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2502V Influence of phytogetic feed additives on performance of dairy cows. C. S. Takiya¹, V. C. Ribeiro¹, C. V. de Almeida¹, M. Bugoni¹, P. C. Vittorazzi Jr.¹, R. G. Chesini¹, N. T. S. Grigoletto¹, A. C. de Freitas¹, D. J. C. Vieira¹, A. H. de Souza², D. Langwinski², and F. P. Rennó^{*1}, ¹University of São Paulo, Pirassununga, São Paulo, Brazil, ²Cargill Animal Nutrition and Health, Campinas, São Paulo, Brazil.

Phytogetic feed additives (PFA) are natural compounds (i.e., condensed tannins, essential oils) that may alter dairy cows' ruminal fermentation and nutrient utilization. A study was conducted to evaluate the effects of a blend of PFA with or without a blend of buffer compounds and mycotoxin binder on DMI and milk composition of cows during the hot season (70.2 ± 5.32 temperature-humidity index). Thirty-six Holstein (162 ± 76 DIM and 32.6 ± 5.57 kg/d milk yield) cows were blocked ($n = 12$) according to parity, DMI, and milk yield and were randomly assigned to the following treatments: control (CON), no feed additive; phytogetic feed additive (PFA, Actifor Boost, Delacon Biotechnick GmbH, Langwiesen, Austria) at 5 g/d; and PFA + 140 g of buffer compounds (*Lithothamnium calcareum*, NaHCO₃ and MgO) + 25 g/d of Notox, a mycotoxin binder (PFAB). The PFA is a blend of pepper oleoresin and extracts of cinnamon, pepper, *Curcuma* sp., and *Quillaja* sp. Treatments were provided mixed into the minerals. 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 a day, and samples were collected weekly for 3 consecutive days for solids analysis. Data were submitted to ANOVA using a mixed procedure of SAS 9.4 modeling the fixed effects of covariate, treatment, time, their interaction, and the random effect of the block. Orthogonal contrasts evaluated treatment differences (CON vs. treatments with PFA; and PFA vs. PFAB). Dry matter intake tended to be greater ($P = 0.077$) in cows fed diets with PFA than CON. Feeding PFA and PFAB increased ($P = 0.033$) milk yield compared with CON (32.1 , 33.7 , 32.8 kg/d for CON, PFA, and PFAB, respectively). Fat-corrected milk amount, milk fat content, and fat and protein yields were more remarkable in cows fed treatments with PFA than CON. Cows fed PFAB had greater ($P = 0.013$) milk protein content than those fed PFA. No significant differences were detected in feed efficiency. Phytogetic feed additives improved the performance of cows. Providing a blend of buffer components and mycotoxin binder may increase milk protein content.

Key Words: Actifor Boost, buffer components, mycotoxin binder

2503V The effects of rumen-protected *Capsicum* oleoresin on performance of transition cows. N. T. S. Grigoletto¹, C. S. Takiya¹, M. Bugoni¹, R. G. Chesini¹, P. C. Vittorazzi Jr.¹, F. M. dos Santos¹, A. C. de Freitas¹, G. Gomes da Silva¹, J. N. Ribeiro¹, G. Acetoze², L. Soares³, and F. P. Rennó^{*1}, ¹University of São Paulo, Pirassununga, São Paulo, Brazil, ²Archer Daniels Midland, Decatur, IL, ³Pancosma LATAM South, Valinhos, São Paulo, Brazil.

Recent studies have shown that rumen-protected *capsicum* (RPC) may alter glucose metabolism in dairy cows (Oh et al., 2017; J. Dairy Sci. 100:1888–1901). An experiment was conducted to evaluate the dietary inclusion of RPC (Pancosma SA, Valinhos, Brazil) on DMI, milk yield and composition of transition dairy cows. Twenty-four Holstein cows were blocked ($n = 12$) according to their BCS, parity, and previous milk yield, and were assigned to the following treatments: Control (CON); or Treatment (RPC), fed at 100 mg/cow/d mixed with minerals. Treat-

ments were provided from 4 weeks before their expected calving date until 8 weeks into lactation. Feed offered and refusals were recorded daily for feed intake measurements. Cows were milked twice a day and milk samples were collected every week during 3 consecutive days for solids analyses using mid-infrared method. Data were analyzed using the MIXED procedure of SAS modeling the fixed effects of treatment, time, and their interaction, as well as the random effect of block. Pre- and postpartum data of nutrient intake and BCS were analyzed separately. Dry matter and NDF intake (as % BW) tended to be lower ($P \leq 0.092$) in cows fed RPC during the pre-partum period but cows had similar feed intake during the postpartum period (20.3 and 19.2 kg/d for CON and RPC, respectively). Cows fed RPC tended to have greater ($P = 0.070$) BCS during the pre-partum period in comparison to CON (3.16 and 2.91, respectively). Milk yield tended to be greater ($P = 0.097$) for cows fed RPC than CON (31.7 and 28.5 kg/d, respectively). Feeding RPC increased ($P = 0.045$) fat yield and tended to improve ($P = 0.067$) FCM (29.5 and 33.3 kg/d for CON and RPC, respectively). No differences were observed for milk solids content. Cows fed RPC had greater ($P = 0.032$) feed efficiency (DMI/FCM) compared with CON (1.83 and 1.59, respectively). No interaction effects between treatment and time were observed in this study. Feeding RPC to transition cows improves performance during early lactation.

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

2504V Effects of dietary capsaicin on performance of dairy cows. N. T. S. Grigoletto, C. S. Takiya, M. Bugoni, R. G. Chesini, P. C. Vittorazzi Jr., L. V. B. de Alcantara, A. C. de Freitas, G. Gomes da Silva, D. J. C. Vieira, and F. P. Rennó*, University of São Paulo, Pirassununga, São Paulo, Brazil.

Natural additives, such as capsaicin (CAP) – a chemical compound found in pepper with thermoregulation properties, may allow greater animal performance by increasing feed digestibility. The aim of this study was to evaluate the inclusion of CAP in diets of dairy cows on total-tract apparent digestibility and milk composition. Twenty-four Holstein cows (35.1 ± 4.95 kg/d milk yield and 175 ± 86.2 DIM) were blocked according to milk yield and DIM and were used into a crossover design experiment with 21-d periods, which the last 7 d were used for data analyses. Treatment sequences included control (CON) or capsaicin (CAP) fed at 1.5 g/d (Capcin, NutriQuest Ltda, Campinas, Brazil) mixed with minerals. Cows were fed a TMR, and feed offered and orts were recorded daily. Cows were milked twice daily, and milk samples were collected for 3 consecutive days and analyzed fresh for solids. Fecal samples were collected on d 15, 16, and 17 of each period on 9-h intervals. Samples of feeds, orts, and feces were analyzed for indigestible NDF content to estimate fecal excretion and nutrient digestibility. Data were analyzed using the MIXED procedure of SAS modeling the fixed effects of treatment, period, and their interaction besides the random effect of animal. Starch intake tended to be greater ($P = 0.075$) in cows fed CAP than CON. No treatment differences were detected on digestibility coefficients. Cows fed CAP had greater ($P \leq 0.031$) milk and solids yield than CON. Greater ($P = 0.009$) 3.5% FCM yield was observed in cows fed CAP when compared with CON (34.3 and 35.1 kg/d for CON and CAP, respectively). Feed efficiency (FCM/DMI) tended to be greater ($P = 0.056$) in cows fed CAP than CON (1.45 and

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 on 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