sample following a negative culture sample. Data on lying behaviour patterns were collected using data loggers for every cow for 7 d prior to each milk sampling. For these 7 d, individual milking and feeding times of the cows was also recorded. Delivery of fresh feed and/or concentrate ± 45 minutes from the onset of milking resulted in cows having a longer latency to lie down following both the AM (80.1 ± 5.0 vs. 71.5 ± 5.3 min; P=0.048) and PM milkings (98.4 ± 5.5 vs. 73.5 ± 5.4 min; P<0.001). Interestingly, the odds of a new IMI caused by any one of the environmental bacteria increased by 1.09 for every 10-min increase in latency to lie down following milking (P_{Wald}=0.01; 95% confidence interval = 1.02, 1.17). Given that this logistic model only accounted for 2% of the variation in risk of a new IMI (R^2=0.02, $P_{Likelihood\ Ratio}$=0.01) and that the increase in odds was very small, it appears that the amount of time cows spend standing following milking, in the range of that observed, has little effect on the incidence of new IMI caused by environmental pathogens.

Key Words: dairy cow, lying behavior, intramammary infection

W12 Using gait score and resting behavior to detect hoof lesions in cows. N. Chapinal[2], A. M. de Passillé[1], D. W. Weary[2], M. A. G. von Keyserlingk[2], and J. Rushen*[1], [1]*Agriculture and Agri-Food Canada*, *Agassiz, BC, Canada*, [2]*University of British Columbia*, *Vancouver, BC, Canada*.

Improved gait scoring to detect lameness requires knowing which changes in gait best indicate hoof lesions. We examined whether changes in gait or resting time predict the development of hoof lesions. Forty-seven Holstein cows housed in a free-stall barn were gait scored every 4 wks from 4 wks before to 24 wks after calving. We assessed overall gait (scored 1 to 5) and 7 gait attributes (abduction/adduction of the back legs, back arch, head bob, tracking-up, joint flexion, asymmetric gait, and reluctance to bear weight) (scored 0 to 100). Activity loggers attached to the cows' legs measured resting time over 24h. Cows' hooves were inspected every 4wks and the occurrence of sole ulcers or sole hemorrhages was noted. Six cows developed sole ulcers after calving and showed no hoof lesions or signs of lameness before calving. These were matched with 6 cows that developed only sole hemorrhages and 6 cows that did not develop any sole lesions and that were of the same parity and DIM. Before calving, there were no differences (PROC GLM P>0.10) between these three groups of cows in any measure of gait. After calving, cows that developed sole ulcers scored higher than cows that did not develop sole ulcers for overall gait score (cows with no lesions vs cows with ulcers; mean ± SE; 2.3 ± 0.1 vs 3.1 ± 0.1), back arch (24.9 ± 2.8 vs 45.0 ± 2.8), joint flexion (41.2 ± 2.9 vs 55.4 ± 2.9), asymmetric gait (40.3 ± 2.8 vs 62.2 ± 2.8) (PROC MIXED P<0.05) and reluctance to bear weight (1.3 ± 0.8 vs 11.7 ± 4.2, P<0.05; Wilcoxon). There were no differences between cows that did not develop any lesion and those that only developed hemorrhages. Overall gait score, back arch and asymmetric stepping were higher (P<0.05) among cows that developed an ulcer 4 wks before the ulcer was diagnosed. An interaction between hoof health and time was found for lying time (P = 0.02). Daily lying time decreased more quickly before calving and increased more quickly after calving in cows that developed an ulcer. Regular gait scoring can detect cows lame from a sole ulcer before the ulcer is apparent on the hoof. An arched back and asymmetric stepping are the gait attributes that best indicate sole ulcers.

Key Words: lameness, gait, welfare

W13 Effect of metritis on health, fertility and milk production in two subsequent lactations in dairy cows. J. R. Lima*[1], J. E. P. Santos[2], and R. G. S. Bruno[1], [1]*University of California - Davis*, *Tulare*, [2]*University of Florida*, *Gainesville*.

Lactating Holstein cows (n=953) in their first lactation were monitored daily during 28 d after calving for postpartum diseases. Animals with watery, fetid, reddish/brownish uterine discharge with or without fever were defined with metritis and received intrauterine infusion (IU infusion) with 6 g of oxytetracycline. IU infusions were performed every other day until signs of metritis recede. Cows were monitored in two subsequent lactations. Cows were presynchronized with two injections of PGF at 37 and 51 d in milk (DIM), and those cows not observed in estrus after the second PGF were enrolled in a timed AI program starting at 62 DIM. Milk yield was recorded once a month during the first two lactations. Data were analyzed by ANOVA and logistic regression using SAS. A total of 379 cows (49.6%) and 166 cows (21.7%) were identified with metritis in the first and second lactations, respectively. Out of 166 cows with metritis in the second lactation, 99 cows (59.6%) were also diagnosed with metritis in the first lactation. Dystocia was the main risk factor for metritis in both lactations (odds ratio, OR=4.8; 95% confidence interval, CI=3.15-7.45; and OR=6.0, CI=3.38-10.62 for 1st and 2nd lactations, respectively). Metritis affected (P>0.01) the proportion of pregnant cows at first AI at the 1st lactation (35.3 vs 44.0%) but not (P=0.67) in the 2nd lactation (34.0 vs 38.4%). In the 1st lactation, cows without metritis had increased (P=0.008) pregnancy at first AI than cows receiving 1 or 2 IU infusions, but it was not different (P=0.61) than cows receiving more than 2 IU infusions (44.0, 30.3 and 42.6% respectively). Incidence of metritis affected (P>0.01) milk production on the first month postpartum in both lactations (25.6±0.30 vs. 27.6±0.31 Kg/d in the 1st lactation, and 33.3±0.62 vs. 37.9±0.36 Kg/d in the 2nd lactation for metritis and no metritis cows, respectively). An increased proportion (P=0.007) of cows with metritis was eliminated from the herd before the 2nd lactation compared with cows without metritis (20.1 vs 13.5%). Metritis negatively impacted performance in the first and subsequent lactation.

Key Words: dairy cow, intrauterine therapy, metritis

W14 Effects of feeding menhaden fish meal or Ca salts of fish oil fatty acids on some cytokine genes expression and endometrial cytology in early lactating cows. A. Heravi Moussavi*[1], H. B. Roman[2], T. R. Overton[2], D. E. Bauman[2], W. R. Butler[2], and R. O. Gilbert[2], [1]*Department of Animal Science and Excellence Center for Animal Science, Ferdowsi University of Mashhad*, *Mashhad, Khorasan Razavi, Iran*, [2]*Cornell University*, *Ithaca, NY*.

The study was designed to test the effects of dietary fatty acid supplementation on IFN-γ, IL2, and IL10 genes expression, and also endometrial cytology in early lactating cows. From d 5-50 postpartum (PP), cows (n = 30; 6/treatment) were fed diets that were isonitrogenous, isoenergetic and isolipid containing 0 (Control), 1.25, 2.5 or 5% menhaden fish meal or 2.3% Ca salts of fish oil fatty acids. Samples for endometrial cytology (low-volume uterine lavage) were obtained on days 25 and 50 PP. A subjective score of 0-3 was assigned with 0 representing the absence of inflammation and 3 as a severe inflammation. On day 50 postpartum, uterine endometrial biopsies were collected for gene expression analysis. Expressions of IFN-γ, IL2, and IL10 were tested by real-time PCR using TaqMan primers/probes. Results were analyzed using comparative critical threshold (ΔΔCT) method in which the amount of target RNA was adjusted to a reference, glyceraldehyde-

3-phosphate dehydrogenase. The initial cytology data were transformed and then were analyzed using mixed models for a completely randomized design with repeated measures. The gene expression data were analyzed using general linear models for a completely randomized design. The cytology data showed that the dietary groups had no effect on uterine inflammation (P=0.07). The effect of time and the interaction of time and treatment were not significant (P>0.16). Compared with the Control, gene expression of IFN-γ (P=0.65; 0.75, 0.58, 0.65 and 0.37 ± 0.22, respectively), IL2 (P=0.079; 0.81, 0.26, 0.36 and 0.35 ± 0.14, respectively) and IL10 (P=0.087; 2.76, 0.83, 1.75 and 0.39 ± 0.63, respectively) were all similar among the supplemented groups. The results demonstrated that the dietary treatments had no apparent effect on the cytokines gene expression and uterine inflammation.

Key Words: dairy cows, endometrial cytology, gene expression

W15 Feeding dairy cows barley grain treated with lactic acid and heat modulated diurnal patterns of selected plasma metabolites. S. Iqbal, Q. Zebeli, A. Mazzolari, S. M. Dunn, and B. N. Ametaj*, *University of Alberta*, *Edmonton, Alberta, Canada*.

The aim of this study was to evaluate the effects of feeding barley grain treated with lactic acid (LA) and heat on diurnal patterns of plasma metabolites in dairy cows. Eight ruminally cannulated Holstein cows (170 DIM) were fed once daily a TMR based on rolled barley grain (32.8% on DM basis) steeped for 48h in equal quantity of water (CTR) or with 1.0% LA (v/v) and heated in an oven at 55°C (TRT). Cows were assigned to the treatments according to a replicated 2 × 2 Latin square design with two 21-d periods, where the first 11d were used for diet adaptation. Blood samples were collected from the tail vein on d 10 of each period shortly before (i.e., at 0h) and at 2, 4, 6, 8, 10, and 12h post-feeding, and analyzed for glucose, lactate, beta-hydroxybutyric acid (BHBA), non-esterified fatty acids (NEFA), and cholesterol. Results showed that feeding the TRT diet decreased concentration of glucose in the plasma (52.7 vs. 49.7 mg/dL; P=0.04), and increased that of BHBA (1,111 vs. 1,502 μmol/L; P<0.01). The time after feeding also affected concentration of metabolites (P<0.01) in the plasma. For example, the effect of TRT diet was more pronounced at 8 and 10h post-feeding for glucose and at 6h for BHBA. Further, feeding the TRT diet tended to increase the overall concentration of circulating NEFA (109 vs. 117 μEq/L; P=0.08). Additionally, cows fed the TRT diet had greater plasma NEFA (110 vs.78 μEq/L; P=0.01) at 12h post-feeding indicating an influence of time after feeding on this variable. However, no effect of diet was obtained for diurnal patterns of plasma lactate (629 vs. 648 μmol/L; P=0.61) or cholesterol (121 vs. 120 mmol/L; P=0.89). In conclusion, feeding 32.8% of diet DM barley grain treated with lactic acid and heat modulated diurnal patterns of selected plasma metabolites. Further research is warranted to establish the influence of these metabolic changes on the health and productivity of early lactating dairy cows.

Key Words: barley grain, diurnal response, dairy cows

W16 Treating barley grain with lactic acid and heat modulates selected plasma metabolites in dairy cows. D. Mansmann, Q. Zebeli, A. Mazzolari, S. M. Dunn, and B. N. Ametaj*, *University of Alberta*, *Edmonton, Alberta, Canada*.

Barley grain contains high amounts of degradable starch and is a potential alternative to corn as a digestible energy source in western Canada. However, feeding dairy cows diets high in readily degradable starch increases the incidence of metabolic diseases. Chemical and thermal processing of barley grain might modify ruminal starch degradation modulating blood metabolic profile. The objective of this study was to investigate the effects of feeding barley grain treated with lactic acid (LA) and heat on variations of plasma metabolites. Eight ruminally cannulated Holstein cows (170 DIM) were offered once daily at 0800 a TMR containing rolled barley grain (32.8% on DM basis) steeped in equal quantity of water (CTR-diet) or with 1.0% LA (v/v) and heated in an oven at 55°C (TRT-diet). The cows were assigned to the treatments according to a replicated 2 × 2 Latin square design with two 21-d periods where the first 11-d were used for diet adaptation. Blood samples were collected from the tail vein at 0730 on days 1, 3, 5, 7, and 10. Cows fed the TRT-diet had similar DMI with controls (19.8 vs. 20.0 kg/d; P=0.28). Results showed that TRT-diet tended to decrease the overall plasma cholesterol (122.1 vs.118.0 mmol/L; P=0.10). In contrast, cows fed the TRT-diet showed higher circulating plasma lactate (663 vs. 537 μmol/L; P=0.02). Other plasma metabolites including beta-hydroxy butyric acid (575 vs. 535 μmol/L; P=0.76), glucose (54.8 vs. 52.4 mg/dL; P=0.36), and non-esterified fatty acids (0.134 vs. 0.128 μEq/L; P=0.34) were not affected by TRT- and CTR-diets, respectively. Additionally, all plasma metabolites measured, except for cholesterol (P=0.73), changed with the day of sampling (P<0.05). This suggests that it is important to take into consideration the day of sampling when interpreting the effect of diets on the blood metabolites measured. In conclusion, the results suggest that feeding dairy cows barley grain treated with lactic acid and heat modulated selected plasma metabolites.

Key Words: barley grain, lactic acid, dairy cows

W17 Effects of *Bacillus subtilis* on antioxidant capacity and immunity of broilers. Y. Dongyou, M. Xiangfei, Q. Yan, and L. Weifen*, *College of Animal Science, Feed Science Institute, Zhejiang University*, *Hangzhou, Zhejiang, China*.

This study was conducted to examine the effects of *Bacillus subtilis* on antioxidant capacity and immunity of broilers. A total of 216 one day-old Ross 308 broilers were divided into 2 groups, the control group (basal diet) and the treatment group (basal diet supplemented with 105 CFU/g *B. subtilis*). Each group had three replicates and each replicate included 36 broilers (half male and half female). The experiment was carried out for 6 weeks. Results showed that T-AOC and the activity of GSH-Px of the treatment group was increased significantly (P<0.05), while level of serum MDA, NO and liver MDA were decreased significantly (P<0.05). *B. subtilis* did improve thymus index, bursa index and the level of serum IgG, but did not significantly affect Spleen index, serum lysozyme, IL-2, TNF-α (P<0.05). These results indicate that antioxidant capacity and immunity of Ross 308 broilers were improved by basal diet supplemented with *B. subtilis*.

Key Words: *Bacillus subtilis*, broiler, immunity

W18 Melamine residues in tissues of ducks fed diets containing graded levels of melamine. M. Lü*, L. Yan, J. Guo, Z. Sun, and S. Zhu, *Research and Development Center, Liuhe Feed Co., Ltd.*, *Qingdao, Shandong, China*.

An experiment was conducted to determine melamine residual levels in the tissues of ducks fed diets containing graded levels of melamine. 300 day-old ducks (Cherry Valley duck SM3) were assigned to 10