ANIMAL HEALTH: COW AND HEIFER HEALTH

0864 (W026) Identification of serum innate immunity reactants in transition dairy cows before clinical signs of laminitis. G. Zhang*, D. M. Hailemariam, E. Dervishi, Q. Deng, S. A. Goldansaz, S. M. Dunn, and B. N. Ametaj, *Dep. of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada.*

Laminitis (LAM) is prevalent in dairy cows and early diagnosis and timely treatment of the disease can lower animal suffering, improve recovery rate, increase longevity, and minimize cow loss. However, there are no indications of disease until it appears clinically, and presently the only approach to deal with the sick cow is intensive treatment or culling. The objective of this study was to identify potential predictive biomarkers of LAM in transition dairy cows. Blood samples were collected from the coccygeal vein once per week before morning feeding from 100 multiparous Holstein dairy cows during -8, -4, disease diagnosis, and $+4$ wks relative to parturition. Six healthy cows (CTR) and six cows that showed clinical signs of disease (i.e., LAM) were selected for intensive serum analyses. Concentrations of 3 cytokines interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor-α (TNF-α); 3 acute phase proteins (APPs) haptoglobin (Hp), serum amyloid A (SAA), and lipopolysaccharide binding protein (LBP), as well as 3 metabolites lactate, non-esterified fatty acids (NEFA), and β-hydroxybutyrate (BHBA), were measured in serum by ELISA or colorimetric methods. Health status, feed intake, rectal temperature, and milk yield was monitored for each cow during the whole experimental period. Data were processed statistically by PROC MIXED of SAS 9.2. Results showed that cows affected by LAM had greater concentrations of lactate, IL-6, SAA, and LBP in the serum vs. CTR. Most interestingly, enhanced serum concentrations of lactate, IL-6, SAA, and LBP at -8 and -4 wk before parturition were significantly different in cows with LAM as compared with the CTR ones. The disease also lowered the overall milk production and feed intake as well as milk fat and fat:protein ratio. In conclusion, LAM affected serum concentrations of the several parameters related to innate immunity and carbohydrate metabolism that might be serve to monitor health status of transition dairy cows. At this point we are not certain whether these are typical LAM biomarkers or indicators of general disease state. More research is warranted to validate these data.

Key Words: dairy cows, innate immunity, laminitis

0865 (W027) Milk yield and reproductive performance of Holstein cows seropositive for tuberculosis. D. S. Resendiz*, *Universidad Autónoma Agraría Antonio Narro, Torreon, México.*

Bovine tuberculosis is a critical, debilitating and chronic disease of dairy cattle in intensive systems. Studies done in the past have not completely characterized the impact of this disease on productivity of cows. Therefore, the objective of this study was to find out if seropositivity for tuberculosis impairs reproductive performance and milk yield in high milk-yielding Holstein cows. For this purpose 1044 healthy cows and 105 Holstein cows seropositive for tuberculosis were used. Cows tested positive for bovine tuberculosis were from various large commercial dairy operations from the same region. Cows that reacted to an intradermal injection of tuberculin were transferred from their barns to an isolated new dairy facility. Cows free from this disease were placed in the same barn as the seropositive cows, but in an isolated division and served as control animals. The GENMOD, npar1way, and LIFETEST procedures of SAS (SAS Inst., Inc., Cary, NC, USA) were used to assess the significance of treatment on reproductive variables. The reproductive performance of positive reactors was impaired; overall pregnancy per artificial insemination differed ($P < 0.05$) between seropositive and healthy cows (16.9 vs. 20.7). Seropositive animals required 4.52 ± 2.94 services per pregnancy compared with 4.34 ± 2.72 for control cows. The intervals between calving and conception were similar between seropositive (154 ± 78 d) and seronegative animals (150 ± 77 d). Control cows tended ($P = 0.08$) to produce more milk than seropositive cows over a 305-d lactation ($10,684 \pm 1720$ vs. $10,345 \pm 1736$; three milkings per day, mean $\pm$ SD). It was concluded that cows tested positive for bovine tuberculosis exert a mild but significant negative effect on both reproductive performance and milk yield.

Key Words: tuberculosis, bovine, milk

0866 (W028) Behavior of lactating dairy cows under mild and severe heat stress with free access or not to shadow. V. Fischer*[1], E. Forgiarini Vizzotto[1], A. Susenbach de Abreu[1], A. Thaler Neto[2], M. Tempel Stumpf[1], D. Werncke[1], and F. André Schmidt[2], *[1]Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil, [2]Universidade Estadual de Lages, Brazil.*

In the tropics, during several months of the year, air temperatures are well above the upper critical temperature for lactating dairy cattle. Despite this fact, many dairy farmers still do not provide shade. The objective of this trial was to study the behavior of dairy cows with or without access to shadow under mild (afternoon THI = 74.7) and severe heat stress (afternoon THI = 81.2). Twenty-eight Holstein cows in mid-lactation producing 21 ± 3 L per day were used. Cows were

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Table 0866.

Attribute	$P > F$ (interaction)			Heat stress					
				Mild			Severe		
	Heat stress severity	Access to shadow	Heat stress x access to shadow	with shadow	without shadow	$P > F$	with shadow	without shadow	$P > F$
Walking (min)	0.0140	0.0001	0.0001	19.6	31.1	0.0323	12.1	52.0	0.0001
Ruminating (min)	0.0001	0.3382	0.0001	175.4	142.3	0.0021	13.1	61.0	0.0001
Grazing (min)	0.3308	0.0001	0.0001	219.0	232.0	ns	257.9	169.2	0.0001
Idling (min)	0.0001	0.1926	0.0436	192.3	201.8	ns	271.0	230.1	0.0243
Lying (min)	0.0054	0.0001	0.0001	158.6	151.8	ns	186.7	50.0	0.0001
Body temperature (°C)	0.0072	0.0001	0.0112	39.6	40.0	0.0298	39.64	40.68	0.0001

split into four groups according to heat stress intensity (mild and severe) and access to shadow (with and without). Behavior of all cows was visually observed from 0600 h to 0900 h for 4 d, and time spent grazing, ruminating, idling, walking, lying, and number of water ingestion bouts were recorded. Body temperature and respiratory rate were recorded at 1800 h. Data was submitted to analysis of variance according to a completely randomized design considering main effects of heat stress severity ($n = 2$), access to shade ($n = 2$) and their interaction. Respiratory rate was greater under severe compared with mild heat stress (100.8×72.8, $P < 0.001$) and when no shadow was provided compared with free access to shadow (98.9×74.7, $P < 0.001$). Significant interactions were detected for time spent ruminating, grazing, walking, idling, lying, and for body temperature. Shadow was beneficial even under mild heat stress, as cows spent less time walking and spent more time ruminating, but provision of shadow did not improve time spent grazing, idling or lying. Under severe heat stress, provision of shadow helped cows in reducing walking time and allow acceptable values for time spent grazing, idling, and lying besides body temperature, but it was unable to keep ruminating time. Dairy cattle should have free access to shadow independently of severity of heat stress.

Key Words: behavior, heat stress, shadow

0867 (W029) Risk factors for hypocalcemia incidence and their effect on milk yield and reproduction in a grazing Jersey, Guernsey, and Holstein herd in Costa Rica. A. Saborío-Montero*, and J. M. Sánchez, *Centro de Investigaciones en Nutrición Animal y Escuela de Zootecnia, Universidad de Costa Rica, San José.*

The aim of this study was to determine risk factors for hypocalcemia (blood Ca concentration under 8.0 mg/dl) and its effect on milk yield and reproduction in three breeds of dairy cows under the same feeding, management and environmental conditions. The study was conducted on a dairy farm located in Cartago, Costa Rica, and comprised a total of 152 cows (62 Jersey, 41 Guernsey, and 49 Holstein). Average lactation number for the three breeds was 2.73 ± 1.59. During the close-up period cows grazed kikuyu grass (*Kikuyuocloa*

clandestina) (14.8% DM, 23.4% CP, 54% NDF, 0.35% Ca, 0.31% Mg and 3.50% K) and were supplemented with 4 kg/animal/d of a concentrate mixture low in Ca (14% CP, 31% NDF, 0.2% Ca, 0.42% Mg and 1.38% K) and 1 kg of hay (82.3% DM, 5.1% CP, 61.4% NDF, 0.4% Ca, 0.35% Mg and 1.8% K)/d. Cows were fed 1 kg of concentrate (18.6% CP, 0.90% Ca, 0.42% Mg and 1.38% K)/2.5 to 3.0 kg of milk during lactation. Blood samples of cows within 24h from calving were taken from the coccygeal vessels and analyzed for Ca, using atomic absorption spectrophotometry, to establish relationships with productive, reproductive and inherent variables. Results are shown in Table 0867. Milk yield in the previous lactation in Guernsey, BCS at calving in Jersey and calving number in Jersey and Holstein cows were risk factors ($P < 0.05$) for suffering hypocalcemia at peripartum. Likewise, Ca concentration was related ($P < 0.05$) to actual milk yield in the succeeding lactation in Guernsey, and to calving interval in Holstein. These results suggest that Ca concentration at parturition in Guernsey cows could be driven by productive variables and in Jersey and Holstein cows seems to be related to inherent factors. These variables should be studied in a wider population for a better understanding of the causes of hypocalcemia incidence in dairy cattle.

Key Words: dairy cows, hypocalcemia, risk factors

Table 0867. Variables associated with blood Ca concentration in peripartum (calving ± 1d) according to breed

Variable	Ca concentration as association variable				
	Pearson correlation		Linear regression		
	Rho	P	R^2	P	Breed
Previous milk yield **	-0.516	0.012	0.266	0.012	Guernsey
Actual milk yield*	-0.371	0.043	0.138	0.043	Guernsey
BCS at calving**	-0.312	0.024	0.097	0.024	Jersey
Calving number**	-0.335	0.008	0.112	0.008	Jersey
Calving number**	-0.323	0.024	0.085	0.024	Holstein
Calving interval*	-0.403	0.027	0.163	0.027	Holstein

* Ca dependent variable.

** Risk factor for hypocalcemia.

0868 (W030) Activation of innate immunity in transition dairy cows before clinical appearance of milk fever.
G. Zhang*, D. M. Hailemariam, E. Dervishi, Q. Deng, S. A. Goldansaz, S. M. Dunn, and B. N. Ametaj, *Dep. of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada.*

Milk fever (MF) is a metabolic disease of transition dairy cows associated with calcium imbalance at the onset of lactation. Its pathogenesis and etiology still remain unclear. The objective of this study was to identify alterations in innate immunity reactants and carbohydrate and lipid metabolites in the blood of transition dairy cows with or without MF. One hundred multiparous Holstein dairy cows were involved in the study and the experimental period lasted 16 wk from −8 wk before until +8 wk postpartum. Health status, feed intake, rectal temperature, and milk yield was monitored for each cow during the whole experimental period. Blood samples were collected from the coccygeal vain once per week before the morning feeding and stored until analyses at −80°C. Six healthy cows (CTR) and six cows that showed clinical signs of MF were selected for intensive blood analyses. Serum concentrations of lactate, non-esterified fatty acids (NEFA), β-hydroxybutyrate (BHBA), interleukin-1 (IL-1), interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α), haptoglobin (Hp), serum amyloid A (SAA), and lipopolysaccharide binding protein (LBP) were determined. Feed intake, milk production and composition also were collected. Data were processed using the PROC MIXED of SAS 9.2. Results indicated that concentrations of serum lactate, IL-6, TNF-α, SAA, Hp, and LBP were significantly greater in cows with MF than CTR. Most interestingly, serum lactate, TNF-α, SAA, LBP, and Hp in cows with MF were different from CTR cows starting at ∼ 4 to 8 wk before diagnosis of disease. Overall feed intake and milk production was lower in MF-affected cows. Interestingly overall milk fat was greater in MF cows vs. CTRs. In conclusion cows affected by MF showed alterations of innate immunity reactants and metabolites related to carbohydrate metabolism weeks before clinical appearance of MF. Since innate immunity is a general non-specific host response to sickness these metabolites might be used to indicate general health status of the transition dairy cows ahead of clinical disease event. More research is warranted to validate these data and better understand etiopathogenesis of MF in transition dairy cows.

Key Words: dairy cow, Innate immunity reactants, milk fever

0869 (W031) Transition dairy cows show blood alterations in innate immunity ahead of occurrence of retained placenta.
G. Zhang*, D. M. Hailemariam, E. Dervishi, Q. Deng, S. A. Goldansaz, S. M. Dunn, and B. N. Ametaj, *Dep. of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada.*

Retained placenta (RP) is defined as failure to expel the fetal membranes from the uterus within 24 h after calving. The incidence of RP in a dairy farm, under normal conditions, averages 7 to 10%. RP results in increased days open, calving to first heat interval, services per conception, and days from calving to first service. The etiopathology of RP is not known and it is of interest to search for contributing factors that induce the disease. The objective of this investigation was to evaluate whether there are alterations in blood variables related to innate immunity and carbohydrate and lipid metabolism in transition dairy cows with placental retention. One hundred multiparous Holstein dairy cows were involved in the study. Seventeen blood samples were collected from the coccygeal vein during the −8 to +8 wk around parturition, once per week before the morning feeding. Six healthy control cows (CTR) and six cows with RP were selected and serum samples collected at −8, −4, time of diagnosis of disease, and +4 wk relative to parturition were analyzed for lactate, non-esterified fatty acids (NEFA), β-hydroxybutiric acid (BHBA), interleukin-1 (IL-1), interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-a), haptoglobin (Hp), serum amyloid A (SAA) and lipopolysaccharide binding protein (LBP). In addition, health status, feed intake, rectal temperature, and milk yield data were monitored for each cow during the whole experimental period. Results revealed that cows with RP had greater concentrations of serum lactate, IL-1, TNF-a, SAA, and LBP in comparison with CTR. Intriguingly, elevated concentrations of all five variables were observed at −8 and −4 wks before the occurrence of RP compared to CTR cows. Cows with RP also had lower feed intake and milk production vs. control animals. However milk composition was not affected by RP. Overall results suggest that serum lactate, IL-1, TNF-a, SAA, and LBP can be used, in the future, to indicate cows that might have health issues during the transition period. More research is warranted to better understand the agent(s) that contribute(s) to RP in transition dairy cows.

Key Words: transition dairy cows, retained placenta, innate immunity

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0870 (W032) Hypocalcemia and hypomagnesemia prevalence in a grazing Jersey, Guernsey, and Holstein herd in Costa Rica. J. M. Sánchez* and A. Saborío-Montero, *Centro de Investigaciones en Nutrición Animal y Escuela de Zootecnia, Universidad de Costa Rica, San José.*

The aim of this study was to determine the prevalence of hypocalcemia and hypomagnesemia in Jersey, Guernsey, and Holstein cows at parturition under the same feeding, management and environmental conditions. The study was conducted on a dairy farm located in Cartago, Costa Rica, during a 9-mo period and comprised a total of 152 cows (62 Jersey, 41 Guernsey, and 49 Holstein). During the close-up period cows grazed intensively managed kikuyu grass (*Kikuyuocloa clandestina*) (14.8% DM, 23.4% CP, 54% NDF, 0.35% Ca, 0.31% Mg and 3.50% K) and were supplemented with 4 kg/animal/d of a concentrate mixture low in Ca (14% CP, 31% NDF, 0.2% Ca, 0.42% Mg and 1.38% K) and 1 kg of hay (82.3% DM, 5.1% CP, 61.4% NDF, 0.4% Ca, 0.35% Mg and 1.8% K)/d. Cows were fed 1 kg of concentrate (18.6% CP, 0.90% Ca, 0.42% Mg and 1.38% K)/2.5 to 3.0 kg of milk during lactation. Blood samples were taken from the coccygeal vessels at peripartum (calving ± 1d) and were analyzed for Ca and Mg. The blood thresholds to classify cows as clinically or sub clinically hypocalcemic were less than 5.5 and 5.5 to 8.0 mg/dl of Ca, respectively. A value of 1.8 mg/dl of Mg or lower was set as criterion to classify cows as hypomagnesemic. Results are shown in Table 0870. Jersey cows were more prone to develop clinical hypocalcemia during peripartum than Holstein cows in this herd (OR = 3.48, 95% CI: 0.76–15.9), and Guernsey cows were more likely to suffer hypomagnesemia than Jersey cows during the same period (OR = 8.47, 95% CI: 1.30–55.2). These results suggest that Jersey grazing cows are more susceptible to clinical hypocalcemia and Guernsey to hypomagnesemia. High prevalence of subclinical hypocalcemia found in this study in Jersey, Guernsey, and Holstein cows could comprise cow health and productivity, and more research should be done to better understand Ca metabolism during the transition period in grazing cows.

Key Words: grazing dairy cows, hypocalcemia, hypomagnesemia

Table 0870. Blood calcium and magnesium concentration and prevalence of clinical and subclinical hypocalcemia and hypomagnesemia according to breed

	Ca (mg/dl)		Mg (mg/dl)		Hypocal.(%)		Hypomag. (%)
Breed	Mean	95% CI	Mean	95% CI	Clin.	Subcl.	
Jersey	7,49	7,11–7,87	2,78[a]	2,64–2,92	13	50	2
Guernsey	8,09	7,63–8,56	2,35[b]	2,18–2,52	0	44	12
Holstein	7,85	7,42–8,28	2,37[b]	2,22–2,53	4	55	0

[a,b] Means in the same column not sharing a common superscript are different (*P* < 0.05).

0871 (W033) Milk and blood selenium concentrations in dairy cattle differ depending on the source of selenium supplementation (sodium selenite, selenium-yeast or l-selenomethionine). L. Vandaele[1], B. Ampe[1], S. Wittocx[2], L. Segers[2], M. Rovers*[2], A. van der Aa[3], G. du Laing[4], and S. De Campeneere[1], [1]*Institute for Agricultural and Fischeries Research (ILVO), Melle, Belgium,* [2]*Orffa Additives BV, Werkendam, Netherlands,* [3]*Excentials BV, Werkendam, Netherlands,* [4]*Ghent University, Belgium.*

Adequate selenium (Se) levels are beneficial for dairy cattle health and fertility. Since many regions in the world have soils with low Se content, supplementation of this trace element is very often warranted. The aim of the present study was to evaluate three different Se sources: sodium selenite (NaSe), selenium-yeast (SeYeast) and L-selenomethionine (SeMet) in their potential to achieve adequate blood and milk Se levels. A feeding trial was set-up with 26 high-producing Holstein Friesian cows. After a 2-wk pre-treatment period without Se supplementation, cows divided in four homogenous groups receiving either no supplementation (Ctrl) or 0.3 mg per kg dry matter (DM) of either NaSe, SeYeast or SeMet for the next 7 wk. Cows were given maize and prewilted grass silage ad libitum, a protein source and a balanced concentrate. Milk and blood serum samples were taken during the pre-treatment period (wk 0) and at wk 3 and 7 after the start of supplementation. Blood serum Se concentrations were analysed by atomic absorption spectrometry. Milk Se concentration was determined by inductively coupled plasma mass spectrometry. Data within each week have been analyzed using ANOVA with treatment as fixed effect. DMI was constant during the trial. Milk production was 29.9kg in Ctrl, 31.6kg in NaSe, 28.3kg in SeYeast and 27.8kg in SeMet cows. Milk composition showed small differences between treatments. The mean blood serum Se and milk Se concentrations during the pre-treatment period were not different between groups (Table 0871). The increase in milk Se concentration between wk 0 and 3 was significantly more pronounced for SeMet in comparison with SeYeast and NaSe, which indicates a better transfer from feed to milk after SeMet supplementation. After 7 wk supplementation Se levels in blood and milk were equally high for SeYeast and SeMet and lower for Ctrl and NaSe. Increase in milk Se content after supplementation is clearly affected by type of Se source.

Key Words: dairy, selenium, transfer

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Table 0871. Blood and milk Se in Ctrl, NaSe, SeYeast and SeMet at wk 0, 3, and 7

	Wk	Ctrl	NaSe	SeYeast	SeMet
Blood Se (µg/L)	0	34 ± 10	25 ± 4	35 ± 13	31 ± 10
	3	39 ± 12[a]	63 ± 14[b]	71 ± 13[b]	68 ± 11[b]
	7	23 ± 5[a]	57 ± 12[b]	71 ± 13[c]	69 ± 10[c]
Milk Se (µg/kg)	0	16 ± 2	15 ± 1	14 ± 2	16 ± 2
	3	18 ± 3[a]	26 ± 2[b]	45 ± 6[c]	61 ± 4[d]
	7	21 ± 9[a]	46 ± 15[b]	63 ± 12[c]	75 ± 14[c]

[a,b,c,d] Values with different superscript differ significantly between groups within the same week (row).

0872 (W034) Dynamic of intramammary infections in 3/4 Holstein x Zebu dairy cows from a herd of Minas Gerais State, Brazil.

C. V. Ladeira[1], F. N. Souza[1], D. R. Freitas[1], L. G. Ladeira[2], D. S. Rodrigues[2], M. O. Leite[1], L. M. Fonseca[1], C. M. Penna[1], M. A. P. Brito[3], and M. P. Cerqueira*[4], [1]*Universidade Federal de Minas Gerais, Belo Horizonte, Brazil,* [2]*EPAMIG, Belo Horizonte, Brazil,* [3]*Embrapa, Juiz de Fora, Brazil,* [4]*Universidade Federal de Minas Gerais* (*School of Veterinary Medicine), Belo Horizonte, Brazil.*

The aim of the present study was to assess the occurrence of subclinical bovine intramammary infections (IMIs) in 3/4 Hosltein x Zebu cattle in a dairy herd from Empresa de Pesquisa Agropecuaria de Minas Gerais (EPAMIG). Thus, composite milk samples ($n = 132$) from 44 cows were collected in April, July, and September (dry period) for bacteriological examination and somatic cell count (SCC). Bacterial analysis was conducted by culturing 0.01 mL of each sample on 5% ovine blood agar plates and MacConkey agar. The plates were incubated for 48 h at 35°C, which was followed by gram staining, observation of colony morphology and biochemical testing. The cow was regarded as uninfected when the milk SCC was < 200,000 cells/mL and bacteriologically negative. A new IMI was determined when a cow was bacteriologically negative and had SCC < 200,000 cells/mL, and in the next sampling the milk sample was bacteriologically positive and/or have SCC > 200,000 cells/mL, or a different pathogen was isolated. If the same pathogen was isolated in all milk samples, the cow was regarded as chronically infected for that pathogen. A cure occurred when a cow that was regarded as infected became uninfected at the end of experiment (bacteriologically negative and SCC < 200,000 cells/mL). From the 44 cows, 22 (50%) were chronically infected by *S. aureus* (77.27%, $n = 17$), *Streptococcus* sp. (9.09%, $n = 2$), coagulase negative staphylococci (CNS; 9.09%, $n = 2$) and *Corynebacterium* sp. (4.55%, $n = 1$). Six cows (13.64%) were initially regarded as healthy, and from these cows, four cows (75%) have become infected. Furthermore, three cows (6.82%) have been cured from IMI (two by *S. aureus* and one by CNS) at the end of experiment. Finally, 13 cows (29.55%) have become infected by a different pathogen from that established at the beginning of the experiment (four by *S. aureus* and CNS, two by *Klebsiella* sp., two by *Corynebacterium* sp. and one by *S. aureus* and *Corynebacterium* sp.). From those, five cows (38.46%) have been cured and then, established a new infection by a different pathogen. The percentage of spontaneous cure of *S. aureus* IMI was 18.18%. Thus, this study demonstrated the dynamic of IMIs in a herd that needs a continuous assessment of mastitis pathogens for a comprehensive control of IMIs.

Key Words: mastitis, milk, dairy cattle

0873 (W035) In vitro efficacy of teat disinfectants against *Staphylococcus aureus* strains isolated from bovine mastitis in Brazil.

R. P. Santos[1], F. N. Souza[1], C. C. Vasconcelos[2], A. Cortez[2], D. O. Lapinha[1], A. B. Jardim[1], A. F. Cunha[1], M. O. Leite[3], M. R. Souza[3], A. Q. Lana[1], M. B. Heinemann[1], and M. P. Cerqueira*[3], [1]*Universidade Federal de Minas Gerais, Belo Horizonte, Brazil,* [2]*Laboratorio Veterinario Vidavet, Botucatu, Brazil,* [3]*Universidade Federal de Minas Gerais* (*School of Veterinary Medicine), Belo Horizonte, Brazil.*

The present study sought to explore the in vitro efficacy of four antiseptics against *Staphylococcus aureus* isolated from milk of dairy cows with mastitis. The efficacy of chlorhexidine (2.0%), chlorine (2.5%), quaternary ammonium (4%), lactic acid (2.0%) and iodine (0.6%) was accessed in concentrations conventionally used as commercial antiseptics before and after teat dipping. We used 50 *S. aureus* strains isolated from milk of 50 different dairy herds located at Minas Gerais, Sao Paulo, Parana, and Rio Grande do Sul States, Brazil. The efficacy of antiseptics were evaluated by incubation of *S. aureus* with the disinfectant at four different times (15, 30, 60, and 300 min). We used 0.8 mL of each antiseptic, 0.2 of sterile milk, and 1.2 mL of a bacteria solution (MacFarland scale 1) for all treatments and testing times. The activity of the antiseptics was accessed by bacteria growth in brain-heart infusion broth and 5% sheep blood agar plates. If there was no bacteria growth in brain-heart infusion broth and blood agar plates, the antiseptic was regarded as efficient. Statistical analysis was performed using Cochran's Q test. We found higher activity of quaternary ammonium (98% at all testing times) and chlorhexidine (84% at 15 min, 90% at 30 min, 94% at 60 min, and 96% at 300 min) against *S. aureus* at all testing times ($P = 0.001$), followed by iodine (46% at 15 min, 56% at 30 min, 66% at 60 min, and 78% at 300 min) and chlorine (30% at 15 min, 40% at 30 min, 48% at 60 min, and 64% at 300 min). Lactic acid showed the worst results (4% at 15 min, 4% at 30 min, 8% at 60 min, and 14% at 300 min) at all testing times and its use should not be recommended. Due to variation in sensitivity and resistance of *S. aureus* to antiseptics, the appropriateness of a given intervention should be based on efficacy in the specific application.

Key Words: dairy cow, intramammary infection, milking, teat dip

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0874 (W036) Profile of clinical and subclinical mastitis pathogens isolated from cows housed on compost bedding. F. V. R. Portilho, S. Favero, G. G. Wanderley, H. Langoni, and J. C. F. Pantoja*, *Sao Paulo State University, Botucatu, Brazil.*

Compost bedding has been increasingly used worldwide. The organic nature of the bedding calls for investigations regarding the role and diversity of pathogens causing intramammary infections in cows housed in this system. The objective of this longitudinal study was to describe the distribution of mastitis pathogens isolated from cows housed on compost bedding. Three farms were visited monthly between May 2013 and January 2014. Farms A, B, and C had 33, 53, and 145 lactating cows and used peanut shell, sawdust, and wood shavings as bedding, respectively. Bedding was cultivated twice a day with new material added to the barn twice a month. Quarter milk samples were collected monthly from a sample of high SCC cows (> 200,000 cells/mL) in each heard and from all cases of clinical mastitis. Pathogens were grouped as environmental streptococci (*Streptococcus uberis*, *Streptococcus dysgalactiae* and *Enterococcus* spp.), CNS (coagulase-negative staphylococci), coliforms (*Escherichia coli*, *Klebsiella* spp. and *Enterobacter* spp.) and others (*Serratia* spp., *Pseudomonas* spp. and *Bacillus* spp.). The average monthly prevalence of subclinical mastitis (based on SCC) per farm was 39.6, 44.0, and 43.5% for farms A, B, and C, respectively. The distribution of culture results for subclinical mastitis (N = 469 quarters) was: negative: 39.4%; *Corynebacterium bovis*: 19.0%; CNS: 10.2%; environmental streptococci: 9.4%; *Staphylococcus aureus*: 6.2%, *Streptococcus agalactiae*: 6.0%; contaminated: 4.9%; coliforms: 3.2%; other: 1.3%, yeast: 0.2%, and *Prototheca* spp.: 0.2%. Culture results for clinical mastitis (N = 128 quarters) were: negative: 34.3%; coliforms: 16.4%; *C. bovis*: 9.4%; *Strep. agalactiae*: 9.4%; contaminated: 8.6%; CNS: 7.8%; environmental streptococci: 7.0%; other: 3.9%, and *Staph. aureus*: 3.1%. The most prevalent coliforms causing clinical and subclinical mastitis were *E. coli* (67% of 21) and *Klebsiella* spp. (74% of 15 cases), respectively. Preliminary results suggest that the distribution of pathogens was similar to those previously reported in Brazil for farms that used other bedding materials such as sand or pasture. *Prototheca* spp.was isolated from one cow on Farm C. *Nocardia* spp. infections were not found and the prevalence of other pathogens of concern such as *Serratia* spp. and *Pseudomonas* spp. was low.

Key Words: milk quality, mastitis, compost bedding

0875 (W037) Risk factors for repeated cases of clinical mastitis during the same lactation. B. dos Santos, G. G. Wanderley, H. Langoni, and J. C. F. Pantoja*, *Sao Paulo State University, Botucatu, Brazil.*

The objective of this nested case-control study was to identify factors associated with the occurrence of repeated clinical mastitis (CM) cases during the same lactation. Between July 2013 and January 2014, a 400-cow herd of Holstein cows was visited monthly for data collection. Quarter milk samples were collected from all CM cases. A repeated case was defined when a cow experienced the second case of CM (regardless of the quarter) within the same lactation. For each repeated case that occurred, three control cows matched by days in milk (DIM) were randomly selected. On the visit day, teat and udder measurements were performed on cases and controls, such as position of the udder floor in relation to the hock, udder depth, teat length and diameter, teat end hyperqueratosis score, ease of milking score, and presence of udder abnormalities (lesions or unbalance). Milk production, parity and the occurrence of further cases of CM were also recorded. The odds of a repeated clinical case were estimated as a function of the variables studied. Data from 68 repeated cases and 171 controls were available. The median time to the first case of mastitis and interval between the first and second cases were 136 DIM and 58 d, respectively. Of the 68 case-cows, 24% had the same pathogen isolated from both the first and second cases, and 57% experienced CM in the same quarter. Parity was associated with the occurrence of a repeated case only in the univariate analysis and was forced into the final model. Cows of first parity were 2.5 more likely to experience a repeated case when compared to cows of parity > 2 (P = 0.04). Ease of milking and udder position in relation to the hock remained in the final model. Cows whose udder was below the hock and cows easy to milk were 6.5 (P < 0.01) and 6.8 (P < 0.01) times more likely to experience a second case of CM when compared to those whose udder was above the hock or difficult to milk, respectively. Results of this study suggest that ease of milking is an important risk factor for repeated CM that should be carefully considered in genetic improvement programs.

Key Words: milk quality, epidemiology, clinical mastitis

0876 (W038) Incidence of retained placenta and the consequences on milk production and reproductive wC. C. Campos, and R. M. Santos*, *FAMEV–UFU, Uberlândia, Brazil.*

Retained placenta (RP) promotes delay in uterine involution and resumption of ovarian activity, besides increasing risk of uterine infections, being the major reason for low fertility of dairy cows. This study aimed to evaluate the effects of parity and calving season in RP incidence, in milk production and in calving to conception interval (CCI), as well as RP effects on these variables. Data were collected at a farm located in Rio Paranaíba city, Minas Gerais state, Brazil during 2012. The herd was composed of 700 Holstein dairy cows producing 32 kg of milk production per day. Calving of 291 cows was registered during the experiment period. To diagnose RP occurrence, cows were observed during calving, and immediately after calving, and those cows that had not eliminated

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all of placenta until 12 h after fetal expulsion was considered with RP. The effects of parity and calving season on RP incidence were analyzed by logistic regression, and the effects of parity, calving season and RP occurrence on milk production and on CCI duration were evaluated by analysis of variance, both using SAS program. The incidence of RP in this herd was 13.75% (40/291). The RP incidence was not affected by parity and calving season, however there was a tendency (P = 0.066) of lowest incidence of RP for calving that had occurred during winter. The effects of parity, calving season and RP occurrence on milk production adjusted to 305 d of lactation were not verified (P > 0.05). CCI duration was influenced (P = 0.007) by parity, cows with three or more lactations had higher interval from parturition to conception. The effects of calving season (P = 0.001) and RP occurrence (P = 0.043) were also detected on CCI duration. Calving that had occurred during summer resulted in significant increase on CCI (263.00 ± 107.70) compare to winter (121.02 ± 60.64). Cows that developed RP had an interval from parturition to conception longer than cows without RP (139.64 ± 73.83 vs. 166.30 ± 95.90). The efficacy of RP treatment implemented by the farm could justify the absence of detectable effects of RP occurrence on milk production; however it was not enough to overcome the negative effects of RP on Holstein cows fertility.

Key Words: placenta, postpartum, bovine

0877 (W039) Associations between severity and etiology of clinical mastitis and pregnancy outcomes to first-service in dairy cows. M. J. Fuenzalida[*1], P. D. Carvalho[2], M. C. Wiltbank[2], P. M. Fricke[1], and P. L. Ruegg[1], [1]*Dep. of Dairy Science, University of Wisconsin–Madison, Madison, [2]University of Wisconsin, Madison.*

The objective of this study was to describe associations between the occurrence and severity of clinical and subclinical mastitis with pregnancies per artificial insemination (P/AI) after artificial insemination (AI) at first service. A total of 3164 cows from four commercial dairy farms were enrolled in a prospective cohort study between May 2011 and December 2013. Cows were submitted for first AI, and pregnancy outcomes were determined by using pregnancy-specific protein B (> 0.3ng/mL) and transrectal ultrasonography 32 to 39 d after AI. Clinical mastitis events were categorized as mild (abnormal milk) or moderate/severe (udder affected to animal depression or fever). Subclinical mastitis was defined when SCC exceeded 150,000 cells/mL. Udder health was categorized based on mastitis events occurring within the period from 3 d before to 32 d after first AI as: 1) subclinical mastitis only (SM); 2) clinical mastitis only (CM); 3) subclinical and clinical mastitis (SCM); or 4) no mastitis events. Chi-square tests were used to determine associations between udder health categories and P/AI at first AI. Occurrence of mastitis was associated with reduced P/AI (P < 0.001). As compared to P/AI of healthy cows

(48%), cows that experienced SM (41.8%), CM (40.7%) or SCM (30.5%) had fewer P/AI. As compared to healthy cows, the odds of P/AI were 0.8 times as likely in cows that experienced SM (P = 0.005) or CM (P = 0.04) or 0.6 times as likely in cows that experienced SCM (P < 0.001). Among cows that experienced CM, P/AI did not vary based on severity (P = 0.69) or etiology (P = 0.26). As compared to P/AI of healthy cows (48%), cows with CM caused by Gram-negative bacteria (27.8%), Gram-positive bacteria (40.5%) and cases from cows that resulted in no growth (39.8%) had fewer (P = 0.006) P/AI. We conclude that both clinical and subclinical mastitis influenced P/AI and differences in P/AI were observed among etiologies and clinical presentation. *Supported by AFRI Competitive Grant no. 2010–85122–20612.*

Key Words: fertility, severity, pathogen

0878 (W040) Application of probiotics in the vaginal tract modulated bacterial composition in transition dairy cows. B. N. Ametaj[*], *Dep. of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada.*

Uterine infections are highly associated with infertility, which is the main reason for culling of dairy cows. The objective of this study was to test whether intravaginal infusion of probiotics could modify the bacterial composition of the vaginal tract of transition dairy cows. One hundred pregnant Holstein cows were randomly (based on parity, body condition score, and milk yield) assigned to three groups 2 wk before the expected day of parturition (wk 0) as following: 1) a dose of probiotics on wk -2 and -1 and a dose of carrier (sterile skim milk) on wk +1 (TRT1); 2) a dose of probiotics on wk -2, -1, and +1 (TRT2), and 3) a dose of carrier on wk -2, -1, and +1 (CTR). Probiotics were a culture mixture of 3 lactic acid bacteria (LAB) composed of *Lactobacillus sakei* FUA3089, *Pediococcus acidilactici* FUA3138, and FUA3140, which were infused at 10^8–10^9 cfu per dose. Vaginal mucus was collected once a week on wk -2, -1, 0, +1, +2, +3 and +8. Vaginal pH was monitored once a week from wk -2 to +3; vaginal microbiota were monitored by quantitative PCR. At wk +3, compared with the control group, TRT1 increased the gene copy number of *Lactobacillus* group by 3 log (P < 0.01), *L. sakei* by 1.5 log (P < 0.05), and *Enterococcus* spp. by 2.5 log (P < 0.01). Meanwhile, TRT2 increased the number of *L. sakei* by 2.5 log relative to the control group (P < 0.05). No difference was observed among treatment groups in terms of gene copy numbers of total bacteria, *Bacteroides* group, *Bacillus* spp., *Staphylococcus* spp., *Enterobacteriaceae*, *E. coli* and pediocin structural gene pedA. The canonical score plot demonstrated that the gene copy numbers of *Lactobacillus* group discriminated best for TRT1, whereas those of *L. sakei* and *Bacillus* spp. discriminated best for TRT2. The bacterial composition of CTR was not discriminated by any of the bacterial populations determined. No differences were

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observed among treatment groups regarding the vaginal pH of periparturient dairy cows. In conclusion, vaginal infusion of probiotics around calving modulated the vaginal microbiota of dairy cows as indicated by alterations in the number of *Lactobacillus* group, *L. sakei*, and *Enterococcus* spp.

Key Words: bacterial composition, dairy cow, probiotics, vaginal tract

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0879 (W041) Intravaginal administration of probiotics modulated serum metabolites and milk composition of transition dairy cows. B. N. Ametaj*, *Dep. of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada.*

Transition dairy cows experience great metabolic fluctuations due to dietary changes and calving-induced stress, which also influence milk composition. Therefore, the objective of this study was to evaluate metabolic responses of periparturient dairy cows administered intravaginally with probiotics around calving. One hundred pregnant Holstein cows were randomly (based on parity, BCS, and milk yield) assigned to three groups 2 wk before the expected day of parturition as following: 1) one dose of probiotic culture on wk -2 and -1 and one dose of carrier on wk +1 (TRT1); 2) one dose of probiotics on wk -2, -1, and +1 (TRT2), and 3) one dose of carrier on wk -2, -1, and +1 (CTR). Probiotics were a mixture of 3 lactic acid bacteria (LAB) composed of *Lactobacillus sakei* FUA3089, *Pediococcus acidilactici* FUA3138, and FUA3140, which were infused at 10^8–10^9 cfu per dose. Blood samples were collected from wk -2 to +3, and milk samples from wk +1 to +5 on a weekly basis. The concentration of serum metabolites and milk components were determined by spectrophotometry, and data were analyzed with SAS 9.2 software. Concentrations of cholesterol in the serum were 108 ± 4, 116 ± 4, and 95 ± 4 mg/dL ($P < 0.01$) in TRT1, TRT2, and CTR, respectively. Concentrations of lactate in the serum were 5.88 ± 0.50, 4.85 ± 0.39, and 3.52 ± 0.35 mmol/L ($P < 0.05$) in TRT1, TRT2, and CTR, respectively. Cows in TRT2 had lower serum NEFA than CTR (452 ± 64 vs. 631 ± 59 μmol/L, $P = 0.05$) but greater BHBA (736 ± 43 vs. 595 ± 43 μmol/L, $P < 0.05$). Treatments had no effect on concentrations of glucose or insulin in the serum. In addition, TRT2 had the highest content of milk lactose ($4.39 \pm 0.02\%$, $4.53 \pm 0.03\%$, and $4.44 \pm 0.03\%$ in TRT1, TRT2, and CTR, respectively, $P < 0.01$), whereas TRT1 had the greatest content of milk protein (2.99 ± 0.04, 2.93 ± 0.05, and $2.82 \pm 0.05\%$ in TRT1, TRT2, and CTR, respectively, $P < 0.05$). No differences were detected in the content of milk fat, total solid content, or SCC. In conclusion, data indicated that administration of probiotics in the vaginal tract of periparturient dairy cows modulated serum concentrations of selected metabolites related to carbohydrate and lipid metabolism as well as milk composition. More research is warranted to understand how intravaginally infused probiotics affect blood metabolites and milk composition.

Key Words: probiotics, serum metabolites, milk composition

0880 (W042) Association among peripartum body condition score and metabolic parameters of Jersey cows and cure of sub-clinical mastitis in the dry period and incidence of sub-clinical and clinical mastitis postpartum. D. N. Liboreiro*, and R. C. Chebel, *Dep. Veterinary Population Medicine, University of Minnesota, St. Paul.*

Objectives were to evaluate the associations among peripartum metabolic parameters and cure of sub-clinical mastitis in the dry period and incidence of clinical and sub-clinical mastitis postpartum in Jersey cows. Cows ($n = 167$) having sub-clinical mastitis within 30 d before drying-off [linear somatic cell count (LSCC) > 4] were considered to be cured if LSCC < 4 within 34 d postpartum. Animals (multiparous = 745, nulliparous = 230) having LSCC > 4 within 34 d postpartum were considered to have sub-clinical mastitis. Clinical mastitis was characterized by change in milk and/or udder swelling (multiparous = 937, nulliparous = 320). Animals received body condition (BCS) and locomotion (LS) scores at -21 and 3 d relative to calving. Blood sampled from -21 to 7 d relative to calving was analyzed for non-esterified fatty acid (NEFA) and blood sampled from 0 to 7 d relative to calving was analyzed for β-hydroxybutyrate (BHB). Binary data was analyzed by logistic regression. Likelihood of cure of sub-clinical mastitis in the dry period had a quadratic association with BCS -21 d relative to calving ($P = 0.03$) and a negative linear association with NEFA concentration from -21 to 7 d relative to calving ($P = 0.07$). Likelihood of incidence of sub-clinical mastitis within 34 d postpartum had a quadratic association with BCS -21 d relative to calving ($P < 0.01$), a negative linear association with BCS loss in the last 21 d of gestation ($P < 0.01$), and a negative linear association with NEFA concentration from -21 to 7 d relative to calving ($P = 0.08$). Likelihood of clinical mastitis in the first 7 d postpartum had a negative linear association with BCS -21 d relative to calving ($P = 0.02$). Similarly, likelihood of clinical mastitis in the first 21 d had a negative linear association with BCS -21 d relative to calving ($P = 0.08$). We conclude from this experiment that BCS -21 d relative to calving, BCS change during the prepartum period, and NEFA concentration in the peripartum period are associated with udder health during the transition period, which is likely a consequence of the association between energy status and immune function.

Key Words: mastitis, transition cow, energy status

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881 (W043) Evaluation of the ketone bodies concentration and clinical parameters in dairy cows supplemented with rumen-protected choline during the transition period. R. C. D. Souza[*1], R. C. Souza[1], R. F. Cota[1], J. M. Leão[2], I. B. Fortes[1], and L. S. D. Andrade[1], [1]PUC Minas, Betim, Brazil, [2]UFMG, Belo Horizonte, Brazil.

The use of rumen-protected choline (RPC) is a strategy to improve fat metabolism in the liver and reduce the prejudicial effects of negative energy balance in dairy cows during the peripartum. The objective of this study was to evaluate serum levels of ketone bodies and clinical parameters of dairy cows and heifers supplemented with RPC during the transition period (from 21 d pre-partum until 21 d post-partum). Thirty-two lactating F1 Holstein x Gir cows (16 multiparous and 16 primiparous) were blocked by parity and randomly assigned to one of two dietary treatments: addition of 60 g of RPC (AC) as Toplac Transition (Nutrifarma, Maripá, PR, Brazil) and no addition of RPC (NC). Diets contained 60% forage as corn silage and were isoproteic and isoenergetic according to the NRC (2001) model. Supplementation of RPC was done 21 d before expected parturition until 21 d post-partum. Blood samples, of coccygeal vein or artery, were collected 2 h after feeding on the d $-21, -14,$ and -7 pre-partum and on the d 7, 14, 21 post-partum to obtain ketone bodies concentration by the portable electronic method Optium Xceed ™. The clinical parameters were evaluated using the methodology described by Rosenberg (1983). The experimental design used was completely randomized blocks with split plots. Ketone bodies concentration means were compared using Tukey test ($P < 0.05$) and clinical parameters (retained placenta) were evaluated by Chi-square test using the PROC MIXED for SAS. No effect of the use of RPC was observed on the ketone bodies concentration ($P = 0.4262$). However, at times evaluated, the lowest ketone bodies concentration in heifers were at parturition, 0.28 and 0.32 μmol/dl, respectively for animals AC and NC ($P = 0.0001$). No effect of time was observed on the concentration of ketone bodies in multiparous. On partum day, the ketone bodies concentration of AC group was lower in heifers (0.28 μmol/dl) than multiparous (0.57 μmol/dl; $P = 0.0062$). On clinical examination it was observed in the post-partum 16.66% of the AC group with retained placenta and 66% of the NC animals with retained placenta ($P = 0.0360$). Rumen protected choline supplementation to F1 Holstein x Gir multiparous cows reduced the incidence of retained placenta showing that this supplement can improve immunity in cattle. However, no effect was observed of rumen protected choline supplementation on the ketone bodies concentration.

Key Words: rumen-protected choline, ketone bodies concentration, clinical parameters.

0882 (W044) Switching lactating Jersey cows from a high neutral detergent fiber diet to an isoenergetic high soluble carbohydrate diet induces mild inflammation. G. Taasoli[1,2], C. R. Nightingale[*1], F. Kafilzadeh[2], D. Ghadimi[3], J. A. Carroll[4], and M. A. Ballou[1], [1]Texas Tech University, Dep. of Animal and Food Sciences, Lubbock, [2]Razi University, Dep. of Animal Science, Kermanshah, Iran, [3]MRI, Institute of Physiology and Biochemistry, Karlsruhe, Germany, [4]USDA-ARS, Livestock Issues Research Unit, Lubbock, TX.

The objective was to investigate whether switching to a high soluble carbohydrate diet induced a systemic inflammatory response in peak lactating Jersey cows. Seven multiparous Jersey cows were selected from a commercial dairy farm. Cows were 71 ± 3 DIM and had an average BW of 407 ± 17.9 kg (mean ± SD). Each cow was individually housed in a 4-by-10-m soil surface pen. All cows received the high neutral detergent fiber (NDF; 33.8% DM)/low non-fiber carbohydrate (NFC; 34.3% DM) diet for 2 wk and then switched to an isonitrogenous/isocaloric reduced NDF (30.2% DM)/high NFC (40.7% DM) diet for 1 wk. The NFC content of the diet was increased by replacing corn distillers products and whole cottonseed with steam flaked barley and canola meal. Feed intake was collected from -7 to 7 d relative to the diet change. Milk yield, milk composition, and peripheral blood samples were collected immediately before switching the diets and 2, 4, and 7 d after the diet change. Blood hematology and plasma haptoglobin, zinc, interleukin-6, and tumor necrosis factor-α concentrations were analyzed. The switch in diet caused a decrease in DMI (19.6 vs. 17.0 ± 0.46 kg/d; $P < 0.0001$). Milk production decreased on d 2 (27.9 vs. 25.5 ± 1.17 kg/d for d 0 and 2 relative to the diet switch, respectively; $P = 0.042$), but had returned to baseline yields by d 7. No differences ($P > 0.473$) were observed in blood hematology, except that hemoglobin concentrations were increased after the diet switch (9.9 vs. 10.9 ± 0.35 g/dL; $P = 0.02$). Plasma haptoglobin concentrations tended to be elevated on d 7 relative to d 0 (62.4 vs. 142.3 ± 23.5 μg/mL; $P = 0.095$). In addition, plasma zinc concentrations were reduced on d 7 relative to d 0 (1.82 vs. 1.42 ± 0.138, mg/L; $P = 0.048$). There were no differences ($P > 0.324$) in the plasma concentrations of either interleukin-6 or tumor necrosis factor-α in plasma after the diet change. These data indicate that switching from a lower NFC diet to an isoenergetic high NFC diet suppressed DMI and caused mild inflammation among peak lactating Jersey cows as evident by the greater plasma concentrations of the positive acute phase protein, haptoglobin, and reduced concentrations of plasma zinc, a negative acute phase metabolite.

Key Words: inflammation, neutral detergent fiber, soluble carbohydrate

0883 (W045) Effects of oral calcium supplementation on body temperature, incidence of uterine diseases, and milk yield in dairy cows.

N. Martinez[*1], L. D. P. Sinedino[1], R. S. Bisinotto[1], R. Daetz[1], G. C. Gomes[1], L. F. Greco[1], W. W. Thatcher[1], C. A. Risco[2], and J. E. P. Santos[1], *[1]Dep. of Animal Sciences, University of Florida, Gainesville, [2]Dep. of Large Animal Clinical Sciences, University of Florida, Gainesville.*

Objectives were to determine the effects of oral Ca supplementation (CaS) on the incidence of uterine diseases in dairy cows considered at low (LRM; normal calving) or high risk (HRM; dystocia, twins, stillbirth, retained placenta and/or vulvo-vaginal laceration > 3 cm) of developing metritis. The hypotheses were that oral CaS with boluses containing $CaCl_2$ and $CaSO_4^-$ (each containing 43 g of Ca) during the first 4 DIM maintain blood ionized Ca (Ca^{2+}) concentrations ≥ 1.0 mM and reduce the incidence of uterine diseases regardless of risk of metritis. In this randomized complete block design, HRM cows ($n = 225$) were matched with LRM ($n = 225$) on the day of calving based on parity. Each pair of matched cows was randomized to one of three treatments: CaS0, no Ca supplementation; CaS2, 2 boluses at 0 and 1 DIM; CaS4, 2 boluses at 0 and 1 DIM followed by 1 bolus at 2, 3, and 4 DIM. Blood Ca^{2+} was measured in a subset of cows ($n = 60$) before the first bolus administration and 35 min after each dose for the first 4 DIM using a Vetscan Istat handheld analyzer (Abaxis). Rectal temperature and vaginal discharge were monitored in the first 10 DIM. Metritis was defined as fetid, watery vaginal discharge, and puerperal metritis (PuMet) was defined as metritis with rectal temperature $\geq 39.5°C$. Endometritis was considered as mucopurulent vaginal discharge. Milk yield was evaluated weekly during the first 30 DIM. Cows with at least one corpus luteum in two ultrasounds performed 2 wk apart beginning on 38 DIM were considered cyclic. Data were analyzed using PROC GLIMMIX and PROC GENMOD of SAS. Oral supplementation with Ca during early postpartum increased blood Ca^{2+} concentrations; however, the two regimens of Ca supplementation failed to reduce the incidence of metritis in either HRM or LRM groups.

Key Words: dairy cows, Ca supplementation, metritis

0884 (W046) Blood calcium dynamics after prophylactic treatment of subclinical hypocalcemia with oral or intravenous calcium.

C. D. Blanc[*1], M. Van der List[2], S. S. Aly[3], H. A. Rossow[3], and N. Silva-del-Rio[3], *[1]Pacific Rim Dairy, Corcoran, CA, [2]Boehringer Ingelheim, St Joseph, CA, [3]VMTRC, University of California, Tulare.*

Total serum Ca dynamics and urine pH levels were evaluated after prophylactic treatment of subclinical hypocalcemia after parturition in 33 multiparous Jersey/Holstein crossbreed cows. Cows were blocked according to their calcemic status at the time of treatment (Vetscan 200–1000R, Abaxis) [normocalcemic (8.0- 9.9 mg/dl; $n = 15$), or hypocalcemic (5.0–7.9 mg/dL; $n = 18$)] and randomly assigned to one of three treatments: Control [no Ca supplementation ($n = 11$)]; intravenous Ca [Ca-IV ($n = 11$), 500 mL of 23% Ca Gluconate (10.7 g Ca, Durvet, Blue Springs, MO)]; and oral Ca [Ca-Oral ($n = 11$), one oral bolus (Bovikalc bolus, Boehringer Ingelheim, St. Joseph, MO) containing $CaCl_2$ and $CaSO_4$ [43 g Ca] two times 12 h apart]. Total serum Ca levels were evaluated at 0, 1, 2, 4, 8, 12, 16, 20, 24, 36, and 48 h after treatment application (Enzymatic Rate/Automated Chemistry Analyzer method, Marshfield lab, WI) and urine pH at 0, 1, 12, 24, 36, and 48 h (on-farm with Oakton pH Testr 20). Overall, total serum Ca levels did not differ with treatment. But Ca-IV cows experienced a sharp increase in serum Ca levels after treatment (Peak = 11.4 mg/dL at 1 h), followed by a steep decline (nadir = 6.4 mg/dL at 24 h). Total serum Ca levels were higher for Ca-IV than control and Ca-Oral at 1, 2, and 4 h after treatment, but lower than Ca-Oral at 20, 24, and 36 h and control at 36 and 48 h. Treatment, time and treatment by time interaction were significant for urine pH. Mean urine pH was lower for Ca-Oral cows (6.69) than for control (7.52) and Ca-IV (7.19) cows. Urine pH levels at 1 h after treatment

Table 0883.

| | Treatment | | | | | | | |
| | CaS0 | | CaS2 | | CaS4 | | | |
	HRM	LRM	HRM	LRM	HRM	LRM	*SE*	*P*
Ca^{2+}, mM	1.08[a]	1.09[a]	1.15[b]	1.17[b]	1.21[c]	1.20[c]	0.02	< 0.01
Temperature, °C	38.87	38.76	38.91	38.77	38.90	38.74	0.03	0.60
Milk, Kg/d	29.4	32.9	29.4	30.7	27.7	32.1	1.1	0.35
Uterine Diseases	%(n/n)							
Metritis	56.0(42/75)[a]	10.7(8/75)[a]	64.0(48/75)[b]	21.3(16/75)[b]	55.4(41/74)[a]	21.3(16/75)[a]		< 0.01
PuMet	14.7(11/75)	1.33(1/75)	18.7(14/75)	5.33(4/75)	18.9(14/74)	6.7(5/75)		0.30
Endometritis	39.1(27/69)	23.2(17/73)	33.3(24/72)	21.6(16/74)	32.4(23/71)	19.2(14/73)		0.59
Cyclicity 52 d	71.0(49/69)	73.3(55/75)	75.3(55/73)	81.3(61/75)	69.4(50/72)	78.1(57/73)		0.42

[a,b,c] different superscripts indicate differences among treatments ($P < 0.05$).

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were lower for Ca-IV compared to both Control and Ca-Oral. At 12, 24, and 36 h, urine pH levels were lower for Ca-Oral compared to both Control and Ca-IV. This was expected as the oral Ca supplementation used (Bovikalc) is designed as an acidifying agent. Wide fluctuations in blood Ca are observed after prophylactic intravenous Ca supplementation in normo- and subclinical hypocalcemic cows. The implications of these transient changes in serum Ca have still to be determined.

Key Words: hypocalcemia, hypercalcemia, dairy cattle

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