stine with an average of 54 g/kg DM and endogenous protein with an average of 7 g/kg DM, but changed the truly absorbed rumen undegraded feed protein in the small intestine from 50 to 108 g/kg DM, total truly absorbed protein in the small intestine from 95 to 154 g/kg DM and degraded protein balance from −54 to 102 g/kg DM. These results indicated that with the inclusion of bioethanol co-product, the nutrient supply from corn grain could be further improved.

Key Words: combined feeds, modeling, nutrient supply

W288 Effects of biodiesel by-products on in vitro fermentation, digestion kinetics and methane production. S. J. Meale*[1], S. M. Olivares-Palma[1], L. G. R. Pereira[2], F. S. Machado[2], H. Carneiro[2], F. C. F. Lopes[2], and A. V. Chaves[1], *[1]Faculty of Veterinary Science, University of Sydney, Sydney, NSW, Australia, [2]Embrapa Dairy Cattle, Juiz de Fora, MG, Brazil.*

Increasing interest in the biofuel industry has produced by-products which show promise as energy and protein feeds in the diets of ruminant livestock. The objective of this study was to determine the effects of biodiesel by-products, from a variety of oilseed sources on *in sacco* nutrient degradability, in vitro ruminal fermentation and CH_4 production. Beard grass (*Brachiaria brizantha*) was incubated alone (control) and in combination with 7 biodiesel by-products (i.e., moringa, castor, cotton, radish, palm kernel and sunflower press oil seeds and glycerine) at ratios of 900:100, 800:200 and 600:400 for each treatment, in a 48 h in vitro batch culture. Gas production (mL/g incubated DM) was measured at 6, 12, 24 and 48 h. Methane production (mg/g of DMD) was measured at 6 and 12 h. Data were analyzed using the MIXED procedure of SAS. After 48 h, culture pH and IVDMD were affected by level x supplement interaction ($P < 0.05$). Supplement type affected gas production, total VFA, proportions of individual VFA and CH_4 production ($P < 0.05$). Moringa produced the lowest amount of CH_4 (g/kg of DM) at 6 and 12 h of incubation, whereas glycerine had the highest CH_4 production ($P < 0.05$). The in sacco experiment examined ruminal degradation of CP and DM in moringa, castor, cotton, radish, palm kernel and sunflower press oil seeds and soybean meal (control). Three nylon bags, containing 5 g of sample, were placed into the rumen of each of the 3 lactating Holstein-Friesian dairy cows. Corresponding bags were removed at 0, 3, 6, 12, 24, 48 and 96 h (i.e., 3 replicates per cow, 9 replicates per time point) for determination of CP and DM disappearance. Moringa press oils seeds exhibited the greatest effective degradability of DM. Similarly, moringa and sunflower press oil seeds exhibited rapid degradation rates of both CP and DM and showed the greatest effective degradability of CP compared with other feed sources ($P < 0.05$). The findings suggest moringa press oils seeds may have the potential to be included in ruminant diets to reduce CH_4 production without adversely affecting nutrient degradability.

Key Words: methane, press oil seeds, ruminal fermentation

W289 Effect of replacing barley grain with glycerol in feedlot diets on nutrient digestibility, methane emissions, growth, fatty acid profiles and carcass traits of lambs. J. S. Avila[1,3], S. J. Meale*[1,2], T. A. McAllister[2], M. L. He[2], O. M. Harstad[4], K. A. Beauchemin[2], S. M. McGinn[2], and A. V. Chaves[1], *[1]Faculty of Veterinary Science, University of Sydney, Sydney, NSW, Australia, [2]Lethbridge Research Center, Agriculture and Agri-Food Canada, Lethbridge, Alberta, Canada, [3]Facultad de Ciencias Veterinarias, Universidad de Concepción, Chillan, Chile, [4]Norwegian University of Life Sciences (UMB), Ås, Norway.*

The aim of the study was to assess the effects of replacing barley grain with increasing concentrations of glycerol on total tract nutrient digestibility, methane (CH_4) emissions, growth performance, and fatty acid (FA) profiles. The control diet (DM basis) contained 57% barley grain, 14.5% wheat dried distillers grain with solubles (WDDGS), 13% sunflower hulls, 6.5% beet pulp, 6.3% alfalfa and 3% mineral-vitamin mix. Increasing concentrations (7, 14 and 21% dietary DM) of glycerol in the diet DM were achieved by substituting it for barley grain. As glycerol was added alfalfa and WDDGS were increased to maintain similar concentrations of CP and NDF among diets. Nutrient digestibility and CH_4 emissions from 12 ram lambs were measured in a repeated 4 × 4 Latin square experiment. Additionally, 60 weaned lambs were blocked by weight and randomly assigned to one of the 4 dietary treatments and fed to slaughter weight. Data were analyzed using the mixed procedure of SAS. The model included the fixed effects of treatment (diet), day and treatment by day interactions and the random effects of period (n = 4), chamber (group) and lamb nested within treatment as random effects with day of sampling within each period treated as repeated measure. Nutrient intakes, digestibility and CH_4 emissions were not altered by inclusion of glycerol in the diets. In the growth trial, increasing glycerol in the diet linearly decreased DMI ($P < 0.01$) and linearly decreased final bodyweight ($P = 0.01$). The 7% glycerol group tended to have higher ADG ($P = 0.06$) compared with all other treatments. Feed efficiency, carcass traits and total SFA or MUFA proportions of subcutaneous fat were not affected by inclusion of glycerol, but PUFA were linearly decreased ($P < 0.01$). Proportions of 16:0, 10*t*-18:1, linoleic acid 18:2 (n-6) and the n-6/n-3 ratio were linearly reduced ($P < 0.01$) and those of 18:0 (stearic acid), 9*c*-18:1 (oleic acid) were linearly increased ($P < 0.01$) by glycerol inclusion in the diets. In conclusion, glycerol did not affect nutrient digestibility or CH_4 emissions of lambs fed barley-based finishing diets. Lamb growth performance was optimized at 7% glycerol inclusion in the diet and may improve back fat fatty acid profiles by increasing 18:0 and 9*c*-18:1, while reducing 10*t*-18:1 and the n-6/n-3 ratio.

Key Words: biofuel by-products, methane, *trans* fatty acids

W290 Crude glycerin decreases fiber digestibility in finishing Nellore bulls. E. H. C. B. van Cleef*[1], J. M. B. Ezequiel[1], J. B. D. Sancanari[1,2], A. P. D'Aurea[1], V. R. Fávaro[1], D. A. V. Silva[1], J. W. Catellan[1], and F. B. O. Scarpino[1], *[1]São Paulo State University, Jaboticabal, São Paulo, Brazil, [2]Uzinas Chimicas Brasileiras S.A., Jaboticabal, São Paulo, Brazil.*

Nellore bulls (n = 30, 277.7 ± 23.8 kg BW) were used to evaluate total tract digestibility when fed diets containing 0, 7.5, 15, 22.5, or 30% crude glycerin. Treatments (5 diets) consisted of a control diet containing 30% corn silage, 35% corn grain, 19.2% soybean hulls, 14.6% sunflower meal, and 1,2% supplement, and diets containing 7.5, 15, 22.5 or 30% glycerin (dry matter basis). In this study, glycerin replaced specifically corn grain. Bulls were vaccinated against common viral and clostridial diseases, stratified in a randomized block design, by initial BW, and assigned randomly to 30 individual feedlot pens (6/treatment). Over a period of 21 d, bulls were transitioned from diets containing 20% concentrate to their respective 70% concentrate finishing diets using 4 step-up diets that contained progressively greater proportions of concentrate. Final diets provided 12.2% CP and 2.5 MCal ME/kg. Data were analyzed using the General Linear Model procedure of SAS, with animal considered as experimental unit. Indigestible acid detergent fiber was used as internal marker to determine nutrient apparent digestibility. Five Nellore rumen-cannulated steers (approximately 400 kg BW) were adapted to experimental diets and incubated in situ with diets, orts and fecal samples from the 30 finishing study animals for 264 h. Feeding glycerin caused linear ($P \leq 0.01$) reductions in neutral detergent fiber