
The study objective was to evaluate the effects of 2 probiotic supplements on in vitro nutrient digestibility, methane (CH₄) and volatile fatty acid (VFA) production using in vitro batch fermentation assay. Three ruminantly-cannulated cows were used in a 3 × 3 Latin Square design and fed either basal corn silage-based TMR without probiotics (Control; CON), the basal diet top-dressed with mixture of Lactobacillus animalis and Propionibacterium freudenreichii at 3 × 10⁹ cfu/day (BOV) or the basal diet top-dressed with BOV and mixture of Saccharomyces cerevisiae and B. licheniformis at 11.8 × 10⁹ cfu/day (BOV), each for 28 of the experimental period for 4 runs of in vitro batch fermentation assay per period. Rumen fluid collected from each donor cow corresponded to the specific dietary treatment the cow was receiving. Additionally, 2 more treatments (BOV+ and BOVC+) were included in the assay by adding extra dose (1.62 mg/mL) of the 2 probiotic supplements (BOV and BOVC) to the vials containing their respective rumen fluids. A corn silage-based TMR (11cc; 5 g) was used as substrate was incubated in serum vials with respective rumen fluid buffered with Van soest medium and reducing agent at 39°C. Data were analyzed using GLIMMIX procedure of SAS and differences were considered significant at P ≤ 0.05. Treatments were used as fixed effects while cow and run were considered random factors. No treatment effects were observed on digestibility parameters. The BOV and BOV+ inocula decreased molar proportion of butyrate (13.8 and 13.6%), compared with CON (14.3%), while BOVC+ tended (P = 0.07) to decrease molar proportion of butyrate. BOV+ lowered gas production (143.9 vs 162.8 mL/g DMD), and tended to reduce CH₄ production (9.07 vs 11.6 mg/g DMD), compared with CON. BOVC reduced ruminal acetate (50.2 vs 51.1%) and tended to reduce isovalerate (P = 0.07) molar proportion. In conclusion, probiotic supplementation did not change in vitro nutrient digestibility, however, it tended to lower CH₄ production.

Key Words: methane, probiotics, rumen fermentation

Saccharomyces cerevisiae fermentation products reduce effects of subacute ruminal acidosis on CowPI-predicted functionalities related to inflammation, and NutriTek attenuated these changes. J. Guo*, J. Pacheco, L. Ghedin Ghizzi, M. Rebouças Pupo, M. Agarussi, L. Ferretti, A. Adesogan, D. Vyas, University of Florida, Gainesville, FL.

Increasing the supply of degradable protein can alter products formed by mixed ruminal microbes, decreasing glycogen and increasing microbial protein synthesis in vitro. The objective of this study was to evaluate the effect of supplementing supplement (SUP) from enzymatically hydrolyzed soybean meal (SBM) on rumen fermentation by mixed ruminal microbes. SBM (20% solids with distilled water; dhH2O) with (+e) or without (-e) ENZECO Protease BL was incubated with continuous mixing for 1 h at 60°C. SUP was isolated by centrifugation at 15,000 x g for 10 min at 5°C. SUP N mg/mL were: -e: 5.72; + e: 13.3. Replicate in vitro fermentations (3) were performed with Goering-Van Soest medium without tryptone. Each tube contained 20 mL medium, 1 mL reducing solution, 79.5 mg glucose in 0.5 mL, 1 mL of tryptone solution or 0.2, 0.4, or 0.6 mL of SUP brought to 1 mL with dhH2O, and 5 mL of strained rumen fluid. Increasing SUP delivered N mg/tube of 1.17, 2.35, and 3.52 for -e, 2.66, 5.32, and 7.99 for +e, and 2.66 and 5.32 for tryptone. -e gave insight to the impact of SUP carbohydrate addition from SBM. Tubes harvested at 3 h of fermentation were analyzed for microbial glycogen. Data were analyzed as a randomized complete block design with run as a random variable. Gel electrophoresis showed the pattern of proteins in -e was similar to that in solubilized SBM; for +e, higher molecular weight proteins present in SBM were reduced and more lower molecular weight proteins were apparent. Glycogen amount was greater with -e (15.2 mg) than +e (13.6 mg); Effects: protease, P < 0.01; supernatant dose, P = 0.76; interaction, P = 0.20; SED 0.68) with a tendency for a quadratic effect of SUP dose (P = 0.08). Comparison of +e and tryptone at the 2 common levels of N gave glycogen values of 13.8 mg for +e and 11.6 mg for tryptone (P < 0.01) with no effects of N dose (P = 0.17) or the interaction (P = 0.97; SED = 0.56). Lower glycogen values for +e vs. -e and for tryptone vs. +e indicate reduced storage of glycogen with +e and tryptone, describing potentially more efficient fermentations, ostensibly due to relatively greater amounts of more immediately available degradable protein and peptides.

Key Words: fermentation, protein, glycogen

Effect of autolysates of wheat, Barley, and Rye meal on ruminal methanogenesis production in vitro. R. Dhakal1, E. Vargas-Bello-Pérez*,1, M. González-Ronquillo2, and H. H. Hansen1, 1Department of Veterinary and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Frederiksberg C, Denmark, 2Facultad de Medicina Veterinaria y Zootecnia, Instituto Literario 100, Universidad Autónoma del Estado de México, Toluca, Estado de México, México.

The objective of this study was to determine the use of dried fruits from commonly used Nepalese plants on rumen fermentation in vitro. Two plants and a plant product were tested in 3 concentrations: the fruit of Terminalia chebula (HA), Terminalia bellirica (BA) and Triphala Churna
(TC), a commercial mixture with 3 equal parts (DM basis) of *Phyllanthus emblica*, *Terminalia bellirica*, and *Terminalia chebula*. These plants/product were tested pure and at 20% and 40% of the total sample dry matter in maize silage (MS). Additionally, pure MS was used as a control. These 10 treatments were tested during 2, 48-h fermentations with quadruplicate samples. Rumen fluid was collected from 2 fasting cannulated heifers. Total gas production (TGP: mL at standard temperature and pressure (STP)/g DM), methane production (MP), and volatile fatty acids (VFA) were measured or calculated from measurements. Data were analyzed with linear mixed models using R version (3.5.1) with each treatment as a main effect and run as a random variable. Total gas production and MP were less ($P < 0.05$) than MS (186 mL gas/g DM with 10% methane) for pure samples, but not significantly different from MS for 20 and 40% plants/product mixtures with a reduction in TGP between 5 and 15 and 8 to 16% for methane. Neither total VFA production (mmol/L) nor proportions of propionic acid and acetate (mol/100mol) were significantly different between MS and plant/product and MS mixtures ($P > 0.05$).

The reduction in MP and similarities between total VFA, TGP, and VFA profiles for the plants/product mixtures and pure MS suggest that these can be used with MS at the given inclusion rates. The decrease in methane makes the animal can theoretically use. Therefore, these plants/product may increase productivity while decreasing enteric methane emission.

**Key Words:** digestibility, fermentation, methane

### 151 Effects of feeding a yeast culture product on performance, blood biomarkers, rumen fermentation, and rumen bacteria species in peripartal dairy cows. N. A. Carpinielli*, J. Halfen†, S. D. L. Ramirez‡, E. Trevisi§, J. D. Chapman, E. D. Sharman and J. S. Osorio

Feeding yeast culture fermentation products has been associated with improved feed intake and milk yield in transition dairy cows. The objective of this study was to evaluate the effects of a commercial yeast culture product (Cellerate Culture Classic HD (YC); Phibro Animal Health, Teaneck, NJ) on performance, blood biomarkers, and rumen fermentation and bacterial population in dairy cows during the transition period until 50 DIM. Forty Holstein dairy cows were enrolled in a randomized complete block design from −30 to 50 DIM and blocked according to expected calving day, parity, previous lactation milk yield, and genetic merit. At −30 DIM cows were assigned for the first 28 d. Data were analyzed using the MIXED procedure of SAS. Dry matter intake tended ($P = 0.07$) to be 1.4 kg/d lower in YC than CON cows, while milk yield was not affected ($P = 0.43$) by diet. Consequently, a trend ($P = 0.07$) was observed for greater milk efficiency in YC than CON cows (1.46 vs. 1.34 milk/DMI). The trend ($P = 0.11$) for a Diet × Time interaction in rumen pH resulted in greater rumen pH in YC than CON cows at 60 d. Greater ($P = 0.02$) propionate was observed in YC than CON (26.9 vs 25.4%). A trend ($P = 0.07$) for lower acetate was observed in YC than CON (60.2 vs 61.2%). There was lower ($P = 0.04$) acetate:propionate ratio in YC vs YC. Prevotella albensis, associated with improved feed efficiency, was greater ($P = 0.05$) in YC than CON. Ruminococcus amylophilus, related to rumen acidosis, had a Diet × Time effect ($P < 0.01$) with lower ($P < 0.01$) abundance in YC than CON at 30 d. These results suggest feeding YC may help maintain milk production during transient reductions in DMI, by modulating rumen microbiota and fermentation patterns.

**Key Words:** yeast culture, rumen bacteria, dry matter intake


The prophylactic use of oral antimicrobials is common practice in calf rearing, however, the impacts on gut health are largely unknown. The objective of this study was to investigate the effects of oral antibiotic (neomycin) on calf health, performance, and gastrointestinal development. One hundred fifty calves, less than a week old, were blocked by BW and randomly assigned to 1 of 3 treatments ($n = 50$ per treatment): control (CON: non-medicated milk replacer, MR), short-term antibiotic (ST: neomycin mixed in MR at 20mg/kg BW from d1–14), or long-term antibiotic (LT: neomycin in MR at 20mg/kg BW from d1–28). Fecal dry matter and BW were measured weekly, whereas daily fecal scores (FS) were assigned for the first 28 d. Data were analyzed using the mixed procedure of SAS. Fixed effects included treatment, period, day, and their interactions, and the random effect of calf within treatment. Statistical
significance was considered at $P \leq 0.05$. A treatment effect ($P = 0.01$) was observed for FS, where CON calves experienced higher average FS (0.640 ± 0.031) compared with ST (0.530 ± 0.034) and LT calves (0.409 ± 0.034). CON calves also experienced longer bouts ($P < 0.01$) of diarrhea (5.44 ± 0.35 d) compared with ST (3.78 ± 0.39 d) and LT calves (3.82 ± 0.38 d). At d7, significant differences were observed in fecal dry matter ($P < 0.01$), where CON calves experienced lower fecal dry matter (0.130 ± 0.012%) than ST (0.200 ± 0.013%) or LT (0.170 ± 0.013%) calves. No significant differences in average daily gain ($P = 0.475$; SEM = 0.0546) were observed. On d 28, a subset of 36 calves (n = 12 per treatment) were euthanized and dissected to assess gastrointestinal development. Histomorphometric measurements were characterized in the distal jejunum, ileum, and colon. Calves in the LT group had heavier (27.50 ± 2.58 g) duodenumbs ($P = 0.04$) and deeper (515.58 ± 6.31 μm) distal jejunum crypt depths ($P < 0.001$). The results of this study suggest that while neomycin may affect intestinal morphology and decrease the incidence and severity of diarrhea, it has no effect on growth performance, which questions the efficacy of neomycin inclusion in milk replacer.

**Key Words:** antimicrobial, gut development, histology