Animal Behavior and Well-Being I

43 Which data recorded by automated calf feeders can help to detect sick calves? C. Medrano-Galarza1,2, L. J. DeVries3, J. Rushen1, A. M. de Passillé1, A. Jones-Bitton1, M. I. Endres3, and D. B. Haley1,2. 1Department of Population Medicine, University of Guelph, Guelph, ON, Canada, 2Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada, 3Faculty of Land and Food, University of British Columbia, Vancouver, BC, Canada.

Automated calf feeders continuously record individual calf feeding behavior data that could help detect illness before clinical signs and monitor recovery. The aim of this study was to evaluate the association between calf health status and milk feeding behavior. Thirty-seven dairy calves with diarrhea or respiratory disease from 2 farms in Ontario, using high milk allowance (9 to 10 L/d), were pair-matched to healthy calves by days on the feeder. Data collected by the feeder for each calf were analyzed. Differences in daily feeding behavior between sick and healthy calves were evaluated using a repeated measures general linear mixed model. Day, health status, and the interaction between day and health status were included as fixed effects. Matched-pair identification was included as a random effect. Compared with healthy calves, sick calves drank less milk in the 5 d before treatment (d−5: −0.9L, P < 0.03; d−4: −1.1L, P < 0.01; d−3: −1.6L, P < 0.001; d−2: −1.7L, P < 0.001; d−1: −2.4L, P < 0.001). Among healthy calves, there were no differences in milk intake between days, whereas for sick calves, there was a drop (P < 0.001) in milk intake from d−5 (6.8L/d) to d0 (5.2 L/d), and an increase (P < 0.001) after treatment day until d5 (7.4L/d). Sick calves drank more slowly than healthy calves (mean speed: 0.4 vs. 0.6 L/min, P < 0.001). Among sick calves, drinking speed dropped by d−1 and d0 (0.06 L/min; P = 0.01), and increased after treatment by 0.07 L/min on d+1 (P = 0.01), and by 0.1 L/min on d+5 (P < 0.001). There was no association of day and no health status × day interaction for the frequency of visits to the feeder or visit duration. In summary, sick calves started to decrease milk intake 5 d before treatment, and drank more slowly only on the day before treatment. Therefore, milk intake could be a useful indicator to help detect sick calves and monitor recovery.

Key Words: calf, health, feeding behavior

44 Daily milk consumption, number of visits, drinking speed and weight gain of preweaned calves in Midwest US farms with automated feeders. M. Peiter*, M. Jorgensen, and M. I. Endres, University of Minnesota, St. Paul, MN.

It is becoming more common in the United States to house preweaned dairy calves in groups and feed them using computerized automated calf feeders. However, limited research has been conducted in the USA to describe behaviors of calves when using these feeders. The objective of this observational study was to characterize daily milk consumption, calf drinking speed, number of calf visits to the feeder (rewarded and unrewarded), and calf daily weight gain in 25 farms in the Upper Midwest using automated feeders to feed their preweaned calves; data were collected for a period of approximately 18 mo. We used PROC MEANS in SAS to calculate means and SD for each variable across all farms. Experimental unit for the analysis was calf-day (an average reading per calf/day recorded by the feeder software). We found that drinking speed (mL/min) was 793.6 ± 324.0 (n = 54,747) with a mean range ranging from 441.5 to 1,112.5 mL/min. The average daily milk allowance (L/calf) was 8.72 ± 2.29; calves consumed 87.0 ± 20.6% (n = 62,548) of their milk allowance resulting in an estimated daily milk intake of 7.59 L/calf. Mean estimated daily milk intake/farm ranged from 5.5 to 11.6 L/calf. The number of daily rewarded visits (visits when calf is entitled to receive milk) was 4.77 ± 3.40 (n = 53,798); mean/farm ranged from 2.45 to 6.86 visits; however, most farms averaged between 4 and 6 visits. The number of unrewarded visits (visits without milk) was 6.52 ± 7.73 (n = 53,798); mean/farm ranged from 0.96 to 9.94 visits. Daily weight gain (g/d) was 803.5 ± 262.9 (n = 60,205); mean/farm ranged from 568.7 to 1,130.6 g/d. The farm with the greatest milk allowance had the greatest daily weight gain per calf. These behavior and weight gain measurements are most likely influenced by differences in housing and management practices across farms. In addition, some of the feeding behavior measurements recorded by the autoteeder software have been shown to be associated with health outcomes in previous university farm studies. Can we detect these associations across farms in this observational study? Further analysis will explore these relationships.

Key Words: calf feeding, behavior, drinking speed

45 Assessment of the effects of oral administration of acetylsalicylic acid on biomarkers of inflammation and stress in dairy cows after parturition. A. A. Barragan1, L. M. Bauman2, J. Lakritz3, J. F. Coetzee4, J. Velez5, J. D. Rozo Gonzalez5, G. M. Schuennemann6, and S. Bas1. 1Department of Veterinary Preventive Medicine, The Ohio State University, Columbus, OH, 2Department of Animal Sciences, The Ohio State University, Columbus, OH, 3Department of Veterinary Clinical Sciences, The Ohio State University, Columbus, OH, 4Department of Anatomy and Physiology, Kansas State University, Manhattan, KS, 5Aurora Organic Farms, Boulder, CO.

Dystocia (DYS), defined as a difficult birth resulting from prolonged calving or severe assisted extraction, not only affects the calf, but also negatively impacts the health, survival and productivity of the dam. Furthermore, DYS has been subjectively described by bovine veterinarians as one of the most painful and stressful events that dairy cattle can experience, and is characterized by a severe inflammatory process. The objective of this study was to assess the effect of an oral treatment with acetylsalicylic acid after calving on biomarkers of inflammation and stress in lactating dairy cows. Animals from 3 organic dairy herds were included in the present study. Cows were blocked by parity and calving ease (eutocia [EUT]; DYS) at parturition, and were randomly assigned to 2 groups: (1) ASP (n = 76): at ~12 h after parturition cows received 4 treatments with acetylsalicylic acid (100 mg/kg; 2 boluses) at approximately 12 h intervals; or (2) PLC (n = 76): at ~12 h after parturition cows received 4 consecutive treatments with gelatin capsules (2 capsules) containing water every 12 h. Blood samples were collected immediately before treatment, at 12 h, 24 h, 36 h and 48 h, and at 7 ± 3 DIM for assessment of circulating concentration of biomarkers of inflammation (haptoglobin; HP) and stress (cortisol). The data were analyzed using ANOVA by the MIXED procedure of SAS as a randomized block design with repeated measures. Cows in the ASP group had
lower \((P < 0.05)\) concentration of HP at 24 h after parturition \((\text{ASP} = 65 \pm 10.11 \mu\text{g/mL}; \text{PLC} = 110 \pm 9.86 \mu\text{g/mL})\) and tended \((P = 0.09)\) to have lower concentration of HP at 36 h after parturition. Furthermore, cows with DYS had higher \((P < 0.05)\) concentration of HP at 24 h, 36 h, 48 h and 7 d after parturition compared with EUT cows. No difference in circulating concentration of cortisol was observed between treatment groups. The results from this study suggest that a short duration anti-inflammatory therapy after calving may decrease inflammatory response in dairy cows early in the postpartum, when the discomfort from parturition may be the highest.

**Key Words:** parturition, acetylsalicylic acid, haptoglobin

46 Holstein calf behavioral responses to acidified milk. A. Adams Progar\#, A. Deml, R. Penu, H. A. Young, and J. Callanan, Washington State University, Pullman, WA.

Feeding acidified milk to preweaned dairy calves is a popular method to reduce bacterial contamination in milk and promote ad libitum feeding, especially in group-housing systems. The objective of this study was to evaluate calf drinking behavior when offered acidified milk versus non-acidified milk. Ten one-day-old Holstein heifer calves were offered either acidified or non-acidified milk on alternating days, with milk on day 1 randomly assigned. The study concluded upon weaning (6 wk of age). Calves were offered 4 L of milk (per feeding) daily at 5:30 and 14:00. The amount of milk refusals were recorded at every feeding for each calf. Calf behavior was recorded during each feeding using video cameras and body weights were recorded every 7 d until weaning. Video footage was analyzed to document the amount of time required to finish drinking and the number of breakaways (calf stopped drinking, remained in the feeding area, and then proceeded to drink) for each calf. Data were analyzed as a randomized complete block design with repeated measures using SAS. The type of milk offered during Day 1 did not affect overall ADG \((P = 0.77)\). When offered acidified milk, calves refused 2.50 \(\pm\) 0.12 L more milk \((P < 0.0001)\) and demonstrated 0.45 \(\pm\) 0.11 more breakaways \((P < 0.0001)\) during feedings than when offered non-acidified milk. As calves aged, they refused less milk \((P < 0.0001)\) and demonstrated fewer breakaways during feedings \((P < 0.0001)\). Holstein calves in this study exhibited more aversive behaviors toward acidified milk than non-acidified, unpasteurized milk; however, the frequency of these behaviors decreased as calves aged. When feeding ad libitum acidified milk to group-housed calves, it is important to monitor individual calf behavior to ensure all calves are drinking sufficient amounts to promote good health and growth.

**Key Words:** acidified milk, calf behavior, milk refusals

47 Clinical trial of local anesthetic protocols for acute pain associated with caustic paste disbudding in dairy calves. C. Winder\#1, S. LeBlanc\#1, D. Haley\#1, K. Lissemore\#1, M. Godkin\#2, and T. Duffield\#1, \#1Dept. of Population Medicine, University of Guelph, Guelph, ON, Canada, \#2Ontario Ministry of Agriculture, Food, and Rural Affairs, Elora, ON, Canada.

Caustic paste disbudding is becoming more commonplace in North America, but few studies have evaluated pain control for this procedure. The objective of this clinical trial was to evaluate the effects of either a lidocaine cornual nerve block or a topical anesthetic incorporated into caustic paste on the acute pain of caustic paste disbudding. Seventy-two Holstein-Friesian calves housed in groups with an automated milk feeder were enrolled into 18 replicates balanced on age and assigned to one of 4 treatments: sham (S), a placebo paste and a saline cornual block; topical (T), a novel caustic paste containing lidocaine and prilocaine, and a saline cornual block; cornual block (B), commercial caustic paste and a lidocaine cornual nerve block; and positive (P), commercial caustic paste and a saline cornual block. All calves received 0.5 mg/kg meloxicam SC at the time of the block. Researchers were blinded to treatment group. Primary outcomes were validated pain behavior responses, and pain sensitivity measured by algometry. Secondary outcomes consisted of respiratory and heart rate, latency to approach the evaluator, play behavior, feeding behavior, and standing and lying bout characteristics. Data were analyzed using linear, Poisson, and negative binomial regression models. Cornual-blocked calves had less pain sensitivity to 180 min after disbudding than all other groups \((P < 0.001)\); T and P calves had more pain sensitivity than S calves for the same time period \((P < 0.001)\). Compared with T and P calves, B and S calves had fewer pain behaviors until 120 min post-disbudding \((P < 0.05)\) and decreased respiratory and heart rates \((P < 0.01)\). S calves exhibited more play behavior than other groups \((P < 0.001)\) and tended to have a shorter latency to feed than T or P calves \((P < 0.10)\). Caustic paste appears to be acutely painful for at least 180 min, and this is reduced by a cornual nerve block but not by our novel paste. We recommend that calves disbudded with caustic paste receive local anesthetic by a cornual nerve block to mitigate acute pain.

**Key Words:** cornual nerve block, pain control, behavior

48 Effects of acute lying and sleep deprivation on behavior and productivity of Holstein dairy cows. J. A. Kull*1, G. M. Piggett1, K. L. Produpoof2, J. M. Bewley3, B. F. O’Hara4, K. D. Donohue5, and P. D. Krawczel1, 1Department of Animal Science, The University of Tennessee, Knoxville, TN, 2Department of Preventive Veterinary Medicine, The Ohio State University, Columbus, OH, 3Department of Animal and Food Sciences, University of Kentucky, Lexington, KY, 4Department of Biology, University of Kentucky, Lexington, KY, 5Department of Electrical and Computer Engineering, University of Kentucky, Lexington, KY.

The objective of the study was to determine the effects of sleep or lying deprivation on the behavior and productivity of dairy cows. Data were collected from 8 multi- and 4 primi-parous cows \((\text{DIM} = 199 \pm 44 \; \text{days}; \text{days pregnant} = 77 \pm 30)\). Each cow experienced: 1) 24 h sleep deprivation from noise or physical contact and 2) 24 h lying deprivation imposed by a wooden grid placed on pen floor that prevented a recumbent position. An 11-d collection period (from 2 d before the first treatment (trt) to 8 d after trt) was followed by 12-d washout periods. Study days were organized from 2100 to 2059. During habituation (d −2 and −1 before trt), baseline (d 0), and trt (d 1), housing was individual stalls (matress with no bedding). After trt, cows returned to sand-bedded freestalls for a 7-d recovery period (d 2 to 8). Lying behaviors were recorded by accelerometers attached to the hind leg. Milk yield was recorded 2 × daily. NEFA and glucose concentrations were evaluated from serum sampled at 0300, 0900, 1500, and 2100 on d 1 and 2. Data were analyzed using a mixed model in SAS including fixed effects of trt, day, and their interaction with significant main effects separated using a PDIFF statement \((P \leq 0.05)\). Interactions between trt and day were evident for lying time and bouts \((P < 0.001)\). Lying time decreased during trt and increased on the first day of recovery for lying deprivation compared with sleep \((d 1: 1.9 \text{ vs.} 8.4 \pm 0.7 \; h/d \; \text{mean} \pm \text{SE}; P < 0.001; d 2: 16.8 \text{ vs.} 13.6 \pm 0.7 \; h/d; P = 0.002)\). Lying bouts were greater during sleep deprivation \((d 1: 7.6 \text{ vs.} 4.1 \pm 0.8 \; n/d; P = 0.01)\). Milk yield decreased during lying deprivation compared with sleep on d 2 \((31.8 \pm \text{ vs.} 35.3 \pm 2.4 \; \text{kg/d}; P = 0.002)\). NEFA and glucose were not affected by trt \((P \geq 0.70)\), but did vary by time \((P \leq 0.03)\).
The combination of sustained energy balance, behavioral changes, and decreased productivity suggest cows shifted resources toward increased maintenance during periods of deprivation. Collectively, this suggests lack of access to resting resources rather than the relative comfort of that resource once accessed may have greater long-term effects on the welfare of dairy cows.

Key Words: behavior, dairy cow, deprivation

Dairy cow preference for outdoor access in summer and winter. A. M. C. Smid*, E. E. A. Burgers¹,², D. M. Weary¹, E. A. M. Bokkers², and M. A. G. Von Keyserlingk¹, ¹University of British Columbia, Vancouver, BC, Canada, ²Wageningen University, Wageningen, Gelderland, the Netherlands.

Freestall-housed dairy cows, when given the option during the summer, have a strong preference to access pasture during the night but remain indoors for the majority of the day. Given that pasture access is not feasible for all farms or in all seasons, there is merit to investigate alternative forms of outdoor access. This study tested the preference of freestall-housed dairy cows to access an outdoor deep-bedded bark mulch pack (versus remaining inside the barn) in summer and winter. For both seasons, 72 lactating pregnant cows were assigned to 6 groups of 12 animals. Groups were formed and allowed to stabilize for 5 d, followed by 2 d of baseline recording to assess location and feeding behavior. Habituation to the outdoor pack took place for the next 2 d during which the cows were moved outside at 5 set times each day (if cows were not already outdoors). Cows were then provided free choice access to the outdoor pack continuously for 5 d (Choice phase). During the Choice phase, the location of each cow (i.e., in the free-stall pen or the outdoor pack) was noted using 5-min scan sampling. Data were analyzed using a mixed model with group treated as the experimental unit. Cows spent a mean (±SE; min - max) of 21.7% (±4.6; 9.0 – 37.0) of the time outside in summer and 11.1% (±6.1; 0.1 – 33.4) in winter. Time spent in the outdoor pack was higher during the night (i.e., between 20:00 and 07:00 h) than during the day (between 07:00 h and 20:00 h), both in the summer (day: 3.3% ± 1.5; 0.8 – 9.2 vs. night: 43.6% ± 9.1; 19.0 – 72.1) and the winter (day: 6.1% ± 3.6; 0.3 – 23.2 vs. night: 17.0% ± 9.6; 0 – 49.0). Total daily time spent feeding indoors did not differ between the Baseline and Choice phases for both the summer and winter. In summary, cows displayed a partial preference to be outside on a bark mulch pack when given the opportunity, especially at night in both summer and winter.

Key Words: animal welfare, outdoor area, free range