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The objective of this study was to characterize dairy nutritionists' familiarity, and perceived barriers to the adoption of methane-reducing feed additives in dairy farms. An electronic survey (Qualtrics) was distributed to 670 dairy nutritionists between October 2025 and January 2026. Response rate was 13.4% (n = 90), representing 3,021 dairies across the Midwest (43.4%), West (25.5%), South (15.2%), Northeast (11.7%), with 4.1% state not reported. Most nutritionists (54.4%) rated reducing enteric methane emissions as having low importance (33.3% slightly; 21.1% not important), whereas 45.6% rated it as moderately, very, or extremely important (34.4%, 8.9%, and 2.2%, respectively). Familiarity was highest for monensin (100%), followed by essential oil–based products (86.7%) and 3-nitrooxypropanol (78.9%) and lower for plant extract–based additives (43.3%), bromoform seaweed-based products (30.0%), and bromoform synthetic compounds (18.9%). A total of 42.2% of respondents indicated that none of their client dairies were using methane-reducing feed additives. Productivity or animal health benefits (95.4%), financial incentives (90.9%), ease of integration into feeding practices (86.3%), improving consumer perception of dairy products (78.4%), market requirements (73.9%), and reducing the environmental impact of dairy (52.3%) were considered moderately, very, or extremely important motivating factors for the use of methane-reducing feed additives. The barriers to adoption most frequently rated as very or extremely important were lack of clear return on investment (90.8%), concerns about impact on productivity (88.5%), and uncertainty about long-term economic viability without incentives (87.4%). The most common formulation or logistical factors anticipated when incorporating methane-reducing feed additives in the diet were ensuring even additive distribution (72.2%), feed additive supply or availability (62.2%), and uncertainty of interactions with existing feed ingredients (54.4%). Nutritionists perceive productivity and economic return as key motivators to adopt additives.

Key Words: questionnaire, CH_4

T251 Effects of heat exposure on milk production and methane production in low- and high-production Holstein cows. S. Shambhvi*[1], X. Yu[1], V. R. Basnayake[1], N. D. Seneviratne[1], T. Azmeera[1], A. Kumar[1], D. A. Ceballos[2], M. M. Ferreira[2], A. Zapata[2], S. Pokharel[1], Y. Fang[1], G. Li[1], F. L. Yepes[2], J. E. Duan[1], J. W. McFadden[1], [1]*Department of Animal Science, College of Agriculture and Life Sciences, Cornell University, Ithaca, NY,* [2]*Department of Population Medicine and Diagnostic Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY.*

We evaluated the effects of extreme heat in low- and high-production late-lactation Holstein cows. Two studies with a randomized block design were completed. Eight low-production cows (304 ± 30.94 d in milk; experiment 1 [EXP1]) and 11 high-production cows (277 ± 59.8 d in milk; experiment 2 [EXP2]) were used. Following acclimation, cows within a block were randomly assigned to thermoneutral (TN; n = 3 [EXP1]; n = 4 [EXP2]), extreme heat (HS; n = 3 [EXP1]; n = 4 [EXP2]), and thermoneutral but pair-fed to HS (PF; n = 2 [EXP1]; n = 3 [EXP2]) treatments in respiration chambers for 3 d. The TN and PF cows were kept at a temperature-humidity index (THI) of 68 (22°C), whereas HS cows experienced a diurnal THI cycle, targeting a maximum daytime THI of 86 and a nighttime THI of 74. Milk production and composition, feed intake, and gas exchange were continuously evaluated (EXP1 and 2). Total urine and feces were collected for energetic evaluation using bomb calorimetry. Data were analyzed using PROC MIXED in SAS. The HS and PF cows had lower dry matter intake, relative to TN *($P <$ 0.01; EXP1 and 2)*. The HS cows reduced milk yield, relative to TN (EXP1 and 2; $P < 0.05$). Milk yield tended to be lower for HS, relative to PF (EXP1; $P < 0.09$); but not in EXP2. Reductions in energy-corrected milk were observed for HS, relative to TN (EXP1; $P < 0.01$); but not in EXP2. Milk fat content tended to be reduced by HS, relative to TN (EXP1 only; $P = 0.09$), and milk protein content (EXP2; $P = 0.09$) and milk urea nitrogen concentrations (EXP1; $P = 0.03$) were increased by HS, relative to PF. Milk production efficiency was lower in HS, relative to PF (EXP 1 only; $P < 0.01$). Methane production was lower in HS, relative to PF (EXP1 only; $P < 0.01$). Methane intensity was greater in HS, relative to TN; but methane intensity was lower for HS, relative to PF (EXP 2 only; $P < 0.05$). Intake, digestible, fecal, and metabolizable energies were lower for HS, relative to TN ($P < 0.05$); but not different from PF (EXP2). In our independent studies in low and high-producing cows, we observed unique responses to extreme heat in milk production and methane emissions.

Key Words: energetics, enteric methane, heat stress

T252 Mitigating enteric methane emissions in lactating cows: Impacts of cooling systems under summer heat stress. S. Dikmen* and Y. Ozkaraca, *Dept. of Animal Science, Faculty of Veterinary Medicine, Bursa Uludag University, Bursa, Turkey.*

Enteric methane (CH_4) and carbon dioxide (CO_2) are major GHG in dairy production, exacerbated by heat stress. This study evaluated the effects of cooling system, parity, stage of lactation, and calving season on CH_4, CO_2, CH_4/CO_2 ratio, and CH_4 per unit of milk (CH_4/milk) in 44 lactating Holstein cows during summer, with an average temperature-humidity index (THI) of 79.8 (moderate-to-severe heat stress). Cows were housed in standard freestall pens (CONT) or pens equipped with fans and sprinklers (TRT) for heat stress mitigation. Statistical analyses were performed using PROC GLIMMIX procedure SAS 9.4 (TS1M6) to determine the effects of cooling system on methane emissions and associated parameters. The statistical model included cooling treatment, parity, stage of lactation, and season of calving as fixed effects, with cow nested within treatment as a random effect. Cooling systems reduced daily CH_4 emissions from 3,590 ± 2,214 g/d in heat-stressed cows to 2,004 ± 2,133 g/d and lowered the CH_4/CO_2 ratio by 44% (32.2% vs. 18.0%). Emission intensity (CH_4/milk) decreased from 119.8 ± 75.1 g/L in heat-stressed cows to 79.2 ± 97.9 g/L under cooling. Primiparous cows emitted more CH_4 (3,572 ± 2,586 g/d) and had higher emission intensity (122.2 ± 89.1 g/L) compared with multiparous cows. Late-lactation cows showed the highest CH_4 intensity (135.2 ± 89.2 g/L), reflecting lower productivity. Season of calving influenced emissions, with winter-calving cows showing higher CH_4 (3,323 ± 2,401 g/d) than summer-calving cows (1,816 ± 1,151 g/d). These findings demonstrate that cooling interventions under severe summer heat stress not only enhance cow comfort and productivity, but also substantially mitigate enteric CH_4 emissions, supporting both animal welfare and environmental sustainability. Integrating targeted cooling and management strategies can help reduce the carbon footprint of dairy systems under future climate change scenarios.

Key Words: enteric methane emission, cooling system, heat stress, Holstein, dairy sustainability

T253 Models to predict nitrogen excretion from dairy cattle fed a wide range of diets compiled from Latin America. S. Z. Barbosa[1],

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This study aimed to develop predictive models for nitrogen (N) excretion in dairy cattle using a database of 847 observations from 24 studies conducted in Latin America (Brazil, Chile, Argentina, and Uruguay). The dataset included fecal and urinary N excretion; DMI; NDF intake (NDFI); nitrogen intake (NI); dietary concentrations of CP, ether extract, and NFC; forage proportion (FP); milk yield (MY) and composition; MUN; and body weight. Mixed-effects linear regression models were developed with the random effect of studies as the intercept. Fecal N excretion was affected positively by DMI, NDFI, NI, MY, milk protein, and MUN, and negatively by CP, ether extract, and FP ($P < 0.05$). The model predicting fecal N excretion, including NI and CP, showed better performance than univariate models derived from DMI, NI, or NDFI, and slightly lower accuracy than the model including DMI, FP, and NDF (root mean square error [RMSE] = 24.8% vs. 19.1%; mean bias = 5.10 vs. 0.65; concordance correlation coefficient [CCC] = 0.60 vs. 0.59). Urinary N excretion was positively affected by intake variables, CP, MY, milk protein, MUN, and body weight, and negatively associated with FP ($P < 0.05$). The model predicting urinary N excretion, including NI, CP, and FP, performed similarly to the model including DMI, CP, and FP (RMSE = 32.2% vs. 33.4%; CCC = 0.50 vs. 0.46). Manure N excretion was positively affected by intake variables, CP, and MY, and negatively affected by FP ($P < 0.05$). Models predicting manure N excretion, using NI alone or NI plus FP, showed comparable performance (RMSE = 21.0% vs. 22.3%; CCC = 0.64 vs. 0.69). Overall, models predicting urinary N excretion were less accurate than those for fecal and manure N excretion, with average RMSE values of 37.5%, 25.6%, and 25.3%, respectively. The developed equations provide robust tools for predicting N excretion in dairy cattle across diverse diets and production conditions in Latin America.

Key Words: nitrogen partitioning, mixed-effects model, manure nitrogen, milk urea nitrogen

T254 Increasing productive to urinary nitrogen ratio on two NY dairy farms through dietary interventions. A. C. Benoit*, D. M. Andreen, K. Workman, and M. E. Van Amburgh, *Cornell University, Ithaca, NY.*

The objective of this study was to determine the effect of dietary interventions on nitrogen (N) intake, productivity, and model-predicted urinary N excretion on 2 New York dairy farms, with the goal of increasing the ratio of productive to urinary N as predicted by the Cornell Net Carbohydrate and Protein System (CNCPS, v7). Participating pens, balanced for DIM, pre-trial milk yield, and parity, were managed under normal farm practices and assigned to either control (CON; n = 6), with diets formulated in CNCPS v6.5.6 by the farm's nutritionist, or treatment (TRT; n = 7), the control diet modified using CNCPS v7 to reduce N excretion. Ten dietary modifications were made on each farm during the 120-d experimental period based on forage quality changes and the discretion of the farms' nutritionist. Daily pen-level DMI and cow-level milk yields were averaged by week. Milk was sampled monthly from 3 consecutive milkings from all cows and analyzed for fat, true protein, lactose, and MUN. Forages were analyzed ≥1× monthly for nutrient content and digestibility. Measured feed chemistry, diet composition, DMI, and milk yield and composition were inputted into CNCPS v7 by pen and diet, and predictions were summarized in 2-week intervals. The statistical model included the fixed effects of treatment, time (week, test day, or diet period), farm, and their interactions, and parity number, and the random effects of DIM and pen nested within treatment. Treatment, farm, and week interacted for DMI and milk yield ($P < 0.01$), where TRT tended to decrease these in farm 1 but not in farm 2. Compared with CON, TRT decreased ECM yield (46.2 vs. 45.3 kg) and feed efficiency (1.88 vs. 1.86). Nitrogen intake was decreased in TRT (675 vs. 657 g/d; $P = 0.04$), with no concurrent change in productive N (209 vs. 205 g/d; $P = 0.15$). There was a tendency for a treatment by farm interaction for predicted urinary N ($P = 0.06$), where TRT decreased urinary N only in farm 1 (farm 1, 209 vs. 194 g/d). Predicted productive to urinary N ratio was increased in TRT compared with CON (0.98 vs. 1.01; $P = 0.05$). Treatment diets reduced N intake, but resulting impacts on N excretion and productivity varied by time and farm.

Key Words: nitrogen use, excretion, dairy cow

T255 Associations between milk urea nitrogen and dietary factors in commercial dairy herds. P. A. Sampaio*[1], M. C. Tamiozzo[1], D. S. Almeida[1], D. Salas[1], K. Kennedy[2], and I. A. M. A. Teixeira[1], [1]*Department of Animal, Veterinary and Food Sciences, University of Idaho, Twin Falls, ID,* [2]*Department of Animal, Dairy and Veterinary Sciences, Utah State University, Logan, UT.*

Milk urea nitrogen is widely used as an indicator of nitrogen use efficiency in dairy systems. However, its variability under commercial conditions limits its interpretability. The objective of this observational study was to identify dietary and production-related factors associated with MUN in commercial dairy herds. Data were collected monthly over one year from 3 commercial Idaho dairies, resulting in 47 repeated pen-level observations that included milk production, milk components, MUN, and detailed dietary composition. Linear mixed-effects models were fitted with MUN (mg/dL) as the response variable, with pens nested within dairy included as random effects. Candidate predictors included milk production and diet composition. The NFC:CP ratio showed a negative association with MUN ($P = 0.09$). Soluble protein (SP) and starch were negatively associated with MUN ($P \leq 0.05$) whereas metabolizable energy, neutral detergent fiber, and milk production were not associated with MUN. A substantial proportion of variability was attributable to dairy-level random effects, highlighting between-dairy differences