Lameness remains one of the greatest welfare challenges for the dairy industry, but there is little consensus on how best lameness can be surveyed on farm. This longitudinal study evaluated how measures of lameness incidence change with sampling frequency. Weekly visits to 6 farms in British Columbia were performed between May and December 2017, and 93 animals without previous history of severe claw horn lesions were repeatedly locomotion scored from 8 weeks prepartum until calving. Lameness was scored using a 1 to 5 numerical rating; cows were considered lame when they scored 3 (mildly lame) on 2 consecutive visits, or ≥4 (severely lame) on one occasion. The weekly data were used to create 3 data sets representing 1) weekly assessment, 2) assessment every other week, and 3) assessment every third week. Incidence of lameness was 31% when using the complete data set (i.e., weekly scores), versus 19% and 11% for assessments every 2 and 3 weeks respectively. Farm incidence ranged between 18 and 50% (median 30%), 6–50% (23%) and 0–50% (6%) when assessment occurred every 1, 2 and 3 wk. Differences in farm incidence depending on assessment frequency was tested using paired sample t-tests. Compared with weekly visits, farm incidence was significantly lower when assessment occurred every 2 (t(5) = 3.5) or 3 weeks (t(5) = 4.2). Of the animals that became lame during the dry period, average time from the first visit until diagnosis as lame was 20.5, 24.1, and 25.1 d when scoring was performed weekly, every other week and every 3 weeks respectively. These results suggest that (1) a high proportion of the animals become lame during the dry period, (2) estimates of lameness incidence are dependent upon sampling frequency, with low sampling rates likely leading to underestimation of the number of animals becoming lame, and (3) frequent assessment shortens the time before lameness is diagnosed.

Key Words: gait, transition cow, lameness

Educating dairy producers to systematically evaluate the cows they cull

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The purpose of this study was to assess the effectiveness of an evaluation form designed to aid dairy producers to evaluate cows being culled, and to prevent the transport of cows that may be unable to withstand the stress of transport. The objectives of this pilot project were to educate dairy producers about Canadian transport requirements; have producers use the evaluation form to prevent the transport of unfit cows; assess the efficacy of the form; and to encourage the use of standard operating procedures for evaluating culled cows. A total of 16 practicing bovine veterinarians and 54 Ontario dairy producers participated in this study. Veterinarians and producers were sent a pre-study survey to assess their knowledge and attitudes regarding culling cows, 10 culled cow evaluation forms, 2 scoring keys (for both body condition and lameness), and later, a post-study survey, to determine whether their knowledge and attitudes had changed. Veterinarians provided training on proper use of the evaluation form, and the producers completed an evaluation form for every cow they culled from the herd from January to August 2017. The evaluation form included space to record the cow’s body temperature, body condition score, gait, CMT score, last drug treatment date, last milking date, removal date and destination. Data analysis is underway to determine the efficacy of the form and opportunities for form improvement. SAS software was used to perform a Wilcoxon signed rank test to determine whether the responses given by participants differed between completed pre- and post-study surveys. Preliminary data analysis indicated that there was a tendency for producers to report higher confidence in their ability to assess cows before transport after using the evaluation form (P = 0.06). There was an increase in veterinarian’s reported confidence in their ability to help their dairy clients assess cows before transport (P < 0.05). The potential implications of this research project include providing producers with an effective tool to help assess their cattle before transport, and to encourage greater veterinary involvement with their clients.

Key Words: culled cow, transport

Effect of selenium-enriched hay on Se concentration in blood and milk, immune function, and performance in dairy cows during the transition period

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Supplementation with selenized yeast before parturition improves Se and antioxidant status of dairy cows during early lactation. Agricultural biofortification is a cost-effective method for selenium supplementation of beef cows and their offspring. In this study, we evaluated the effect of supplementing dairy cows with sodium-selecanate fertilized alfalfa from 40 d prior parturition to 2 weeks postpartum on whole blood and milk level of Se and other trace minerals, immune competence, and performance. After blocking for breed, 12 dairy heifers (6 Holsteins and 6 Jerseys) fed ad libitum with a TMR based on grass silage (0.14 mg Se/kg DM) were randomly assigned to a TRT group supplemented with 1 kg DM/100 kg BW with alfalfa enriched with Se (3.2 mg/kg DM) or a CTR group supplemented with low Se alfalfa (0.4 mg/kg DM). Cows were monitored daily for health status, dry matter intake, activity, and milk yield and weekly for body weight and body condition score. Carreggaen skin test was performed throughout the experiment. Whole blood and milk were used to determine Se and other trace minerals, immune competence, and performance. After blocking for breed, 12 dairy heifers (6 Holsteins and 6 Jerseys) fed ad libitum with a TMR based on grass silage (0.14 mg Se/kg DM) were randomly assigned to a TRT group supplemented with 1 kg DM/100 kg BW with alfalfa enriched with Se (3.2 mg/kg DM) or a CTR group supplemented with low Se alfalfa (0.4 mg/kg DM). Cows were monitored daily for health status, dry matter intake, activity, and milk yield and weekly for body weight and body condition score. Carreggaen skin test was performed throughout the experiment. Whole blood and milk were used to determine Se and other trace minerals, immune competence, and performance. After blocking for breed, 12 dairy heifers (6 Holsteins and 6 Jerseys) fed ad libitum with a TMR based on grass silage (0.14 mg Se/kg DM) were randomly assigned to a TRT group supplemented with 1 kg DM/100 kg BW with alfalfa enriched with Se (3.2 mg/kg DM) or a CTR group supplemented with low Se alfalfa (0.4 mg/kg DM). Cows were monitored daily for health status, dry matter intake, activity, and milk yield and weekly for body weight and body condition score. Carreggaen skin test was performed throughout the experiment. Whole blood and milk were used to determine Se and other trace minerals, immune competence, and performance. After blocking for breed, 12 dairy heifers (6 Holsteins and 6 Jerseys) fed ad libitum with a TMR based on grass silage (0.14 mg Se/kg DM) were randomly assigned to a TRT group supplemented with 1 kg DM/100 kg BW with alfalfa enriched with Se (3.2 mg/kg DM) or a CTR group supplemented with low Se alfalfa (0.4 mg/kg DM). Cows were monitored daily for health status, dry matter intake, activity, and milk yield and weekly for body weight and body condition score. Carreggaen skin test was performed throughout the experiment. Whole blood and milk were used to determine Se and other trace minerals, immune competence, and performance. After blocking for breed, 12 dairy heifers (6 Holsteins and 6 Jerseys) fed ad libitum with a TMR based on grass silage (0.14 mg Se/kg DM) were randomly assigned to a TRT group supplemented with 1 kg DM/100 kg BW with alfalfa enriched with Se (3.2 mg/kg DM) or a CTR group supplemented with low Se alfalfa (0.4 mg/kg DM). Cows were monitored daily for health status, dry matter intake, activity, and milk yield and weekly for body weight and body condition score. Carreggaen skin test was performed throughout the experiment. Whole blood and milk were used to determine Se and other trace minerals, immune competence, and performance. After blocking for breed, 12 dairy heifers (6 Holsteins and 6 Jerseys) fed ad libitum with a TMR based on grass silage (0.14 mg Se/kg DM) were randomly assigned to a TRT group supplemented with 1 kg DM/100 kg BW with alfalfa enriched with Se (3.2 mg/kg DM) or a CTR group supplemented with low Se alfalfa (0.4 mg/kg DM).
measurable effect on leukocytes profile and peripheral immune response in primiparous cows during the peripartum.

Key Words: agricultural biofortification, immune response, dairy cows

Statistical validation of a geometric approach to image analysis of anatomical traits. C. McVey*1, J. Velez2, and P. Pinedo1, 1Colorado State University, Fort Collins, CO, 2Aurora Organic Dairy, Boulder, CO.

With milk records and treatment histories increasingly supplemented with insights from genomic and sensor technologies, the future of dairy will be an incredibly data rich one. Yet a cow’s conformation and structure, the cornerstones of most dairy evaluations, are still largely assessed by eye. The goal of this research was to establish the foundational algorithmic framework needed to extract objective and reproducible measures of anatomical traits from standard quality 2D images acquired in a typical production environment. The training data set consisted of facial images from 108 mature Holstein cows acquired on 3 separate days while restrained at the feed bunk. The standard human facial mesh was adapted to a bovine model, and key anatomical points extracted from each cow image using the MatLab Ginput tool. Eye shape was then quantified using 2 schemes: normalized distances between all pairwise combination of points, and a novel geometric approach to biometric extraction that emphasized angles and projection lengths. Compared with the simple normalized distances, the geometric biometrics showed on average a 10% reduction in measurement error associated with human error in point annotation. Geometric measures also demonstrated less correlation among themselves than the normalized distance measures, a desirable trait for the development of stable linear predictive models. To assess the resilience of these metrics to variations in image quality, measurement error across days was regressed against measures designed to reflect changes in image scaling, frame position, and face angle. For the geometric measures, average total correlation between measurement error and measures of image quality was less than 5%, with no correlations exceeding 25%. For normalized distances, average total correlation between measurement error and measures of image quality with 15%, with multiple metric having over 50% of their measurement error attributed to subtle changes in image attributes. These results suggest that a geometric approach to anatomical biometrics could provide a more robust and consistent means of extracting detailed quantitative measures of physical traits from farm quality images.

Key Words: image analysis, dairy

Factors associated with veal calf morbidity on an Ontario grain-fed (red) veal operation. K. J. Scott*, D. L. Renaud, T. F. Duffield, and D. F. Kelton, University of Guelph, Guelph, ON, Canada.

Health status at arrival at veal facilities may be an important predictor of calf morbidity and performance, as substantial disease occurs early in the calves’ growing period on veal operations. The objective of this prospective cohort study is to explore associations between health attributes measured at arrival at a veal rearing facility and morbidity risk. Calves were evaluated immediately at arrival using a standardized health scoring system (Calf Health Scorer App), blood was collected to measure serum total protein (STP), and weight was measured at arrival. A mixed logistic regression model was built to evaluate factors associated with morbidity <21 d following arrival. Between January and July 2017, a total of 590 Holstein calves of unknown age were evaluated. In the first 21 d following arrival, 68% of calves were treated for either respiratory disease or diarrhea, and 5% died. There were 5 variables significant in the final model evaluating the association between morbidity and conditions identified at arrival. Calves without a sunken flank, those that weighed more at arrival, or those that had a higher concentration of STP had reduced odds of morbidity. Calves that were moderately dehydrated had a reduced odds of being treated for disease compared with a non-dehydrated calf. More specifically, 38% of calves presented with sunken flank, 25% were below 95lbs upon arrival, failure of passive transfer was present in 32% of the calves, and moderate dehydration was present in 7% of the calves. The results of this study indicate that risk factors for morbidity can be identified upon arrival at a veal facility, and interventions may be warranted to reduce morbidity. Future work will evaluate the efficacy of interventions to reduce the prevalence of these risk factors before arrival, so that veal calf health and welfare can be improved.

Key Words: male calves, dairy, morbidity

Effects of prebiotic supplementation on gut health, cellular immune function and performance of dairy calves. R. Gardi- nal1, C. A. F. Oliveira1, J. F. A. Koch1, B. Mazzer*1, F. de Oliveira Roberti1, A. M. Rocha1, and V. Vetvicka2, 1Department of Research and Development, BioRight Company, Lençóis Paulista, SP, Brazil, 2Department of Pathology, University of Louisville, Louisville, KY. The commensal gut microbiota plays an important role for the host. Many carbohydrates from yeast cell wall, such as mannanoligosaccharides are used in livestock as gut prebiotic, acting as substrates for beneficial bacteria in the gut and purified β-glucans as immune response enhancers. This study aimed to evaluate if Proweum Rumi (PWR, Biorigin, Brazil) – a new generation of functional carbohydrates from yeast cell wall—is able to modulate the gut environment and enhance cellular immune function. The study was performed at University of Louisville, Kentucky. A total of 30 dairy calves with 20 d of age were randomly and equally assigned to 2 treatments: 1) Control (C; n = 15), no supplementation; 2) PWR (n = 15), fed 100 mg of PWR kg⁻¹ of body weight added to milk during 28 d. The body weights were recorded weekly to quantify the average daily gain (ADG). At the end of experiment peripheral blood sample were collected and assays employing phago- cytosis of synthetic polymeric microspheres were carried as described by Vetvicka et al. (2014). Short-chain fatty acids (SCFA) in feces were measured by PCR at the last day of experiment. Data were analyzed by ANOVA using the PROC MIXED of SAS 9.1 with fixed dietary effect, time effect, interaction between diet and time. Our results showed that addition PWR potentiated phagocytic activity (P < 0.05) of peripheral blood monocytes (21.8 vs. 24.6%) and neutrophils (25.4 vs. 28.9%) and increased (P < 0.05) SCFA concentration (105.5 vs. 111.5 mmol/L) in feces compared with control animals, demonstrating prebiotic effect and a more efficient immune response. Moreover, calves supplemented with PWR showed higher (P < 0.05) ADG and final body weight compared with control animals, demonstrating that modulation of the intestinal environment can result in higher absorption of nutrients. In conclusion, PWR can improve gut health, cellular immune function and performance of dairy calves supplemented.

Key Words: gut health, prebiotic, dairy calves

Evaluating the relationship between hoof lesions and culling of dairy cows. B. O. Omontese*1, R. Bellet-Elias1, A. Molinero1, G. Catandi1, R. Casagrande1, Z. Rodriguez1, R. S. Bisinotto2, and G. Cramer1, 1Department of Veterinary Population Medicine, University
Objective of this study was to evaluate the relationship between hoof lesions (HL) and culling in lactating dairy cows. Jersey cows were enrolled at 20 ± 3 DIM (d20). At d20, cows were evaluated for body condition score (BCS; high ≥3.50, moderate = 2.75 to 3.25, low ≤2.50) and were examined for presence of claw horn HL (sole ulcers, toe ulcer, white line disease), sole hemorrhage (SH), infectious HL (digital dermatitis, foot rot), and injury. At 120 ± 3 DIM (d120), cows were reevaluated for presence of HL and BCS. Culling data (died or sold) were collected until 250 DIM and cows that left the herd were right censored. To evaluate the relationship between HL present in early lactation and culling, lesion status at d20 was categorized into (1) no HL (noHL; n = 1,197) or with HL (wHL; n = 442) and (2) HL category as claw horn (CLW; n = 113), SH (n = 280), infectious (INF; n = 36), and injury (INJ; n = 13). To assess the relationship between development of new HL and culling, cows were classified as healthy (no HL at d20 and d120; n = 308), cured HL (presence of any HL at d20 and no HL at d120; n = 72), new HL (no HL at d20 and presence of any HL at d120; n = 597), or chronic HL (presence of any HL at d20 and d120; n = 226). Association between HL and culling was assessed using Kaplan Meier curves and Cox’s proportional hazard regression. Overall, 13.4% cows (n = 221) were culled and there was no relationship between HL at d20 and culling (HR: 1.21; 95% CI: 0.91 to 1.61). Of all the lesion categories assessed in this study, cows with CLW had a greater culling hazard compared with healthy cows (HR: 1.52; 95% CI: 1.01 to 2.27; P < 0.01). Furthermore, cows with INF lesions tended to have greater culling hazard compared with healthy counterparts (HR: 1.72; 95% CI: 0.94 to 3.12; P = 0.07). Overall, 93% of new HL was SH. Cows that developed new HL had a smaller culling hazard compared with healthy cows (HR: 0.42; 95% CI: 0.22 to 0.78; P < 0.01). In conclusion, preexisting CLW and INF lesions at d20 were associated with increased hazard of culling whereas development of new HL between 20 and 120 DIM was associated with a reduction in hazard of leaving the herd.

Key Words: herd exit, hoof trimming, lameness