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1.40, respectively). Feeding CAP at 1.5 g/d improves performance of dairy cows without affecting nutrient digestibility.

Key Words: *Capsicum* oleoresin, feed additive, feed efficiency

2505V Effects of dietary capsaicin on ruminal fermentation of dairy cows. N. T. S. Grigoletto, C. S. Takiya, M. Bugoni, R. G. Chesini, P. C. Vittorazzi Jr., A. C. de Freitas, G. Gomes da Silva, N. P. Martins, O. P. Sbaralho, and F. P. Rennó*, *University of São Paulo, Pirassununga, São Paulo, Brazil.*

Capsaicin (CAP) is an organic compound available in large amounts in fruits of pepper variants (genus *Capsicum*) and has demonstrated antibacterial properties. A study was conducted to evaluate CAP on ruminal fermentation, predicted rumen microbial protein synthesis (MPS), and apparent digestibility of DM. Four Holstein cows (32.2 ± 0.8 kg/d milk yield, 212 ± 51.1 DIM) with rumen cannulas were blocked ($n = 2$) according to milk yield and DIM and used in a crossover design experiment with 21-d periods, which the last 7 d were used for data analyses. Treatments were either control (CON) or CAP fed at 1.5 g/d (Capcin, NutriQuest Ltda, Campinas, Brazil) mixed with minerals. Cows were milked twice daily, and milk solids were analyzed by mid-infrared method. Ruminal digesta samples were collected on the last day of each period before feeding and every 2 h until 16 h for VFA analysis. Urine and fecal samples were collected on d 15, 16, and 17 of each period at 9-h intervals. Purine derivatives (PD) in milk and urine (allantoin and uric acid) were used to predict MPS. Samples of feeds, orts, and feces were incubated (288 h) in the rumen of cannulated cows to determine indigestible NDF, which was used to estimate fecal output. Data were analyzed using the MIXED procedure of SAS modeling the fixed effects of treatment, period, and their interactions with the random effect of animal. Ruminal fermentation data (pH, $\text{NH}_3\text{-N}$, and VFA) were analyzed as repeated measures modeling the fixed effects of treatment, period, and their interaction, sampling time and its interaction with treatment, and the random effect of animal. No treatment effects were detected for ruminal pH, $\text{NH}_3\text{-N}$, or VFA molar percentages. Total VFA concentration was similar between treatments (95.7 and 95.5 mM, for CON and CAP, respectively). Excretion of PD was similar between treatments, hence did not affect predicted MPS. Digestibility of DM was greater ($P = 0.02$) in cows fed CAP than CON (62.2 vs. 57.1%, respectively). No differences were detected in milk yield and composition. There was no evidence that feeding CAP at 1.5 g/d modulates ruminal fermentation, but CAP may increase diet digestibility.

Key Words: capsaicin oleoresin, essential oil, feed additive

2506V Effects of capsaicin supplementation on apparent digestibility and physiological parameters of lactating cows during the summer. P. C. Vittorazzi Jr., G. Gomes da Silva, N. T. S. Grigoletto, A. T. Nunes, R. G. Chesini, M. Bugoni, L. V. B. de Alcântara, F. M. dos Santos, C. V. de Almeida, and F. P. Rennó*, *University of São Paulo, Pirassununga, São Paulo, Brazil.*

Capsaicin (CAP) is a phenolic alkaloid, found in red peppers, with thermoregulatory properties. This study aimed to evaluate CAP levels (Capcin; NutriQuest, Campinas, Brazil) on DMI, total apparent digestibility, and physiological parameters (rectal temperature, heart and respiratory rates, and surface temperature). Thirty-six Holstein cows (160 ± 88 DIM and 30.9 ± 7.2 kg/d milk yield) were used in a complete randomized block design experiment. Cows were blocked ($n = 12$) by DIM and milk yield and were allowed a 2-wk period for adaptation. Data collected during this period were used for covariate purposes. After the

2-wk period, cows received one of the following treatments for 9 wks: control (CON), or 0.75 and 1.5 g/d of CAP added to the concentrate. Samples of feeds and orts were collected daily and pooled into composite samples per wk for chemical analyses. Samples of feeds, orts, and feces were incubated in the rumen of 2 cannulated cows for 288 h to determine indigestible NDF content and fecal output. Fecal samples were collected directly from the rectum of cows for 3 consecutive days on 9-h intervals on wks 3, 6, and 9. Physiological parameters were measured twice a day (1000 and 1730 h) on the 3rd and 4th day of wks 3, 6, and 9. Data were analyzed using the MIXED procedure of SAS modeling the fixed effects of time, treatment and their interaction, and the random effect of block. Cows were housed in barns with 72 ± 4.3 temperature-humidity index. Orthogonal contrasts were used to evaluate treatment differences (CON vs. CAP; or CAP at 0.75 g/d vs 1.5 g/d). Organic matter intake was greater ($P = 0.05$) in cows fed CAP than CON (23.0, 23.6, and 24.4 kg/d for CON, 0.75 g/d, and 1.5 g/d, respectively). Cows fed CAP at 1.5 g/d tended to have greater ($P = 0.06$) DMI than those fed CAP at 0.75 g/d (26.2 and 25.3 kg/d, respectively). No treatment differences were detected on nutrient digestibility. Neither rectal temperature, surface temperature (forehead, face, and rumen), nor heart and respiratory rates were influenced by treatments. Capsaicin can increase DMI without affecting diet digestibility in cows.

Key Words: additive, capsaicin oleoresin, essential oil

2507V Effects of partially replacing soybean meal with heat-treated soybean meal or corn dried distillers grains with soluble N utilization and purine derivatives excretion. R. G. Chesini, C. S. Takiya, P. C. Vittorazzi Junior, G. Gomes da Silva, N. T. S. Grigoletto, A. T. Nunes, D. J. C. Vieira, O. P. Sbaralho, M. Bugoni, A. C. de Freitas, and F. P. Rennó*, *University of São Paulo, Pirassununga, São Paulo, Brazil.*

Feeding byproducts from the corn ethanol industry while reducing N excretion is of great interest to the dairy industry in terms of sustainability. An experiment was conducted to evaluate different protein sources on N excretion and predicted rumen microbial protein supply (MPS). Twenty-four Holstein cows (200 ± 40 DIM and 30.0 ± 3.92 kg/d milk) were blocked according to parity, milk yield, and DIM and used in a 3×3 Latin square design experiment with 21-d periods, and the last 7 d were used for sampling. Treatment sequences were composed of: control (CON), diet containing 15.9% SBM as the main protein source; heat-treated soybean meal (HTSBM), HTSBM at 4.40% diet DM; and high-protein corn dried distillers' grains with soluble (DDGS), DDGS at 5.34% diet DM. Diets had similar CP. Cows were milked twice daily, and milk samples were collected during 3 consecutive days for N and allantoin analyses. Fecal and urine samples were collected for 3 consecutive days in 9-h intervals and analyzed for N. Fecal output was determined using indigestible NDF as an internal marker. Urine samples were analyzed for concentrations of N, allantoin, uric acid, and creatinine. Urine daily output was estimated based on a daily creatinine excretion of 24.05 mg/kg BW. Predicted MPS was calculated based on purine derivatives (PD) excretion (allantoin and uric acid). Data were submitted to ANOVA using the mixed procedure of SAS, modeling the fixed effects of treatment, Latin square, and their interaction, and period. Animal within square was considered as a random effect. Treatment differences were evaluated by orthogonal contrasts (CON vs HTSBM+DDGS; or HTSBM vs DDGS). Nitrogen intake was greater ($P = 0.026$) for cows fed HTSBM and DDGS than CON (703, 723, and 683 g/d, respectively). Cows fed HTSBM and DDGS tended to excrete more ($P \leq 0.082$) N in milk and feces CON. No differences were detected on urine N output and N utilization (as % of N intake). Treatments did not

affect excretion of PD and MPS. Protein sources did not affect efficiency of N utilization and MPS in mid-lactation cows.

Key Words: dried distillers grains with soluble (DDGS), protein sources, RUP

2508V Autolyzed or live yeast supplementation on performance of dairy cows. A. C. de Freitas¹, N. T. S. Grigoletto¹, P. C. Vittorazzi Junior¹, M. Bugoni¹, J. N. Ribeiro¹, C. V. de Almeida¹, N. P. Martins¹, O. P. Sbaralho¹, C. S. Cortinhas², T. S. Acedo², and F. P. Rennó*¹, ¹University of São Paulo, Pirassununga, São Paulo, Brazil, ²DSM Produtos Nutricionais Brasil S.A., São Paulo, SP, Brazil.

Yeast products may alter microbiota of the digestive tract of ruminants, hence affecting nutrient absorption and performance. This study aimed to evaluate dietary yeast (*Saccharomyces cerevisiae*) supplementation on milk yield and composition, and feed efficiency of dairy cows. Forty-two Holstein cows (171 ± 40 DIM and 32.6 ± 17.7 kg/d milk yield) were blocked (n = 14) according to parity, DIM, and milk yield and randomly assigned to the following treatments: Control (CON); Autolyzed yeast (AY), AY fed at 0.617 g/kg dietary DM (Levabon Rumen E; Biomin Holding GmbH, Inzersdorf-Getzersdorf, Austria); or Live yeast (LY), LY fed at 0.123 g/kg dietary DM (Vistacell; AB Vista, Marlborough, England). Feed additives were provided mixed into the concentrate. Cows were allowed a 2-wk covariate period, and treatments were applied for the following 9 wks. Feed offered and refusals were recorded daily. Cows were milked twice daily, and samples were collected weekly during 3 consecutive days for solids analyses using mid-infrared method. Data were submitted to ANOVA as repeated measures modeling the fixed effects of covariate, treatment, time, and their interaction; block was considered as a random effect. Orthogonal contrasts evaluated treatment differences: CON vs. treatments with yeast; and AY vs. LY. Dry matter intake tended to be greater ($P = 0.10$) in cows fed LY than AY (27.6 and 25.9 kg/d, respectively). Milk yield tended to be greater ($P = 0.08$) in cows fed yeast products than CON. Fat-corrected milk was increased ($P = 0.01$) in cows fed yeast products (33.8, 35.6, 35.8 kg/d for CON, AY, and LY, respectively). Yeast supplementation increased ($P \leq 0.03$) solids yield but decreased ($P = 0.05$) protein content in milk (3.16, 3.13, 3.14% for CON, AY, and LY, respectively). Feed efficiency (FCM ÷ DMI) was greater ($P = 0.02$) in cows supplemented yeast than CON (1.30, 1.39, and 1.35 for CON, AY, and LY, respectively). Milk SCC was not influenced by treatments. Dietary supplementation of either AY or LY increases milk fat yield and brings benefits to performance of dairy cows.

Key Words: feed additive, direct-fed microbials, *Saccharomyces cerevisiae*

2509V Effect of filter bags and washout water temperature on dry matter recovery of pure starch and dry ground corn. C. Heinzen Jr.*¹, M. S. Souza^{2,1}, R. D. Shaver¹, and L. F. Ferraretto¹, ¹University of Wisconsin, Madison, WI, ²Universidade Federal Rural da Amazônia, Belém, PA, Brazil.

Assays accurately predicting ruminal starch digestibility could provide useful information for ration formulation. But even though a 0 h starch disappearance assay has been recently used to rank forages and feedstuffs, the implications to ration formulation are unclear as different methodologies could alter the degree of particulate loss. Thus, the objective of this study was to evaluate the effect of filter bags commonly used in starch digestibility assays and washout water temperature on DM recovery of pure corn starch and finely ground corn samples following a

0 h starch disappearance assay. Triplicate samples of each starch source were placed in Dacron polyester in situ bags (DPB; R1020, 10 cm x 20 cm, 50 µm porosity; Ankom Technology), F57 bags (F57; 25 µm porosity; Ankom Technology) or filter papers (WG3; 6 µm porosity; Whatman G3) and incubated in water at either 23°C or 39°C. Approximately 5, 0.5 and 1 g of DM was used for DPB, F57 and WG3, respectively. The WG3 samples were incubated in Erlenmeyer flasks before filtration. After the washout, all samples were dried in an air-forced oven set at 60°C for 48 h and DM recovery was calculated. Two independent runs were conducted. Data were analyzed as a completely randomized design in a 2 × 3 × 2 factorial arrangement of treatments using PROC GLM-MIX of SAS with the Random effect of run and Fixed effects of starch source, filter bags, water temperature and their 2- and 3-way interactions. A starch source x filter bag interaction was detected ($P < 0.01$), with greatest DM recovery observed for pure starch placed in F57 and WG3 (92.1%, on average), intermediate for ground corn regardless of filter bag (85.3%, on average), and lowest for pure starch in DPB (74.8%). Moreover, less DM was recovered for samples incubated at 39°C than 23°C (84.9% vs. 86.6%, respectively, $P = 0.02$) regardless of filter bag or starch source. In conclusion, greater particulate loss was observed in filter bags traditionally used for ruminal in situ disappearance assays and when washing out samples with water simulating rumen temperature.

Key Words: starch, starch disappearance, corn grain

2510V Effect of sodium butyrate, phytogetic compounds or egg yolk antibodies supplementation in milk replacer on growth performance of dairy calves. P. Gorka*¹, J. Milik², W. Budzinski³, M. Przybylo¹, J. Kanski¹, T. Jankowiak⁴, and K. Budzinska², ¹University of Agriculture in Krakow, Krakow, Poland, ²University of Sciences and Technology in Bydgoszcz, Bydgoszcz, Poland, ³Polmas S.A., Bydgoszcz, Poland, ⁴Vetbovis, Zydowo, Poland.

The same study methodology and treatments were used on 2 different commercial farms to determine whether supplementation of sodium butyrate (SB), phytogetic compounds (PC), and egg yolk antibodies (EY) in milk replacer (MR) containing probiotic bacteria will affect growth performance, feed efficiency, fecal score and health of calves. One hundred calves (52 females and 48 males) in Study 1 and 90 6 calves (48 females and 48 males) in Study 2 were blocked by date of birth and sex at 10 d of age and within block allocated to one of 4 treatments: 1) MR (CTRL); 2) MR with SB (3.4 kg/ton; Adimix Easy, Nutriad); 3) MR with PC (0.5 kg/ton; Digestarom, Biomin); and 4) MR with EY (3 kg/ton; Globigen Life Start, Globigen). The MR (21.5% CP and 18%) contained *Bacillus licheniformis* and *Bacillus subtilis* (1.3×10^6 cfu/g), and *Enterococcus faecium* (1.2×10^6 cfu/g). Calves were fed daily 6 L of MR (900 g of MR powder) divided into 3 equal feedings and ad libitum starter mixture. Growth performance and health of calves was monitored for 50 d. Data were analyzed separately for each study as completely randomized block design using MIXED procedure in SAS. In Study 1, SB tended to increase fecal score (1.39 vs. 1.29; $P = 0.06$) and EY tended to decrease number of calves requiring medical treatment (8 vs. 14; $P = 0.09$), compared with CTRL. In Study 2, SB and EY tended to decrease ADG of calves (633 and 622 vs. 702 g/d) in the first 20 d of the study ($P \leq 0.10$), EY increased ADG of calves from d 21 to 50 of the study (1000 vs. 927 g/d; $P = 0.03$), PC decreased fecal score in first 20 d of the study (1.05 vs. 1.12; $P = 0.03$) and increased overall feed efficiency (756 vs. 716 g ADG/kg DM; $P = 0.05$), compared with CTRL. In summary, SB supplementation in MR containing probiotics had rather a negative impact on performance of calves, whereas EY and PC supplementation improved feed efficiency, fecal score, and health