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in group 3 was 0.72% higher than that in the control group ($P < 0.05$). The evaluation of whole-plant corn silage quality scores (CSQS) was: Group 3 (71.21) > Group 2 (66.82) > Group 2 (63.82) > control group (62.76). In summary, adding 40 mg/kg glucose oxidase to the whole-plant corn silage has the optimal effect on the quality.

Key Words: glucose oxidase, whole-plant corn silage, sensory score, whole-plant corn silage quality scores

2520V Using Fourier-transform infrared spectroscopy to predict urinary allantoin and creatinine from urine and milk samples. L. A. C. Ribeiro*, T. Bresolin, S. I. A. Apelo, and J. R. R. Dorea, *University of Wisconsin–Madison, Madison, WI.*

Microbial protein (MicP) accounts for most of the total amino acids flowing to the small intestine and is considered a high-quality protein for dairy cows. Quantifying MicP yield as well as factors influencing its supply is of major importance in dairy cattle nutrition. However, MicP is difficult to measure in research and commercial settings. For that reason, research studies have extensively used internal markers such as purine derivatives and creatinine (for urinary volume) to estimate total MicP yield. Infrared spectroscopy has been widely used for milk and feed analyses as also to predict feed components and milk traits. This technology is fast, noninvasive, nondestructive, and has great potential to predict difficult-to-measure phenotypes of large-scale operations in a timely manner. The objective of this study was to evaluate if Near Infrared Spectroscopy (NIR) and Mid-IR obtained from urine and milk samples, respectively, could be used to predict urinary allantoin (ALN) and creatinine (CRE). We evaluated 3 covariate sets for each urinary compound: (1) urine NIR; (2) milk MIR; and the combination of urine and milk spectra. Samples were collected from 185 Holstein cows at the University of Wisconsin–Madison. Quality prediction was assessed using partial least squares (PLS) by randomly splitting data set into training and test set (75% and 25% of the data set, respectively). The number of components in each model was selected based on 5k-fold cross-validation. The best predictions for urinary ALN were observed when urine NIR was used as covariate set ($R^2 = 0.60$; RMSE = 3.65 mM/l). Combining milk MIR with urine NIR did not improve ALN prediction ($R^2 = 0.56$; RMSE = 3.60 mM/l). CRE was not accurately predicted by urine NIR ($R^2 = 0.18$; RMSE = 3.01 mM/l), milk MIR ($R^2 = 0.04$; RMSE = 3.40 mM/l), or combination of both ($R^2 = 0.21$; RMSE = 3.00 mM/l). Our results suggest that urine spectrum has important information related to allantoin concentration, which could be used as an additional source of data for predictions of complex traits such as intake, microbial synthesis, and nitrogen efficiency.

Key Words: infrared spectroscopy, purine derivatives, allantoin

2521V Feeding amylolytic and proteolytic exogenous enzymes: Effects on ruminal fermentation of dairy cows. M. Bugoni¹, C. S. Takiya¹, P. C. Vittorazzi Junior¹, N. T. S. Grigoletto¹, G. Gomes da Silva¹, R. G. Chesini¹, L. V. B. de Alcantara¹, T. Durman², and F. P. Rennó¹, ¹University of São Paulo, Pirassununga, São Paulo, Brazil, ²Alltech Brazil, Maringá, Paraná, Brazil.

Adding exogenous enzymes (ENZ) to diets may increase rumen degradability and energy available for milk yield. A study was conducted to evaluate the effects of amylolytic (Amaize, Alltech, USA) and proteolytic (Allzyme Vegpro, Alltech) ENZ on nutrient intake, milk yield and composition, and ruminal fermentation. Four Holstein cows with ruminal cannulas (185 ± 63.8 DIM and 35.8 ± 9.89 kg/d milk yield) were used in a 4 × 4 Latin square experiment with four 21-d periods.

Treatments included: Control (CON), without ENZ; Amylolytic ENZ (A5), 0.5 g/kg diet DM; A5 + proteolytic ENZ 1X (A5P2), 0.2 g/kg; and A5 + proteolytic ENZ 2X (A5P4), 0.4 g/kg. Cows were milked twice daily and samples were collected for 3 consecutive days of each period. Ruminal digesta samples were collected on the last day of each period before feeding and every 2 h until 16 h after feeding and analyzed for pH, VFA, ammonia. Ruminal fermentation data were analyzed as repeated measures using the MIXED procedure of SAS modeling the fixed effects of treatment, period, time, and their interactions besides the random effect of animal. Differences between treatments were analyzed by orthogonal contrasts: CON vs ENZ; A5 vs A5P2+A5P4; and A5P2 vs. A5P4. No differences were detected for DMI or milk yield and composition. Cows fed ENZ had greater ($P = 0.012$) feed efficiency (FCM ÷ DMI) than CON cows (1.31, 1.40, 1.37, and 1.34 for CON, A5, A5P2, and A5P4, respectively). A trend for greater ($P = 0.053$) feed efficiency was observed for cows in A5 group than those in A5P2 and A5P4. No differences were detected for ruminal pH or NH₃-N concentration. Ruminal propionate molar percentage tended to be greater ($P = 0.083$) in cows fed ENZ than CON (18.3, 19.2, 18.2, and 18.8% for CON, A5, A5P2, and A5P4, respectively). Propionate molar percentage was greater ($P = 0.039$) in cows fed A5 than those in A5P2 and A5P4. Cows fed A5P4 tended to have greater ($P = 0.098$) propionate molar percentage than cows in A5P2. No other significant contrast effects were detected for VFA. Exogenous amylolytic and proteolytic ENZ resulted in greater feed efficiency and modulated ruminal fermentation of dairy cows.

Key Words: amylase, feed additive, protease

2522V Feeding amylolytic and proteolytic exogenous enzymes: Effects on nutrient digestibility, milk yield and composition of dairy cows. M. Bugoni¹, C. S. Takiya¹, P. C. Vittorazzi Junior¹, N. T. S. Grigoletto¹, G. Gomes da Silva¹, R. G. Chesini¹, F. M. dos Santos¹, L. F. Costa e Silva², and F. P. Rennó¹, ¹University of São Paulo, Pirassununga, São Paulo, Brazil, ²Alltech Brazil, Maringá, Paraná, Brazil.

Exogenous enzymes (ENZ) are added to diets to increase total enzymatic activity within the rumen and to improve nutrient utilization. A study was conducted to evaluate the effects of amylolytic (Amaize, Alltech, Nicholasville, KY) and proteolytic (Allzyme Vegpro, Alltech) ENZ on intake and apparent nutrient digestibility, and milk yield and composition of dairy cows. Twenty-eight Holstein cows (161 ± 87.7 DIM and 35.2 ± 5.19 kg/d milk yield) were blocked according to milk yield and DIM and used in a 4 × 4 Latin square experiment with four 21-d periods. Treatments included: Control (CON), with no ENZ; Amylolytic ENZ (A5), 0.5 g/kg diet DM; A5 + proteolytic ENZ 1X (A5P2), 0.2 g/kg; and A5 + proteolytic ENZ 2X (A5P4), 0.4 g/kg. Enzymes were provided mixed into the concentrate. Feed offered andorts were recorded daily. Cows were milked twice daily, and samples were collected for 3 consecutive days of each period and analyzed for total solids using mid-infrared method. Fecal samples were collected for 3 consecutive days of each period on 9-h intervals. Fecal excretion was calculated based on indigestible NDF content in feeds, orts, and feces. Data were analyzed using the MIXED procedure of SAS modeling the fixed effects of treatment, period, Latin square, and interaction between treatment and Latin square. Animal within square was considered a random effect. Differences between treatments were analyzed by orthogonal contrasts: CON vs ENZ; A5 vs A5P2+A5P4; and A5P2 vs. A5P4. No differences were detected in DMI or digestibility of DM, CP, or EE. Digestibility of NDF was greater ($P = 0.021$) in cows fed A5P4 than those fed A5P2 (58.1 and 55.3%, respectively). The 3.5% Fat-corrected milk was greater ($P \leq 0.032$) in cows fed ENZ than CON (33.3, 34.2, 34.5, and 34.6 kg/d