect Calorimety System

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Heat energy (HE) of small ruminants in free-moving settings is often measured from heart rate (HR) and HE:HR determined in a stationary calorimetry system. Therefore, feasibility of use of a portable indirect calorimetry system with goats while grazing was investigated. Ten yearling Boer goat wethers were used to determine HE and the grazing activity energy cost (GAEC) while standing or grazing Sudangrass pasture with a portable indirect calorimetry system. The method entailed use of a partial face mask that allowed unrestricted grazing to measure oxygen consumption and carbon dioxide emission for 30 min while restrained in a stanchion, followed by 60 min of grazing. The face mask was attached to a 15-m tether along with a corrugated plastic hose through which exhaled air was passed to portable calorimetry system carried by a researcher. Measurement periods were during morning and afternoon grazing bouts. HE while restrained was 18.7 kJ/kg BW0.75/h. Grazing HE increased to 35.1 kJ/kg BW0.75/h, implying that the GAEC was 16.4 kJ/kg BW0.75/h. Goats spent 8.5 h/d grazing; therefore, the daily GAEC was 138 ± 17.3 kJ/kg BW0.75. Similar GAEC (165 ± 10.4 kJ/kg BW0.75/d) was determined from the difference in HE estimated from HR between times when grazing a 0.8-ha pasture and confined in nearby 1.2 × 1.2 m pens and fed fresh forage. In conclusion, this method offers promise for relatively simple and direct estimates of the sizable fraction of total HE comprised by GAEC

05.02.06 Effects of Mixing Different Breeds to Evaluate Electric Fence Strand Additions to Barbed Wire Fence to Contain Growing Meat Goat Kids

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A method of evaluating electric fence strand addition to cattle barbed wire fence for goat containment would be useful to promote co-grazing. Therefore, 79 Boer (B) and 80 Spanish (S) growing goats were used to evaluate effects of grouping, single breed (SGL) and breeds combined (COM), on behavior when exposed to barbed wire fence with different electric strand additions. Evaluation pens had 1 side of barbed 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, kids were exposed in evaluation pens to no electric strands (NES), NES, LH at 0 kV, LH at 6 kV, and NES in wk 1, 2, 3, 4, and 5, respectively. Then kids were divided into 2 replication sets per grouping (2 B-SGL, 2 S-SGL, 2 B-COM, and 2 S-COM). There were no main effects of grouping. Fence treatment affected ($P<0.01$) animals receiving a shock (59, 45, 34, 23, and 6%), exiting with shock (38, 36, 31, 20, and 3%), and exiting without shock (0, 15, 50, 68, and 76% for LH, LM, L, M, H, respectively). There was an interaction ($P=0.01$) between FT and grouping in pen exit (50, 25, 75, 86, and 43% with B-COM, 13, 78, 88, 75, and 100% with B-SGL, 63, 63, 75, 88, and 75% with S-COM, and 25, 38, 88, 100, and 100% with S-SGL for LH, LM, L, M, and H, respectively). In conclusion, either method of grouping appeared appropriate to evaluate electric strand additions to barb wire fence.

05.02.07 Effects of Breed and Resistance Classification of Sire on Progeny Growth Performance and Response to Artificial Infection with Haemonchus contortus in a Central Performance Test

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Fifteen Dorper (D), 14 St. Croix (C), 14 Kiko (K), 13 Boer (B), and 17 Spanish (S) males were used to investigate effects of classification for resistance to H. contortus of sire and among and within breed differences in the second year of a central test for growth and response to artificial infection with infective larvae. In the first year, males were randomly selected from 6 herds/flocks. Animals used in this study were progeny of the sires (i.e., High and Moderate, with no progeny of susceptible males) selected in the first year. The test entailed an adjustment period of 2 wk followed by 8 wk of data collection. During adaptation, anthelmintic treatment resulted in low fecal egg count (FEC; < 600/g), after which 10,000 larvae were administered orally. Breed affected ($P \leq 0.01$) average daily gain (ADG) (307, 286, 159, 247, and 142 g), dry matter intake (DMI) (2.2, 1.6, 1.3, 1.5, and 1.3 kg), FEC (2,098, 1,278, 1,419, 1,335, and 716 eggs/g, original scale), and packed cell volume (27.2, 31.7, 31.6, 28.1, and 25.6% for D, C, K, B, and S, respectively). Means of resistance classification of sires were similar for FEC, PCV, ADG, and DMI. Correlation coefficients of sire and progeny FEC within breed were nonsignificant. In conclusion, with only one generation of selection, there was no detectable relationship in resistance to internal parasite between selected sires and progeny based on FEC after an artificial challenge.

05.02.08 Growth Performance and Resistance to Internal Parasitism of Small Ruminant Males from the South-Central US in a Centralized Test

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Young male sheep and goats from farms in AR, KS, MO, and OK were used in a centralized test, which included artificial infection with Haemonchus contortus, to investigate growth and resistance to internal parasitism. Year 1 included 2 Katahdin flocks (KS-A, n = 17g; KS-B, 18), 20 Dorper (DS), 13 St. Croix (CS), 2 Boer herds (BG-A, 16; BG-B, 17) 16 Kiko (KG), and 14 Spanish (SG). In yr 2, animals were progeny from breeding groups classified in yr 1 as of high and moderate resistance. There was 2 wk for adaptation and an 8-wk test period, with automated feeders allowing free-choice diet access. During adaptation, anthelmintic treatment resulted in low fecal egg count (FEC; < 600/g), after which 10,000 infective larvae were administrated orally. Breed affected ($P \leq 0.01$) FEC in yr 1 (1,512, 2,196, 3,072, 1,229, 1,069 2,713, 3,575, and 1,182 eggs/g for KS-A, KS-B, DS, CS, BG-A, BG-B, KG, and SG, respectively) and yr 2 (2,621, 1,368, 1,413, 1,669, and 884 eggs/g for DS, CS, BG-A, KG, and SG, respectively). Animals were placed in 3 categories of resistance (i.e., high, moderate, low) within flocks/herds based primarily on FEC but also considering residual feed intake and average daily gain (ADG). Resistance category means were similar ($P > 0.05$) for ADG and gain:feed in both years. In conclusion, based on FEC after an artificial challenge in a standardized environment, there was considerable variability among flocks/herds of small ruminants in resistance to internal parasitis

05.02.09 Determination of Unknown Species of Sorex From Western North Dakota Using Cranial Morphometric Analysis

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Small mammals were trapped in western North Dakota during 2014 and 2015 summer field seasons. Collected specimens were preserved according to standardized museum protocols and installed in Northeastern State's Museum of Natural History. Among the 1091 collected small mammals, shrews composed 119 total specimens. Of these, 26 specimens in the genus Sorex, could not be identified in the field to species. Previous research conducted on skull morphology of Sorex specimens has shown that measurements of both the palatal length and breadth have been successfully used to identify. Our goal was to identify, using palatal breadth and length of skulls the species designation of the 26 unknowns Sorex. We plotted these data from the 26 unknown species against known palatal lengths and breadths of both S. haydeni and S. merriami from western North Dakota. By comparing our unknown measurements to known measurements of both species, we were able to successfully identify all 26 unknown species as S. haydeni.

05.02.10 Evaluation of Ehrlichiosis Affecting Canines in Northeastern Oklahoma

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Ehrlichia species can be found in ticks and are concerning because they can cause world-wide ehrlichiosis in humans and other mammals. The primary vector for the bacteria is the lone star tick. Ehrlichia spp. reproduce in mammalian leukocytes. In ticks, organisms remain dormant in the salivary glands until transferred to secondary hosts, such as humans and canines, during feeding. The purpose of this study was to evaluate canines in Northeast Oklahoma with symptoms of tick-borne disease, such as lethargy, anorexia, fever, and depression for exposure to Ehrlichia spp. Between September 2014 and September 2015, samples from 51 symptomatic canines were obtained from local veterinary hospitals. Sera were screened for antibodies to Ehrlichia spp. using an indirect immunofluorescent antibody assay (IFA). This testing revealed that 33 (65%) canines had positive titers to Ehrlichia spp. DNA was extracted from EDTA-treated whole blood from the positive IFA samples and end-point polymerase chain reaction (PCR) was employed to confirm the presence of the organism. PCR confirmed the presence of Ehrlichia spp. DNA in 17 (52%) samples while 16 (48%) were negative. These data support the conclusion that while symptomatic canines may test positive for antibodies to Ehrlichia spp., it does not necessarily indicate a current infection with the organism.

05.02.11 Use of Species Specific Interferons in Veterinary Medicine

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Interferons are cytokines, a type of signaling proteins involved in immune response that are released by affected cells in situations such as the invasion of viruses, bacteria, or parasites. Currently, human recombinant interferons are used in veterinary medicine to treat various conditions in animals; however, interferons are species specific and human interferon based drugs require higher dosages administered to animals to achieve remission. The purpose of this study is to determine how well species specific interferon medication works in improving health of domestic animals suffering from various conditions. Pharmaceutical substances based on recombinant bovine, swine, canine, equine interferons with or without an antibiotic will be administered to animals suffering from low immune response levels, viral and bacterial infections, stress, etc. In order to collect data for analysis veterinarians will examine the condition of animals subjected to study followed by completion of a questionnaire by animal owners. The use of species specific interferons will be analyzed to test the prediction that these pharmaceutical substances are more beneficial when compared to human interferon that are currently administered.