SYMPOSIA AND ORAL SESSIONS
Animal Health: Dairy II

810   I. Dairy calving management: Dystocia and timing for intervention. G. M. Schuenemann*, I. Nieto, S. Bas, K. N. Galvao, and J. Workman, *Department of Veterinary Preventive Medicine, The Ohio State University, Columbus.*

Dystocia is defined as an abnormal or difficult birth at any stage of labor. The objective of this study was to determine the timing for intervention in dairy cattle [primiparous (PRIM) and multiparous (MULT)] that need assistance during calving. Cows (85) from 1 commercial dairy operation were used in this study. Periparturient dairy cows (PRIM, n = 54; MULT, n = 31) were placed in calving pens and constantly monitored until birth. The calving ease (CE) of cows (1–2 scale; 1 = unassisted or 2 = assistance required), timing from amniotic sac (AS) appearance to birth, and stillbirth (born dead or within 24 h after birth) were recorded. According to farm protocol, assistance was provided to cows without calving progress 80 min after the AS appearance. Data were analyzed using PROC MIXED of SAS. Least squares means (LSM) and 95% CI were reported. For unassisted calving (CE1), the time from AS appearance to birth was not different ($P > 0.05$) for PRIM (51 min; CI: 38.9–63.2) and MULT (46.7 min; CI: 31.4–61.9) cows. For cows that received assistance (CE2), the time from AS appearance to birth was not different ($P > 0.05$) for PRIM (83.6 min; CI: 66.4–100.8) and MULT (79.4 min; CI: 53.5–105.2) cows. However, the overall time from AS appearance to birth differed ($P < 0.05$) for CE1 cows (48.9 min; CI: 39.1–58.6) compared with CE2 cows (81.5 min; CI: 65.9–97). Cows with CE2 had greater incidence of stillbirth (23.2%) compared with CE1 cows (0.8%; $P < 0.05$). Cows with assisted births (dystocia) had longer time period from the AS appearance to birth and increased incidence of stillbirth as opposed to cows with unassisted calving. This study suggested that calving personnel should start assisting cows 60 min after the AS appearance. Recognizing the signs of normal calving such as appearance of the AS and timing to birth is critical to know when to intervene. These findings have important implications for dairy personnel executing the calving tasks.

Key words: calving management, education, dystocia

811   II. Dairy calving management: Effect of perineal hygiene scores on metritis. G. M. Schuenemann*, I. Nieto, S. Bas, K. N. Galvao, and J. Workman, *Department of Veterinary Preventive Medicine, The Ohio State University, Columbus.*

The objective of the present study was to assess the impact of hygiene scores of the perineal region (HSPR; surface around the birth canal) of dairy cows [primiparous (PRIM) and multiparous (MULT)] at the time of calving on the risk of metritis. Cows housed in free-stalls from 2 commercial Ohio dairies were used in this study. Periparturient cows (n = 562) were placed in individual calving pens and monitored until birth. Wheat straw bedding was changed every 2 d. Immediately before calving, the HSPR of cows was recorded using a 1–3 scale (1 = free of dirt-manure and completely dry; 2 = slightly wet dirt-manure in 1–10% of the surface; 3 = moderately covered with wet dirt-manure in 11–30% or greater of the surface) by 1 calving personnel in each

farm. Both calving personnel received calving training at the beginning of the study. The average length of stay per cow in the calving pen was 1.9 h. Immediately after calving, cows were moved to a fresh pen. The calving ease (CE; 1–2 scale; 1 = unassisted or 2 = assistance required), stillbirth (born dead or within 24 h after birth), and retained fetal membranes (RFM) were recorded. Lactating cows were screened for metritis within 14 DIM by farm personnel. Metritis was defined as a foul-smelling red-brown watery uterine discharge. Data were analyzed using PROC GLIMMIX of SAS, accounting for the effects of CE, parity, stillbirth, herd, and RFM. Cows with a HSPR of 3 (n = 84) or 2 (n = 177) had greater incidence of metritis ($22.4 \pm 6\%$ and $18.9 \pm 4\%$, respectively) compared with cows (n = 301) with a HSPR of 1 ($10.8 \pm 3\%$; $P < 0.05$). These findings indicate that cleanliness of the perineal region at the time of calving is significantly associated with metritis.

Key words: calving hygiene, education, metritis

812   Dam heat load affects neonatal calves' bacterial levels and innate immunity. D. Pan*[1,2], C. N. Lee[3], M. H. Rostagno[2], and S. D. Eicher[2], [1]*Purdue University, W Lafayette, IN,* [2]*USDA- ARS, W Lafayette, IN,* [3]*University of Hawaii, Honolulu.*

Heat stress is known to suppress animal's immunity, making them more susceptible to bacterial infections. Field observations have shown that calves have greater morbidity and mortality when they are born after a heat event. Objectives of this study were to determine effects of heat load on bacterial levels in the calves' environment and on calves' innate immunity. The study was undertaken in March and August, 2010 on 2 commercial dairies (dairy 1 and dairy 2) located in Hawaii. Fifty-three neonatal Holstein calves were used, 27 born in spring (SP) and 26 born in summer (SU). Hide and udder swabs (100 cm^2) from the dams on dairy 1 were taken shortly after calving. Rectal and nasal swabs from calves on the same farm (n = 15 for each SP an SU) were taken 1, 2, and 3 wk after birth. Colony forming units of total aerobes and total coliforms were determined for all samples. Jugular blood samples from calves on dairy 2 (n = 12 and 11 for SP and SU, respectively) were collected wk 1, 2, 3, and 4 after birth to determine blood leukocyte RNA expression of toll-like receptor 4 (TLR4) and tumor necrosis factor-α (TNF-α). All data were transformed and analyzed using the MIXED procedure of SAS with season and time as fixed effects. Hide and udder total coliform counts did not differ between SP and SU cows. However, compared with the SP cows, SU cows had greater hide ($P = 0.0003$) and udder ($P = 0.0002$) total aerobe counts. Rectal coliform counts in SP calves were greater ($P < 0.0001$) than in SU calves throughout the 3-wk study. SP calves also had greater ($P < 0.0001$) nasal coliform counts at wk 2. No difference was found in rectal aerobe counts between SP and SU calves. SU calves had greater ($P < 0.0001$) nasal aerobe counts than SP calves at wk 1 and 3. No difference in TLR4 expression was detected between SP and SU calves. However, TNF-α expression in SU calves was less ($P < 0.01$) at wk 2 compared with SP calves. Our results showed that heat load increased the total aerobes in the calving environment and

decreased TNF-α expression of neonatal calves, thus may increase calf morbidity and mortality.

Key words: heat stress, innate immunity, microbial populations

813   Antisecretory factor counteracts calf diarrhea and increases daily weight gain. B. E. O. Johansson*[1], E. Johansson[2], and S. Lange[2,3], [1]*Lantmännen Lantbruk, Lidköping, Västra Götaland, Sweden, [2]Bacteriological Laboratory, Sahlgrenska University Hospital, Gothenburg, Västra Götaland, Sweden, [3]Institute of Biomedicine, Department of Infectious Diseases, Section of Clinical Bacteriology, University of Gothenburg, Gothenburg, Västra Götaland, Sweden.*

Antisecretory factor (AF) is a protein with potent antisecretory and anti-inflammatory actions and part of the natural, innate defense system. This study investigated whether the AF level in calf blood were correlated with diarrhea. The study was performed in 101 dairy calves raised according to standard Swedish procedures: colostrums/ whole milk for 3 d, milk replacer d 4 to 55 with ad lib access to forages and concentrates. No experimental diet was given. Live weight and incidents of diseases were documented during the study period. Blood plasma samples were taken at d 3 after birth and AF activity in the samples was tested by an in house developed enzyme-linked immunosorbent assay (ELISA). The AF activity was compared for calves who either got diarrhea before 55 d or who did not. Live weight at d 55 was compared between calves with or without diarrhea before this age. Both comparisons were made with one-way ANOVA in Minitab 15 and sample means were tested with Student′s t-test. Differences were judged significant when the p-value was lower than 0.05. Standard error means are reported directly after the group means. Live weight was recorded for 83 of the 101 calves. Plasma was analyzed from 17 of the 83 calves with live weight records, and from 18 without weight records. In total were 35 plasma samples analyzed and live weight compared on 83 calves. The mean AF activity (net absorbance at 405 nm) in calves suffering from diarrhea was significantly lower than in the healthy calves (0.520 ± 0.049 vs. 1.287 ± 0.164, $P < 0.05$). On d 55, calves who had experienced diarrhea weighed 75 ± 2.15 kg compared with the 81 ± 0.94 kg of healthy calves ($P < 0.05$). The natural level of AF activity in calves has a positive and significant correlation to diarrhea. Thus, calves with low AF activity are subjected to an increased risk of catching a diarrheal disease, which is commonly followed by a diminished growth rate.

Key words: antisecretory factor, calf diarrhea, innate defense system

814   Innate immune function of Holstein calves after commingling. L. E. Hulbert*[1,2], C. J. Cobb[1], L. R. Schwertner[1], and M. A. Ballou[1], [1]*Department of Animal and Food Sciences, Texas Tech University, Lubbock, [2]Department of Animal Sciences, University of California-Davis, Davis.*

Sixty-four Holstein dairy calves were all reared in individual polyethylene calf-hutches (Agri-Plastics) until they were randomly assigned to treatments of Grouped (3 calves/pen, n = 36 calves) or Control (remained in hutch, n = 28 calves). The individual calf hutch design ($5.98 m^2$ of free space) allowed visual, olfactory and auditory contact but no physical contact with other calves. Grouped calves were moved at 68 ± 2.3 d of age to pens of 3 calves ($5.97 m^2$/calf of free space). Whole blood was collected via venapuncture from all calves at 68, 71, 75, and 87 d of age. Cortisol and haptoglobin concentrations, total leukocyte and differential counts, neutrophil L-selectin and β_2-integrin expressions, neutrophil phagocytosis and oxidative burst, and tumor necrosis factor-α (TNF-α) secretion from lipopolysaccharide (LPS)-stimulated whole blood were measured. Grouped calves had reduced ADG, DMI, and gain:feed for the 21 d period, and weighed less than Control calves at 87 d of age ($P < 0.01$). Seven d after commingling, Grouped calves had greater cortisol concentrations than Control calves ($P < 0.01$). In addition, Grouped calves tended ($P = 0.06$) to have more total leukocytes than Control calves for the entire period. Grouped calves also had decreased oxidative burst response 3 d after commingling ($P < 0.05$); however, the phagocytic responses were increased on d 3, but were decreased 7 d after Group calves were commingled ($P < 0.01$). On d 87 of age, all calves had increased haptoglobin concentrations and TNF-α secretion ($P < 0.05$), and Grouped calves had increased neutrophil:lymphocyte ratio and neutrophil β_2-integrin expression with a concomitant decreased neutrophil L-selectin expression ($P < 0.05$) compared with Control calves at d 87 of age. Commingling calves decreased innate immune responses and performance during the 21 d observation period.

Key words: calf, grouping, immunity

815   Risk factors and impact of postpartum anovulation in dairy cows. J. Dubuc*[1], T. F. Duffield[2], K. E. Leslie[2], J. S. Walton[3], and S. J. LeBlanc[2], [1]*Faculté de médecine vétérinaire, Université de Montréal, St-Hyacinthe, Québec, Canada, [2]Department of Population Medicine, University of Guelph, Guelph, Ontario, Canada, [3]Department of Animal and Poultry Science, University of Guelph, Guelph, Ontario, Canada.*

The objective of this study was to identify risk factors for and to quantify the impact of postpartum anovulation on reproductive performance in dairy cows. Data from 2178 Holstein cows (6 herds) enrolled in a randomized clinical trial were used. Data on periparturient disease, calving history, and body condition score at calving were collected. Cytological endometritis (CYTO) was defined as ≥6% polymorphonuclear cells in endometrial cytology at wk 5 postpartum. Purulent vaginal discharge was defined as the presence of mucopurulent or purulent vaginal discharge at wk 5 postpartum. Serum BHBA, NEFA, and haptoglobin were measured at wk 1, 2, and 3 postpartum. Serum progesterone (P4) was measured at wk 3, 5, 7, and 9 postpartum. The end of postpartum anovulation period was defined as the first sampling time at which P4 was >1ng/mL. Statistical analyses were performed using logistic regression models and Cox proportional hazard models in SAS, accounting for the effects of treatments in the clinical trial and herd clustering. The prevalence of anovulation was 72, 44, 26, and 17% at wk 3, 5, 7, and 9, respectively. Risk factors for prolonged anovulation (ANOV; no P4 > 1 ng/ml through wk 9) were CYTO (OR = 1.5; $P = 0.02$), and elevated NEFA concentration (≥0.9 mmol/L; OR = 1.5; $P = 0.02$), hyperketonemia (≥1.2 mmol/L; OR = 1.4; $P = 0.03$), and hyperhaptoglobinemia (≥0.8 g/L; OR = 1.6; $P < 0.01$) at wk 1. Parity group (≥3; OR = 1.5; $P < 0.01$) and season (summer and spring; OR = 1.6; $P < 0.01$) were also associated with ANOV. Cows with ANOV had an increased median time to first breeding (ANOV = 77 d; cyclic = 72 d; HR = 0.88; $P < 0.01$) but no difference in first service conception risk (ANOV = 28.9%; cyclic = 30.1%; $P = 0.73$). The impact of ANOV on median time to pregnancy was conditional on parity group; a detrimental impact was present in cows of parity ≥3 (ANOV = 196 d; cyclic = 135 d; HR = 0.56; $P < 0.01$) but there was no impact in cows of parity ≤2 (ANOV = 137 d; cyclic = 128 d; HR = 0.91; $P = 0.54$). Overall, these findings suggest that ANOV was associated with indicators of energy balance and uterine inflammation, and with detrimental impacts on reproductive performance.

Key words: dairy cow, anovulation, risk factor

J. Anim. Sci. Vol. 89, E-Suppl. 1/J. Dairy Sci. Vol. 94, E-Suppl. 1

745

816   Inflammation and infection of the reproductive tract in dairy cows. T. Osawa*[2], R. C. Neves[1], and S. J. LeBlanc[1], *[1]University of Guelph, Guelph, ON, Canada, [2]Iwate University, Morioka, Japan.*

Purulent vaginal discharge (PVD), cytological endometritis (>6% neutrophils; CYTO_U), and cytological cervicitis (>5% neutrophils; CYTO_C) are associated with impaired reproductive performance. Weak agreement between PVD and CYTO_U led to the question of the source of PVD. The objective was to describe relationships among inflammation and bacterial infection in various parts of the reproductive tract of postpartum dairy cows. 102 cows were examined by vaginoscopy, ultrasound (US), and cytobrush cytology of the vagina (V), cervix (C), and uterine body (U) at 3 and 5 weeks postpartum. In a subset of 78 cows, aerobic and anaerobic bacterial cultures were performed from each site. At wk 3 and 5 postpartum the prevalence of PVD was 17 and 13%, of CYTO_U 32 and 18%, of CYTO_C 37 and 14%, and of bacterial contamination of V 65 and 59%, C 68 and 54%, and U 69 and 49%, respectively. There was no association of CYTO_U or CYTO_V or of prior or concurrent gross vaginitis or cervicitis with PVD at wk 5. However, 43% of cows with CYTO_C had PVD vs. 8% among cows without CYTO_C ($P = 0.003$). Infection of V, C, or U with A. pyogenes (prevalence = 8–11%) and fluid in the uterus visible by US (sensitivity = 85%; specificity = 51%) were associated with PVD at wk 5. In a logistic regression model, CYTO_C and uterine A. pyogenes infection were significantly ($P = 0.002$) associated with increased odds of PVD. CYTO_U was associated with gross and cytological cervicitis but not with bacterial infection of any segment of the tract. There was strong association ($P < 0.0001$) and good agreement (Kappa = 0.4) between CYTO_C and CYTO_U, yet 43 to 55% of cows with inflammation in one location did not have it in the other. In a logistic regression model, CYTO_C and swollen cervical folds seen by vaginoscopy were associated with cytological endometritis at wk 5. Leukocyte esterase test strips on uterine swabs provided good to high (85–93%) negative predictive value but moderate to low (66–33%) positive predictive value for cowside diagnosis of CYTO_U using test scores of 3 to 1, respectively. Cervicitis and endometritis are distinct, sometimes overlapping conditions.

Key words: reproductive health, endometritis, cervicitis

817   Physiological and behavioral characteristics related to vitality of newborn dairy calves and the efficiency of absorption of immunoglobulins. C. Murray*[1], D. Viera[2], A. Nadalin[2], V. Bielmann[1], and K. Leslie[1], *[1]Department of Population Medicine, University of Guelph, Guelph, Ontario, Canada, [2]Agriculture and Agri-Food Canada, Agassiz, British Columbia, Canada.*

Calving difficulty and stillbirth are formidable issues for the dairy industry. Recent research has identified associations between assisted calving and failure of passive transfer of immunoglobulins. The objective of this research was to examine physiological and behavioral characteristics of newborn Holstein calves with the aim of developing a newborn calf vitality scoring system that would be strongly associated with absorption of colostral immunoglobulins, general health and performance. A total of 48 calving events (n = 51calves) were continuously monitored from the first sight of fetal membranes. All calves were assessed for measures of vitality at the time of first sternal recumbency (SR), and at 2 and 24h, 7 and 14 d of age. Measurements included time to SR and standing, blood gases, oxygen saturation, lactate, glucose, rectal temperature, respiration and heart rates, suckling response, IgG absorption and growth. At 2 h, all calves were separated

from their dam and fed 180 g of IgG from a commercial colostrum replacer by esophageal tube feeder. Calves born from a hard pull (n = 10) were more acidic (mean pH ± SD: 7.20 ± 0.12 vs. 7.28 ± 0.05) and took twice as long to attain SR than those born unassisted (n = 18) (SR ± SD: 5.2 ± 3.0 vs. 10.3 ± 4.4 min). All calves achieved a normal pH (7.4 ± 0.04) within 24 h of birth. A higher proportion of calves born from a hard pull had a weak suckling response at SR and at 2 h compared with unassisted calves (86 vs. 43% and 50 vs. 6%, respectively). No correlation was found between SR, first attempt to stand, to stand for 2.5 and 5 min when compared with IgG concentration at 24 h of age. There was no trend between level of calving difficulty and average apparent efficiency of absorption of IgG. Overall, calves born from a hard pull are weaker and less responsive in the first few hours than calves born unassisted or from an easy pull. Yet, objective and easy to measure physiological or behavioral outcomes that are highly correlated to calf vitality and success of passive transfer remain unclear.

Key words: newborn, calf, vitality

818   The effect of omega-3 supplementation on the immune response of Holstein calves. E. L. Karcher*[1], T. M. Hill[2], N. Vito[1], L. M. Sordillo[1], H. G. Bateman[2], R. L. Schlotterbeck[1], and M. J. VandeHaar[1], *[1]Michigan State University, East Lansing, [2]Nurture Research Center, Provimi North America, Lewisburg, OH.*

The ability to reduce incidence of disease in calves and improve early vaccination strategies is of particular interest for dairy producers. Omega-3 fatty acids (FA) were shown to reduce inflammation in human diseases, such as diabetes and cardiovascular disease, but there is limited research in calves. Therefore, the objective of this study was to determine if supplementation with omega-3 FA from fish and flax oils improves immune function in calves. Forty-eight Holstein bull calves from a commercial dairy were randomly assigned to 1 of 3 diets beginning at 4 d old: 1) control milk replacer (MR) with all pork fat, 2) MR with 2% flax oil, and 3) MR with 2% fish oil. All diets were 27% CP, 17% fat on DM basis with all protein from whey sources. Calves were each fed 654 g DM of MR daily for the first 25 d and then 327 g/d for d 26, 27, and 28. On d 28, calves were challenged with a *Pasteurella* vaccine (Presponse HM) and the temperature response to the vaccine was recorded. Milk and feed intake and fecal scores were recorded daily and BW and skeletal measures were recorded weekly. Blood was collected on d 25. One tube of collected blood was incubated with endotoxin (LPS, 2 μg/mL) for 2 h. Quantitative RT-PCR was used to assess the effects of LPS stimulation on TNFα and IL-4 gene expression in leukocytes isolated from whole blood. During the 28 d, calves supplemented with flax oil had a greater gain to feed efficiency than calves supplemented with fish oil (0.522 ± 0.02 vs. 0.477 ± 0.02 g gain/g feed; $P < 0.03$). Both flax and fish oils tended to decrease the expression of TNFα following a 2 h in vitro stimulation with LPS compared with the control ($P < 0.08$). Flax oil, but not fish oil, decreased the expression of the IL-4 ($P < 0.05$). Calves receiving the flax oil treatment tended to have a decreased rise in rectal temperature in response to a *Pasteurella* vaccine ($P < 0.08$). In conclusion, supplementation with omega-3 FA tended to decrease the expression of the pro-inflammatory cytokine TNFα and reduce the temperature increase in response to a *Pasteurella* vaccine. Results indicate that supplementation may affect the ability of the calves to respond to a disease challenge.

Key words: calves, omega-3

819   Impact of intrauterine dextrose therapy on conception of lactating dairy cows with clinical endometritis. T. A. Brick*, S. Bas, J. B. Daniels, C. Pinto, D. M. Rings, and G. M. Schuenemann, *The Ohio State University, Columbus.*

The objective of this study was to determine if lactating dairy cows with clinical endometritis (CE) treated with an intrauterine infusion of 50% dextrose in water (DEX) have similar pregnancy per AI (PAI) compared with parental ceftiofur crystalline free acid (CEF) and untreated cows (CON). Cows (n = 760) from 2 herds were screened using vaginoscopy for CE at 26 ± 3 DIM and scored using a 0–3 scale. Cows scored as 2 or 3 were stratified by parity and randomly allocated into 1 of 3 treatment groups: 1) CON (n = 83), 2) 6.6 mg/kg CEF sq (n = 75), or 3) 200 mL DEX (n = 79). Fourteen days post-therapy (at 40 ± 3 DIM), treated cows were re-examined to assess treatment responses. All cows were presynchronized with 2 injections of PGF given 14 d apart (starting at 26 ± 3 DIM) followed by Ovsynch (OV; GnRH-7 d-PGF-56 h-GnRH 16 h-timed-AI; TAI) 12 d later. Cows displaying standing estrous any time during the protocol received AI, while the remaining cows were subjected to TAI-16 h after second GnRH of OV. Body condition scores (BCS) were recorded at calving, 26 ± 3 and 40 ± 3 DIM. Pregnancy diagnosis was performed via ultrasonography at 39 ± 3 d post-AI. DIM to first service (DIMFS) and pregnancy per AI (PAI) were evaluated. DIMFS, milk yield at first service, BCS at treatment, rectal temperature at treatment were not different among the treatment groups. Mortality within 10 d post-treatment and culling rate at 250 DIM were not different for cows with or without CE. Cows with CE had greater cervical diameters at the time of treatment compared with cows without CE. Mean vaginoscopy scores were reduced for DEX cows compared with CON and CEF cows ($P = 0.05$). PAI in DEX ($29.8 \pm 4\%$) tended to differ from cows in CON ($21.1 \pm 4\%$) and CEF groups ($19.7 \pm 4\%$; $P = 0.1$). However, PAI in DEX cows was not different from cows without CE ($39.1 \pm 2\%$). Based on these findings, the use of intrauterine DEX alone or as an adjunct of antibiotic therapy for the treatment of cows diagnosed with CE needs further investigation.

Key words: dairy cow, dextrose, endometritis

820   Effect of propylene glycol in fresh cows diagnosed with subclinical ketosis on milk yield and resolution of ketosis. J. A. A. McArt*[1], D. V. Nydam[1], P. A. Ospina[2], and G. R. Oetzel[3], *[1]Cornell University, Department of Population Medicine and Diagnostic Science, Ithaca, NY, [2]Cornell University, Department of Animal Science, Ithaca, NY, [3]School of Veterinary Medicine, University of Wisconsin, Madison.*

The purpose of this study was to determine the effect of oral propylene glycol (PG) administration on ketosis resolution and milk yield in cows diagnosed with subclinical ketosis (SCK) using the Precision Xtra meter (Abbott Laboratories, Abbott Park, IL). Cows from 4 freestall dairy herds in NY and WI were each tested 6 times for SCK from 3 to 16 d in milk. SCK was defined as a β-hydroxybutyrate (BHBA) reading of 1.2–2.9 mM; clinical ketosis was defined as ≥ 3.0 mM. Cows with SCK were randomized to treatment group (oral PG) or control group (no PG); treatment cows were drenched with 300 mL PG once daily from the day they tested 1.2–2.9 mM until the day they tested < 1.2 mM. Outcomes evaluated for all farms included time from SCK until BHBA test < 1.2 mM or until BHBA test ≥ 3.0 mM; individual milk weights for the first 30 d in milk were evaluated for 3 farms. Semiparametric proportional hazards models were used to evaluate time to event outcomes; repeated measures ANOVA was used to assess milk weights which were stratified by herd after a significant treatment by herd interaction was found. A total of 741 of 1,777 (41.7%) eligible enrolled cows had at least one BHBA test of 1.2–2.9 mM. Of these, 372 were assigned to the treatment group and 369 to the control group. Based on hazard ratios, PG treated cows were 1.50 (95% confidence interval (CI) = 1.26 to 1.79) times more likely ($P < 0.0001$) to resolve their SCK and 0.56 (95% CI = 0.35 to 0.88) times less likely ($P = 0.013$) to develop clinical ketosis than control cows. Treated cows produced more milk per milking on Farm A (0.98 kg, $P = 0.0002$) and Farm B (1.16 kg, $P < 0.0001$) in the first 30 d of lactation than control cows, for a total difference of 2.94 kg and 3.49 kg per day, respectively; there was no difference in milk (0.055 kg, $P = 0.70$) between the 2 groups on Farm D. These results show the positive effects of oral PG administration in fresh cows with SCK by both helping resolve SCK as well as prevent clinical ketosis. In addition, oral PG significantly improves milk yield during early lactation in some herds.

Key words: ketosis, propylene glycol, milk yield

821   Association between serum metabolite concentrations in the transition period and milk production in dairy cows. N. Chapinal*[1,2], M. E. Carson[1], S. L. Leblanc[1], K. E. Leslie[1], S. Godden[3], M. Capel[4], J. E. P. Santos[5], M. W. Overton[6], and T. F. Duffield[1], *[1]Department of Population Medicine, University of Guelph, Guelph, ON, Canada, [2]Animal Welfare Program, University of British Columbia, Vancouver, BC, Canada, [3]Department of Veterinary Population Medicine, University of Minnesota, St. Paul, [4]Perry Veterinary Clinic, Perry, NY, [5]Department of Animal Science, University of Florida, Gainesville, [6]Department of Population Health, University of Georgia, Athens.*

The objective was to study the association of the serum concentrations of nonesterified fatty acids (NEFA), β-hydroxybutyrate (BHBA) and calcium with milk yield across the first 4 Dairy Herd Improvement (DHI) tests. Serum from 1919 Holstein cows in 45 herds was collected weekly from 1 wk before through 2 wk after calving. The herds were located in California, southeast (Georgia, Florida, Virginia, South and North Carolina), northeast (New York and Ontario, Canada) and Midwest (Wisconsin and Minnesota) North America. Repeated measures ANOVA was conducted including parity, clinical disease, precalving body condition score, and region as covariates, and the random effect of herd. Serum concentrations were dichotomized at various cut-points to identify the thresholds of metabolites with the strongest associations with milk loss. Precalving NEFA ≥ 0.5 mEq/L (in multiparous cows only; 25% of the cows), BHBA ≥ 600 μmol/L (26% of the cows) and calcium ≤ 2.1 (5% of the cows) were associated with milk loss of 1.6 ± 0.5, 1.7 ± 0.4, and 3.3 ± 0.8 kg/d, respectively, across the first 4 DHI tests. In wk 1 after calving, NEFA ≥ 0.7 mEq/L (in multiparous cows only; 41% of the cows), BHBA $\geq 1,400$ μmol/L (12% of the cows) and calcium ≤ 2.1 (23% of the cows) were associated with milk loss of 1.9 ± 0.6, 2.5 ± 0.6, and 2.6 ± 0.5 kg/d, respectively, at the first DHI test. In wk 2 after calving, NEFA ≥ 1.0 mEq/L (12% of the cows), BHBA $\geq 1,200$ μmol/L (20% of the cows) and calcium ≤ 2.1 (8% of the cows) were associated with milk loss of 1.7 ± 0.8, 1.4 ± 0.6, and 4.8 ± 1.0 kg/d, respectively, at the first DHI test. Increased serum concentrations of NEFA and BHBA and decreased concentrations of calcium around calving are associated with milk loss in early lactation.

Key words: transition cow, nonesterified fatty acids, ketones

J. Anim. Sci. Vol. 89, E-Suppl. 1/J. Dairy Sci. Vol. 94, E-Suppl. 1

747