

## Small Ruminant: Nutrition

**433 Cereal nutrition of periparturient ewes: Corn versus wheat-barley.** A. Nikkhah\*, M. Karam Babaei, and H. Mirzaei, *University of Zanjan, Zanjan, Iran*.

The objective was to establish effects of periparturient dietary grain choice, grain level, and interactions on ewe metabolism. Twenty Afshari × Merino ewes (80.3 ± 2.0 kg BW) were used in a completely randomized design study from 24 d prepartum through 21 d postpartum. Ewes were kept indoor in individual boxes (1.5 × 2.5 m) and received once daily at 0900 h an either 1) higher or 2) lower concentrate total mixed ration (TMR), based on either 1) solely corn grain (CO) or 2) 50:50 blend of wheat and barley grains (WB). Ewes were stepped into the postpartum diet via feeding 2 prepartum diets. DM based dietary forage for all groups had 3:1 ratio of chopped alfalfa hay:corn silage, mixed with concentrates. For the higher grain level, forage to concentrate ratio was respectively 65:35 and 60:40 for the 2 prepartum diets, and 50:50 for the postpartum diet. The respective ratios for the lower grain level were 75:25, 70:30 and 65:35. Prepartal DMI increased by feeding CO vs. WB. Feeding CO, and not WB, at higher vs. lower level improved postpartum DMI (2.3 vs. 2.0 kg/d,  $P < 0.05$ ). Lambing DMI tended to increase with the higher vs. lower WB (1.59 vs. 1.37 kg/d,  $P < 0.10$ ). DM intake was greater postpartum vs. lambing (2.1 vs. 1.5 kg/d,  $P < 0.05$ ). Feeding CO vs. WB, and feeding both CO and WB at lower vs. higher level increased fecal pH. Postpartal rumen pH decreased by feeding the higher vs. lower WB (5.7 vs. 6.2,  $P < 0.05$ ). Rumen propionate decreased (20.4 vs. 18.9 mmol/L), and acetate (67 vs. 70 mmol/L) and acetate to propionate ratio (3.3 vs. 3.7) decreased by feeding higher vs. lower levels of both CO and WB. Colostrum properties, periparturient urine pH, lamb weight, and placenta weight and expulsion time were unaffected. Milk yield (1.64 vs. 1.27 kg/d) and fat yield (99 vs. 81 g/d) were increased by higher levels of CO and WB. Plasma glucose was higher for higher vs. lower WB (57.6 vs. 52.2 mg/dL). Feeding CO vs. WB tended to reduce periparturient plasma NEFA (0.25 vs. 0.28 mmol/L) and increased insulin to NEFA ratio (2.47 vs. 1.77). Novel findings provide evidence on independent and interactive effects of dietary cereal choice and level on periparturient sheep metabolism and performance.

**Key words:** cereal, periparturient, sheep

**434 Effect of replacement of barley grain with oak acorn (*Quercus persica*) on Markhoz kids' performance.** E. Foroutan\*, O. Azizi, G. H. A. Sadeghi, F. Fatehi, and S. H. Karimi, *Department of Animal Science, Faculty of Agriculture, College of Agricultural and Nature Science, University of Kurdistan, Sanandaj, Kurdistan, Iran*.

The past researches have showed that Oak acorn can be replaced by barley grain in ruminant's diet. The results of some studies indicate that acorns contain an anti-nutritional factor (tannin) that has some effects on ruminants such as a reduction in nutrients digestibility. High level of tannin can reduce voluntary feed intake, whereas low to moderate level may improve the digestive utilization of feed mainly due to a reduction in protein degradation in rumen and an increase in amino acid flow to the small intestine. There is evidence that goats may be less susceptible to toxic effects of tannin, and microbial tanninase enzymes are thought to be responsible. Therefore, the aim of this study was to investigate the effect of replacing oak acorn with barley grain on dry matter intake (DMI), water intake (WI), live weight (LW), average daily gain (ADG) and feed conversion ratio (FCR). Twenty-four Markhoz kids (mean BW 16.93 ± 1.25 kg and 4–5 mo of age)

were used in a randomized complete design with 4 treatments (diets) including: a) control (barley), b) 8% oak acorn, C) 17% oak acorn, and d) 25% oak acorn of dry matter diet. The forage to concentrate ratio was a 60:40 in diets. The experimental period lasted for 105 d. The last square means of dry matter intake (g/d) and water intake (l/d) were 880, 903, 942, 961 and 2.578, 2.653, 2.753, 2.798, respectively for treatments 1 to 4 and there was not any significant effect of treatments on these parameters ( $P > 0.05$ ). LW, ADG, and FCR were 30.683, 31.117, 31.567, 31.950 and 130, 136, 140, 141 and 6.87, 6.67, 6.78, 6.86, respectively for treatments 1 to 4 and there were not any significant effects between treatments for LW (kg), ADG (g/d) and FCR ( $P > 0.05$ ). Based on our results it can be concluded that acorns can substitute with barely at 25% without any problem on kid's performance.

**Key words:** Markhoz kids, oak acorn, performance

**435 Performance of pre-weaned WAD lambs fed Mexican sunflower leaf meal (MSLM) based diets.** A. H. Ekeocha\*, A. O. Akinsoyinu, and O. Makinde, *University of Ibadan, Ibadan, Oyo, Nigeria*.

Studies were conducted using 16 West African Dwarf (WAD) lambs selected from 16 ewes brought to heat (estrus) by synchronization and served by 2 rams. The experimental animals were placed at 6 weeks of age and were fed with grass (*Panicum maximum*) plus concentrate diet mixture of sunflower leaves (MSL) and wheat bran (WB) such that 0%, 15%, 30% and 45% of wheat bran was replaced by weight with MSL gravimetrically. Diet A served as control while animals on diets B, C and D received Mexican sunflower leaf (MSL) at 15, 30 and 45% respectively. The experiment lasted for 7 weeks. Feed and water were provided ad libitum and routine vaccination and medication administered. Parameters measured were weight gain, dry matter intake, weaning weight and feed conversion ratio (FCR). The dry matter intake (DMI)g/day was highest for lambs on diet C (30%MSL)(156.94) followed by B (15%MSL)(156.53) > A (0%MSL)(154.29) > D(45%MSL) (152.04) g/day respectively. This increase was numerically higher than observed values for animals on treatments A (0%MSL) and B(15%MSL) but statistically significant ( $P < 0.05$ ) when compared with animals on treatments D(45%MSL). This trend was observed for weight gain and weaning weight. Values obtained for FCR (2.30, 2.33, 2.30 and 2.38) for lambs on treatments A,B,C and D respectively were not significantly affected by treatment ( $P > 0.05$ ). The low FCR (2.30–2.38) obtained in this study is an indication of high digestibility and utilization of the experimental rations by pre-weaned lambs and this could be attributed to low fiber content (15.70–17.50%), low ADL (7.92–9.85) of the rations, high daily weight gain (63.85 - 68.16 g/day) and lamb weaning weight (7.40 - 8.00 kg). Results from this study showed that 30% MSLM based diet were acceptable to the pre-weaned lambs as it supported dry matter intake, optimum weight gain, weaning weight and feed conversion ratio before diminishing return sets in.

**Key words:** performance, pre-weaned, West African dwarf lambs

**436 Effects of including okara into the diet of weanling cross-bred Boer goats and its impact on growth and performance.** L. L. Ramsey\*, F. R. B. Ribeiro, J. J. Heitholt, J. A. Carter, W. S. Stewart, and D. D. Weir, *Texas A&M University-Commerce, Commerce*.

Reducing the total cost of feedstuffs is a primary concern for livestock producers. Okara shows promise as a byproduct feedstuff because it

provides an excellent source of protein and can be substituted in an animal's diet to minimize feed costs. The objective of this study was to determine if including okara, to the diet of weanling crossbred Boer goats would impact their growth and performance. Okara is a cost-free insoluble pulp extract remaining after producing soymilk that has 35.5% CP, 13.6% ADF, 19.8% NDF, 1.15 Mcal/lb NE<sub>m</sub> and 0.81 Mcal/lb NE<sub>g</sub>. A preliminary study in 2009 with 10 yearling crossbred Boer does, half of which received a 10% okara diet, indicated no effects on growth and performance. In this 2010 study, 25 weanlings (14 wethers and 11 does) were blocked by gender and randomly assigned based on BW to one of 2 treatments, an okara group (OG, n = 13) and a control group (CG, n = 12). Measurements were taken every 14 d and consisted of hip height (HH) girth circumference (GC), BW and daily feed intake. Variables that were calculated were ADG, HH gain (HHG), GC gain (GCG) and daily DMI (DDMI). All weanlings grazed on a 2-acre paddock that consisted of coastal bermudagrass, coastal bermudagrass hay and water ad libitum. The CG were fed daily a diet that was composed of commercially available pelleted feed, 16% CP, at a rate of 1.5% of their BW for 98 d. The OG diet was composed of 80% commercial feed and 20% oven-dried okara, at a rate of 1.5% of their BW for 98 d. There were no gender effects or interactions with treatment were found for any of the variables measured; thus, only means for treatment are presented. Results showed that there were no significant differences ( $P > 0.05$ ) in HHG (0.046 vs. 0.050 cm), GCG (0.040 vs. 0.035 cm), ADG (0.046 vs. 0.044 kg) and DDMI (193 vs. 182 g/day) between the CG and OG, respectively. These 2010 results, combined with those of 2009 preliminary study, indicate that replacement of a commercial feed with up to 20% okara in the diet of crossbred weanling Boer goats will not compromise their growth and performance.

**Key words:** goat, okara, performance

**437 Energy and protein requirements of Canindé, Moxotó and Boer crossbred goats in semi-arid region of Brazil.** M. L. Chizzotti<sup>1,2</sup>, K. C. Busato<sup>2,1</sup>, T. S. Silva<sup>2</sup>, R. T. S. Rodrigues<sup>2</sup>, C. W. S. Wanderley<sup>2</sup>, I. F. Silva<sup>2</sup>, and G. G. L. Araújo<sup>3</sup>, <sup>1</sup>Universidade Federal de Lavras, Lavras, MG, Brazil, <sup>2</sup>Universidade Federal do Vale do São Francisco, Petrolina, PE, Brazil, <sup>3</sup>Embrapa CPATSA, Petrolina, PE, Brazil.

This study was designed to determine protein and energy requirements for growth and maintenance of the Brazilian indigenous breeds Canindé and Moxotó and F1 Boer crossbreds with nondescript goats raised on semi-arid region of Brazil. A comparative slaughter trial was conducted with 60 goats (20 of each breed group), averaging 15 kg of initial body weight (BW). The baseline group consisted of 5 animals of each breed group. The remaining goats were allocated on 3 treatments: ad libitum intake and fed 50 or 75% of the ad libitum intake, and were fed 90 d. Diet consisted of 40% of *Pennisetum purpureum* and 60% of concentrate. A digestion trial was conducted in parallel to determine the metabolizable energy intake (MEI). Animals were kept in individual stalls, partially shaded, in the middle of a native Caatinga area, to replicate the semi-arid environment. The maintenance requirement for net energy (NEm) was calculated by the equation  $HP = a \times e^{(b \times MEI)}$ , where HP is the heat production. The net energy requirement for growth (NEg) was determined by the equation  $a \times EBG^b \times EBW^{0.75}$ , where EBW is the empty BW, a and b are the antilog of the intercept and the slope of the linear regression of the log of RE (kcal/kg EBW<sup>0.75</sup>) on the log of the empty body gain (EBG), while the growth requirement for net protein (NPg) was calculated by the equation  $NPg = w \times z \times EBW^{z-1}$ , where w and z are the coefficients of the regression of the logarithm of the body protein on the logarithm of EBW. The

NPm was assumed to be 6.25 times the intercept of the linear regression of the retained N on N intake. There were no differences ( $P > 0.05$ ) in NEm and NPm among breeds, and the overall values found were 74.1 kcal.kg<sup>-0.75</sup> of EBW.d<sup>-1</sup> for NEm and 1.9 g CP.kg<sup>-0.75</sup> of EBW.d<sup>-1</sup> for NPm. There were also no differences ( $P > 0.05$ ) in NEg and NPg among breeds, which can be estimated as NEg (Mcal d<sup>-1</sup>) = 0.1560 x EBW<sup>0.75</sup> x EBG<sup>0.716</sup> and NPg (d<sup>-1</sup>) = 0.217 x EBW<sup>-0.0574</sup> x EBG. The requirements of Brazilian indigenous and crossbred goats raised on semi-arid were lower than those recommended by NRC (2007) for local or meat goats. Funded by CNPq and FACEPE.

**Key words:** comparative slaughter, Caatinga, maintenance

**438 Effect of yeast culture and direct-fed microbes on the growth performance of lambs.** S. P. Doto\*, J. K. Wang, and J. X. Liu, *Institute of Dairy Science, College of Animal Sciences, Zhejiang University, Hangzhou* <sup>310029</sup>, P.R. China.

An experiment was conducted to determine the effect of yeast culture and direct-fed microbes on the growth performance of weaned lambs. Thirty-two male lambs of Hu sheep with initial weight of 22.2 (±0.75) kg were fed on a basal diet with grass hay and concentrate at a ratio of 2:1, and randomly assigned to 1 of 4 treatments: (1) basal diet without additive (control), (2) added with yeast culture (YEC, Diamond V Mills, Inc., Iowa, USA), (3) yeast culture plus *Bacillus licheniformis* (YBL, Zhejiang Future, Hangzhou, China), and (4) yeast culture plus *Clostridium butyricum* (YCB, Zhejiang Future). The direct-fed microbes in powder form consisted of live microbes and their respective carrier fermentation media. Yeast culture was offered at a dose of 15 g per head per day, while *B. licheniformis* and *C. butyricum* were offered at 2.3 g per head per day. Average daily gain of growing lambs was 102, 114, 90, and 89 g/d in control, YEC, YBL, and YCB, respectively, with no significant difference ( $P > 0.05$ ) among treatment, but the carcass weight was significantly higher ( $P < 0.05$ ) in the YEC-added lambs than in other treatments. There were little differences in blood glucose and plasma urea-N concentrations among 4 treatments, while blood creatinine concentration (µmol/L) was significantly higher ( $P < 0.05$ ) in YBL (97.9) and YCB-added lambs (92.1), compared with the control (77.3) and YEC (79.6). Solid-associated fungi population relative to total rumen bacteria 16S ribosomal DNA was significantly lower ( $P < 0.05$ ) in the lambs on YBL (3.55) compared with those on YCB (23.12). From the results obtained in the current study, it is inferred that yeast culture can significantly improve growth performance of weaned lambs and that no additional advantage can be expected from combined addition with either *B. licheniformis* or *C. butyricum*. Further study is needed to investigate the effects of these additives using an adjusted diet formulation.

**Key words:** yeast culture, direct-fed microbes, growth performance

**439 Mineral profile of lactating West African Dwarf ewe fed Mexican sunflower leaf meal based diets.** A. H. Ekeocha\*, *University of Ibadan, Ibadan, Oyo, Nigeria.*

A study was conducted to determine the mineral balance of lactating West African Dwarf (WAD) ewe. Sixteen lactating WAD ewes weighing between 22.80 – 26.03 kg on a basal diet of *Panicum maximum* were allotted into 4 treatment groups of 4 replicates each. The experiment was conducted using completely randomized design with 4 replicates. The Mexican sunflower leaf (MSL) replaced wheat bran (WB) gravimetrically at 0,15,30,45%. The control treatment (treatment A) had no MSL but treatments B, C and D had 15, 30 and 45% MSL

as graded replacement for WB. The experiment lasted for 13 weeks. Feed and water were provided ad libitum and routine vaccination and medication administered. Parameters measured include macro minerals i.e Calcium (Ca), Magnesium (Mg), Phosphorus (P), Potassium (K), Sulfur (S), Sodium (Na) in terms of apparent digestibility, balance and retention and micro minerals i.e Copper (Cu), Zinc (Zn), Manganese (Mn) in terms of apparent digestibility, balance and retention. Animals on treatments 0, 15 and 30% MSL were significantly higher ( $P < 0.05$ ) than animals on treatments D in calcium and sulfur digestibility. Mineral balance were not significant ( $P > 0.05$ ) among treatments. Animals on treatment D had less apparent sulfur digestibility and retention. Inclusion of up to 30% MSLM in the diets of lactating ewe appeared most beneficial to sheep as it had no negative effects on mineral profile.

**Key words:** mineral profile, lactation, West African dwarf ewe

**440 Mineral profile of pregnant West African Dwarf ewe fed Mexican sunflower leaf meal based diets.** A. H. Ekeocha\*, *University of Ibadan, Ibadan, Oyo, Nigeria.*

Minerals are useful indicators of nutritional and physiological status. In view of this a study was conducted to determine the mineral balance of pregnant West African Dwarf (WAD) ewe. Sixteen pregnant WAD ewe weighing between 17.50 and 17.88 kg on a basal diet of

*Panicum maximum* were allotted into 4 treatment groups A, B, C and D of 4 replicates each. The MSL replaced wheat bran (WB) gravimetrically at 0, 15, 30, 45%. Treatment A served as control, while animals in treatments B, C and D received Mexican sunflower leaf (MSL) at 15, 30 and 45% respectively. The experiment lasted 5 mo. Feed and water were provided ad libitum and routine vaccination and medication administered. Parameters measured were macro minerals such as Calcium (Ca), Magnesium (Mg), Phosphorus (P), Potassium (K), Sulfur (S), Sodium (Na) in terms of retention, balance and apparent digestibility and micro minerals such as Copper (Cu), Zinc (Zn), Manganese (Mn) in terms of retention, balance and apparent digestibility. The treatment effects on observed variations were not significant ( $P > 0.05$ ) for mineral balance. Animals on treatments 0, 15, and 30% Mexican sunflower leaf meal (MSLM) were significantly higher ( $P < 0.05$ ) in calcium, magnesium and sulfur retention than animals on treatments D (45% MSL). Animals on treatments 0, 15, and 30% MSLM were significantly higher ( $P < 0.05$ ) in sulfur and magnesium apparent digestibility than animals on treatments D (45%MSL). Mineral balance were not significant ( $P > 0.05$ ) among treatments. Inclusion of dietary Mexican sunflower leaf meal up to 30% improved the mineral digestibility, balance and retention of pregnant ewe.

**Key words:** mineral profile, pregnant ewe, Mexican sunflower leaf meal