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Evolution of milk freezing point depression during the year in Holstein and Normande dairy cows

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an INO mix of Zn, Mn, and Cu to supply 35, 45, and 6 ppm, respectively, of the total diet DM. Cows were assigned to treatments in a randomized complete block design, receiving an oral bolus with a mix of INO (n = 21) or AAC (n = 16) containing Zn, Mn, Cu, and Co to achieve 75, 65, 11, and 1 ppm, respectively, in total diet DM. Inorganic trace minerals were provided in sulfate form and AAC were supplied via AvailaZn, AvailaMn, AvailaCu, and CoPro (Zinpro Corp., Eden Prairie, MN). Blood glucose and NEFA were measured at -30, -14, 3, 15, and 30 DIM. Liver biopsies were harvested at -30, -15, 10, and 30 DIM. BHBA was measured via Precision Xtra every other day from 1 to 15 d postpartum. Data were analyzed using the MIXED procedure of SAS. Prepartal DMI was lower ($P = 0.06$) in AAC cows. In contrast, a tendency ($P = 0.11$) was detected for diet by time ($D \times T$) interaction that resulted in ca. 2 kg/d greater postpartal DMI in AAC. Milk and milk protein yield had a $D \times T$ ($P < 0.05$), because AAC cows produced ca. 3.3 kg/d more milk and 0.14 kg/d more protein during the first 30 DIM. Although blood glucose, NEFA, and liver triacylglycerol were not affected ($P > 0.56$) by diet, the Precision Xtra BHBA was lower ($P = 0.02$) in AAC than INO (1.44 vs 2.18 mmol/L). The positive response in milk yield and milk protein observed in AAC cows might be partly explained by the beneficial effect of AAC on postpartal DMI. Greater BHBA in cows fed INO suggests a mild-to-severe state of ketosis.

Key Words: metabolite, trace mineral, transition cow

W373 Evolution of milk freezing point depression during the year in Holstein and Normande dairy cows. Catherine Hurtaud¹, Elise Vanbergue^{1,2}, Sophie Lemosquet¹, Ségolène Colette³, Yves Gallard³, and Luc Delaby¹, ¹INRA-Agrocampus Ouest UMR1348 Pegase, Saint-Gilles, France, ²Institut de l'Élevage, F-35650 Le Rheu, France, ³INRA, Domaine du Pin-au-Haras, Exmes, France.

Milk freezing point depression (FPD) content is regarded as being relatively stable in cows' milk during lactation. Since the 30s, its measurement is a means to determine if water has been added to the milk. However, results from commercial herds have suggested that changes in milk FPD occurred during the year. The reason of those variations is unclear. However, dairy cow feeding might be an explanation. The objective of this experiment was to compare the characteristics of milk (especially milk FPD measured by MIR spectrometry) based on low input grass-based system compared with corn silage-based system, across 2 breeds of dairy cows (Holstein vs. Normande). Sixty-four dairy cows were observed from calving to drying off. Two feeding systems were compared. The Intensive system was designed to maximize individual performance, with a high energy diet (in winter, corn silage with 30% concentrate; in spring, summer and autumn periods, pasture with 4 kg/d of concentrate supplemented with corn silage from July). The Grass system was designed to decrease inputs (in winter, conserved grass with no concentrate; in spring, summer and autumn, pasture with no concentrate). The experimental design was a continuous design. Data were analyzed by using SAS mixed procedure. There was no significant effect of breed and feeding system on milk FPD. There was a significant effect of month of sampling and month of lactation. Milk FPD did not change from calving to 7th month of lactation. After that date, it largely decreased. These effects could be related to the high temperature in summer, specific feeding (grazing), or restricted access conditions for watering. There was also a significant effect of rank of lactation. FPD was higher for multiparous cows. This difference could be due to the opening of mammary tight junctions and a different repartition of ions and lactose on both sides of the epithelial barrier. Surprisingly FPD did not correlate with lactose content the most important osmotic agent in

mammary epithelial cells. Some investigations have to be done to explain the mechanisms of FPD and its physiological variations.

Key Words: milk, dairy cow, freezing point depression

W374 Influence of calcified seaweed supplementation on rumen pH, digestive efficiency, and health in lactating dairy cows fed an acidosis inducing diet. B. P. Molloy^{*1}, E. W. Neville², S. J. Taylor¹, A. W. Fahey², and F. J. Mulligan², ¹Celtic Sea Minerals Ltd., Carrigaline, Cork, Ireland, ²College of Food Science, Veterinary Medicine and Agriculture, University College Dublin, Dublin, Ireland.

Subacute ruminal acidosis (SARA) is a significant problem on intensively managed dairy farms throughout the world. High producing dairy cows are unable to acquire sufficient nutrients from forage-based diets to meet their needs during early lactation. Therefore, forage based diets are often supplemented with high-energy starch-rich ingredients to meet their caloric demand. High consumption of rapidly fermentable ingredients can cause excessive acidification of the rumen decreasing fiber digestion and milk fat %, inducing rumenitis, laminitis, reduced reproductive performance and liver abscesses. The objective of this experiment was to evaluate the potential for 3 different treatments to prevent SARA and the associated decrease in digestive efficiency. A highly fermentable diet containing 380 g of starch and 300g of total dietary NDF was fed to 4 ruminally fistulated lactating dairy cows. The diet was composed from grass silage, corn silage and concentrates and fed at a 45:55 forage to concentrate ratio. The diets were either not supplemented (control) or supplemented with calcified seaweed (CS), calcified seaweed and marine magnesium oxide (CS + MMgO) or sodium bicarbonate (SB) 4 treatments. A range of parameters investigating the effect of supplementation on rumen physiology were analyzed including pH, volatile fatty acid production, fiber digestion, rate of passage, total-tract digestibility, milk yield and milk quality. Rumen pH was measured every 10 min over 3 d during each experimental period, 25.4% of control, 3.2% of CS, 2.8% of CS + MgO and 13.2% of SB readings were <5.5. All treatments maintained rumen pH above 5.5 for significantly longer ($P < 0.0001$, respectively) than the control. The CS and CS + MMgO were significantly more effective ($P < 0.0001$, $P < 0.000$, respectively) than the SB in maintaining rumen pH above 5.5 (min). Supplementing with CS or CS + MMgO has the potential to maintain rumen pH above 5.5 for a longer period of the day.

Key Words: acidosis, calcified seaweed, rumen

W375 Evaluation of an on-farm tool to estimate physically effective neutral detergent fiber of forages and total mixed rations. Sarah E. Schuling^{*1}, Eric J. Staudinger¹, Jeff A. Rortved¹, Paul M. Windschitl¹, Greg L. Golombeski¹, and Kurt W. Cotanch², ¹Hubbard Feeds Inc., Mankato, MN, ²William H. Miner Agricultural Research Institute, Chazy, NY.

The objective of this experiment was to evaluate the use of a 3 screen Penn State Particle Separator box (19.0-, 8.0-, and 4.0-mm screens; PSPS4mm) to estimate physically effective factor (pef) and physically effective neutral detergent fiber (peNDF) of forages and total mixed rations (TMR) using the Ro-Tap method as the gold standard. Samples of corn silage (CS; n = 21), alfalfa silage (AS; n = 21), and TMR (n = 20) were collected from 20 Midwest dairy farms in summer/fall 2014. Four gallons of each sample were collected and mixed thoroughly. Samples were split and analyzed for pef using PPS4mm and Ro-Tap with standard shaking methods. Sample nutrient composition was