

# ADSA-SAD (Student Affiliate Division) Undergraduate Competition: ADSA-SAD Undergraduate Student Poster Competition

**M1 An analysis of cow cooling methods in lactating Jersey cows, while simultaneously assessing the accuracy of infrared thermography in characterizing heat stress.** Amy P. McBirney\*<sup>1</sup>, Stan L. Henderson<sup>1</sup>, and Luis A. Rodriguez<sup>2</sup>, <sup>1</sup>*California Polytechnic State University, San Luis Obispo, CA*, <sup>2</sup>*Innovative Liquids LLC, El Dorado Hills, CA*.

Cow comfort is a crucial component to maximizing dairy cattle health and productivity. Combating high temperatures is of particular importance to dairy producers located in California's Central Valley who must ensure their herd remains cool and comfortable to maintain animal wellbeing and productivity. The purpose of this project was to determine differences in heat stress based on cow cooling methods on a California Jersey dairy while also using infrared technology to measure and predict heat stress. Infrared rear udder surface temperatures, digital rectal temperatures and respiration rates were collected on 30 Jersey cows. Fifteen cows from each of 2 different high-producing mature cow pens were selected to obtain measurements during 3 different times: morning in freestalls (8–9:15 AM), mid-morning in the milk barn (9:30–11 AM), and afternoon in freestalls (1:30–2:45 PM). Management and freestall barn design were similar between pens, with the exception of differing cow cooling methods. One pen was provided with soakers only, while the other pen was provided with soakers and fans. Low to high heat stress was observed in the sample of 30 cows throughout the day. The lowest respiration rates, rectal temperatures, and udder temperatures were observed in the milking parlor during the mid-morning, particularly as cows stood in the holding pen for greater lengths of time. Rectal temperatures for cows in Pen 6 (no fans) differed significantly ( $P = 0.003$ ) from rectal temperatures measured on the same group of cows when in the milk barn. The positive response to the more frequent soaking times of the milk barn cooling system suggests this method may be more effective in reducing the effect of heat stress than either of the freestall cooling systems. Infrared body surface temperature is currently being explored as a potentially dependable and accurate means of quantifying heat stress in cattle (Jones, 1999; Berg et al., 2013). Data indicated a significant correlation ( $P = 3 \times 10^{-4}$ ) between infrared udder temperatures and digital rectal temperatures, suggesting that infrared thermography is valuable in identifying heat stress.

**Key Words:** heat stress, infrared thermography, cow comfort

**M2 Comparison of dry matter measurements between a hand-held near infrared unit and 48 hour-60°C oven drying with corn silage and alfalfa silage.** Derek M. Donnelly\*, Robb W. Bender, and David K. Combs, *University of Wisconsin-Madison, Madison, WI*.

Calculating accurate dry matter of forages is important for adjusting rations on a day-to-day basis. This study evaluated the accuracy of a hand-held near infrared (NIR) unit (Moisture Tracker, Digistar Inc., Fort Atkinson, WI) compared with conventional oven drying for 48 h at 60°C using 2 different forages: alfalfa silage and corn silage. Twenty frozen samples each of alfalfa silage and corn silage were obtained from a commercial feed testing laboratory (Rock River Labs Inc., Watertown, WI). The NIR unit was calibrated for each different forage type. Approximately 105 g of each sample was spread over an 8 cm × 8 cm area on brown paper and scanned with the NIR unit 30 times, each scan was in a different location on the sample. Upon the thirtieth measurement, the NIR unit would show the average dry matter content on its display. The

average of the 30 scans was recorded as the dry matter content of the sample. Two 100-g subsamples of each forage sample were weighed into aluminum pans. The samples were then oven-dried for 48 h at 60°C and weighed back to calculate oven dry matter. Dry matter determined by NIR and oven were compared by *t*-test within each forage type. Dry matter determined for corn silage via the NIR (39.59%) were similar ( $P = 0.557$ ) to those obtained from conventional oven drying (39.92%). Dry matter estimated from the NIR for alfalfa (48.6%) were greater ( $P < 0.0001$ ) than obtained from oven drying (44.17%). The results of this experiment showed that dry matter values were similar with oven dry matter when analyzing corn silage, but were not similar when analyzing alfalfa silage.

**Key Words:** dry matter, near infrared, dairy cattle

**M3 Evaluation of pH test strips for accuracy in determining pH of cow urine.** Colleen N. Curtiss\*<sup>1</sup>, Kayleigh G. Gratz<sup>1</sup>, David P. Chamberlin<sup>1</sup>, Timothy F. Brown<sup>2</sup>, and Elizabeth L. Karcher<sup>1</sup>, <sup>1</sup>*Michigan State University, East Lansing, MI*, <sup>2</sup>*West Central, Ralston, IA*.

Hypocalcemia is a periparturient metabolic disorder that is costly to the US dairy industry. One strategy to reduce incidences is to feed anionic supplements during the close-up period. The effectiveness of this strategy may be monitored by evaluating urine pH of cows, with an effective preventative pH in the range of 6.0 to 7.0. There are multiple commercial urine pH strips available to test the acidity of urine. The objective of this study was to evaluate several pH test strips for accuracy in determining pH of cow urine. Urine was collected from 4 mid-lactation Holstein dairy cows, composited, and distributed into ten 250-mL samples. The pH of each sample was then adjusted, using 12 N HCl and a laboratory pH meter, to 1 of 10 pH values: 5.5, 6.0, 6.25, 6.5, 6.75, 7.0, 7.25, 7.50, 7.75, and 8.0. The pH of each standard was recorded at the end of sampling and the average of the 2 values (5.68, 6.10, 6.33, 6.63, 6.81, 7.06, 7.33, 7.57, 7.76, and 8) was used to compare the accuracy of the strips. Seven evaluators assessed each pH sample with 9 commercially available pH strips to determine equivalence between the pH strip reading and the pH of the prepared standard. Confidence intervals (90%) were calculated for each pH strip and sample combination and compared with the standard. Seven of the 9 strips fell within the 90% confidence interval ranges for 1 to 3 urine samples and 1 strip was within the range for 5 samples. Of the pH strips tested, only 1 was able to identify a correct pH for 7 of the 10 urine samples. Based on our results, this strip could be used to identify urine pH in a range from 5.7 to 7.75. These results depict the variation in the accuracy of the test strips to detect urine pH. Producers must be aware of these variations as they utilize urine pH to measure the effect of feeding anionic supplements in a transition cow program.

**Key Words:** hypocalcemia, pH, urine

**M4 Rumen epithelial gene expression in response to oral NaHCO<sub>3</sub> treatment in Holstein bull calves.** Emily R. Meese\*<sup>1</sup>, Taylor T. Yohe<sup>1,2</sup>, Hannah L. M. Tucker<sup>1,2</sup>, and Kristy M. Daniels<sup>1,2</sup>, <sup>1</sup>*The Ohio State University, OARDC, Wooster, OH*, <sup>2</sup>*Virginia Tech, Blacksburg, VA*.

While common, concern exists that low rumen pH in periruminant calves should be avoided. Oral NaHCO<sub>3</sub> can increase rumen pH. The objective

was to study effects of oral administration of  $\text{NaHCO}_3$  on expression of select genes in the rumen epithelium at 49 d of age. Genes included in the investigation encode for proteins that are used for volatile fatty acid (VFA) absorption, pH regulation, and  $\text{NaHCO}_3$  transport. Neonatal Holstein bulls ( $n = 12$ ) were randomly assigned to one of 4 treatments, arranged in a  $2 \times 2$  factorial design. Factors were treatment [control (con) or  $\text{NaHCO}_3$  (bicarb)] and oral route of delivery (water-based drench or gelatin-filled capsule). Administration of  $\text{NaHCO}_3$  dose was adjusted weekly and reached a maximum of 48 g/d. Treatments were administered before each of 2 daily feedings. Calves were fed 543 g DM/d of a 22% CP, 20% milk fat replacer, had access to a 20% CP starter and water. At wk 8, rumen tissue was obtained from the cranial ventral region of each calf. Total RNA was extracted from the epithelial portion of rumen tissue, reverse transcribed into cDNA, and used in quantitative reverse transcription PCR assays. Relative abundance of 10 VFA transporters, pH regulators, anion exchangers and cotransporters were quantified. Rumen pH was not increased by  $\text{NaHCO}_3$ , (measured 2, 4, and 6 h post-dosing) but urine pH was. This observation went against past findings regarding ruminal pH with oral  $\text{NaHCO}_3$  administration but generally supports the notion that post-ruminal, rather than ruminal,  $\text{NaHCO}_3$  absorption and metabolism occurs in young calves. In support of this,  $\text{NaHCO}_3$  had no effect on expression of any ruminal gene measured here. Findings suggest that in young calves, low rumen pH is part of the developmental process and regulatory mechanisms associated with non-diffusional VFA transport, rumen pH, and  $\text{NaHCO}_3$  transport are not affected by supplemental  $\text{NaHCO}_3$ .

**Key Words:** dairy calf, rumen, gene expression

**M5 Effect of overstocking at the feed bunk on indicators of cow temperament.** Danielle N. Coleman\*, Maurice L. Eastridge, Jessica A. Pempek, and Kathryn L. Proudfoot, *The Ohio State University, Columbus, OH.*

Our objective was to investigate the effect of overstocking the feed bunk on dairy cow behavioral responses to human approach and reactivity to blood sampling. One hundred and 20 dry Holstein cows were allocated to 1 of 2 treatment groups with different stocking densities [overstocked (OS): 0.88 headlocks/cow; understocked (US): 1.17 headlocks/cow]. Over 2 testing periods (7 d apart), flight response was assessed using a human-approach test with a 5-point ordinal scale defining the distance at which the cow stepped away from the approaching experimenter (0 = not approachable from 3 m to 4 = cow moves away when experimenter is 0 m from the cow). A qualitative assessment was also made of the cow's response to the experimenter using a visual analog scale (VAS) that included the terms: relaxed, nervous, alert, shy, aggressive, social, and curious. Reactivity to blood sampling via the coccygeal vein was assessed in the pen using a 4-point scale (0 = least reactive to 3 = most reactive). Data were analyzed through a mixed model analysis, using treatment, time, and their interaction. The relationship between qualitative measures was assessed using a Pearson correlation. Treatment did not affect the cow's flight response; however, there was a significant treatment by time interaction whereby flight response scores decreased with time in OS cows and increased with time in US cows (OS: 1.65 to 1.47, US: 1.33 to 1.68;  $P = 0.02$ ). Reactivity to blood sampling did not differ by treatment (OS: 1.11, US: 0.98;  $P = 0.47$ ), and there was also no treatment by time interaction (OS: 1.17 to 1.11, US: 1.01 to 0.98;  $P = 0.88$ ). The overall correlation between qualitative terms was low. However, the terms 'relaxed' and 'nervous' showed a significant negative correlation (OS:  $r = -0.71$ ;  $P < 0.0001$ ; US:  $r = -0.61$ ;  $P < 0.0001$ ). In conclusion, overstocking the feed bunk affected the animal's response to an approaching human. Cows in the OS treatment

became less approachable over time, which may indicate fear, stress, or an increase in arousal. Future research should investigate the effect overstocking may have on cow temperament for a longer duration, as this may further decrease approachability.

**Key Words:** stocking density, feed bunk, temperament

**M6 Relationship between cow lying behavior and freestall barn design.** Jennifer Callanan\* and Amber L. Adams-Progar, *Washington State University, Pullman, WA.*

There is concern that barn design may cause underutilization of isolated freestalls and, in turn, lead to overcrowding and decreased cow comfort. The objective of this study was to observe and describe cow utilization of isolated stalls in one pen of lactating dairy cattle. One pen of 67 Holstein cows, with lactations ranging from one to 7, was selected for observations because the pen was designed to include one row of 8 stalls (isolated stalls = IS) out of a total of 72 stalls that faced the northwest concrete wall of the barn. This design allowed cows within the IS to face a wall rather than other cows. All 67 cows were randomly assigned a study number and identified with fluorescent animal marking paint. Cow attendance in the IS was observed via 2 time-lapse cameras mounted on the northeast and southwest ceilings of the barn. Time-lapse images were captured at 20-s intervals over the course of 5 d. The scan sampling method was implemented to record the number of cows within the IS, cow study numbers, and cow behavior (standing or lying). Descriptive statistics and correlations were applied to analyze the data. A correlation was detected between time of day and the percentage of cows utilizing the IS ( $r = -0.53$ ,  $P = 0.007$ ), where maximum attendance ( $4.78 \pm 0.19\%$  of cows) occurred at 0300 h and 0500 h, and minimum attendance ( $0.30 \pm 0.08\%$  of cows) occurred at 1000 h. Throughout the study, most the cows within the IS preferred to lie down ( $95.25 \pm 2.27\%$  of cows) rather than stand ( $4.75 \pm 2.27\%$  of cows). Thirty-seven percent of the cows in the pen attended the IS at least once during the study, with 7.5% of the cows accounting for 64% of the visits to the IS. No correlation was detected between cow lactation and IS utilization ( $r = 0.007$ ,  $P = 0.95$ ). These results indicate that the IS in this study were utilized primarily for lying purposes by a small percentage of cows; however, additional research is needed to determine whether cow health or social status may explain the small number of cows that visited the isolated stalls throughout this study.

**Key Words:** cow comfort, lying behavior, barn design

**M7 Effect of carbon dioxide on oxidative stability of raw milk.** Jayendra Kumar Amamcharla and Jia Xin Tang\*, *Kansas State University, Manhattan, KS.*

Sensory attributes play a critical role in the consumer acceptability of pasteurized milk. Any off-flavor present in raw milk is carried onto the pasteurized milk. One such off-flavor is oxidized flavor (OF). This can have a huge economic impact on dairy farmers as well as on milk processors. Raw milk invariably undergoes oxidative changes as soon as the milk leaves the udder. Still, the rate of OF development mainly depends on nature, concentration, and distribution of pro- and anti-oxidants in the milk system. Antioxidants in raw milk play an important role by donating a hydrogen ion to terminate auto-oxidation. In this process, the antioxidant capacity raw milk diminishes during storage. Recent studies showed that the total antioxidant capacity (TAC) of raw milk decreases by 10% after 24 h and 27% after 48 h of storage. The objective of the present work was to mitigate the reduction in TAC of raw milk by using carbon dioxide ( $\text{CO}_2$ ). It has been established that

CO<sub>2</sub> inhibits growth of psychrotrophic bacteria and extends the shelf-life of raw milk but the effect of CO<sub>2</sub> treatment on TAC of raw milk has not been established. Approximately one gallon of raw milk was divided into 4 sub-samples and 3 of the sub-samples were injected with CO<sub>2</sub> to 3 pH levels (pH 6.65, 6.55, and 6.45) and the remaining fourth subsample was used as a control. Subsequently, each of these 4 sub-samples were divided into 25 equal samples and stored at 4°C. On each experimental day, 5 equal samples were withdrawn and analyzed using a modified ferric reducing ability of plasma (FRAP) assay. Modified FRAP assay was used to determine the TAC of samples on Day 0, 1, 2, 3, and 4. The data were analyzed as repeated measures design using the MIXED procedure in SAS. The presence of CO<sub>2</sub>, storage time, and their interaction significantly ( $P < 0.05$ ) influenced the FRAP value of raw milk. It was observed that the TAC of all raw milk samples was gradually reduced during refrigerated storage. However, the drop in TAC was found to be significantly ( $P < 0.05$ ) lower in CO<sub>2</sub> treated milk. Overall, CO<sub>2</sub> treatment of raw milk shows potential in reducing TAC loss during storage of raw milk.

**Key Words:** modified FRAP assay, total antioxidant capacity, raw milk

**M8 Hepatic patatin-like phospholipase domain-containing protein 3 protein is regulated during the transition to lactation period in dairy cows.** Ryan S. Pralle\*, Rafael C. Oliveira, Tawny L. Chandler, Sandra J. Bertics, and Heather M. White, *University of Wisconsin-Madison, Madison, WI.*

Patatin-like phospholipase domain-containing protein 3 (PNPLA3) is a membrane bound triglyceride lipase that contributes to lipid metabolism in the liver and is responsive to feed restriction. PNPLA3 mRNA expression is dynamic in dairy cows with lower expression during negative energy balance. The objective of this study was to characterize PNPLA3 protein abundance in transition cows subjected to fatty liver induction. Multiparous cows were blocked by expected calving date and randomly assigned to a control ( $n = 3$ ) ad libitum intake group, or a fatty liver induction ( $n = 6$ ) group that was overfed during the dry period, and feed restricted (80% of dry matter intake) at +14 d relative to calving (DRTC) until onset of clinical ketosis. Liver biopsies were taken in the prepartum (-28, -14 DRTC), lipid accumulation (+1, +14, +28 DRTC), and recovery (+42, +56 DRTC) periods and at the time of clinical ketosis. Liver PNPLA3 protein abundance was determined through Western blot analysis and normalized to total protein. Data were analyzed using PROC MIXED of SAS 9.3. Abundance of PNPLA3 was analyzed with main effects of treatment, period, and treatment x period, and random effect of cow. Protein abundance was also analyzed by PROC MIXED and PROC CORR based on total lipid accumulation diagnosed as high (>15%, dry matter) or low (<15%, dry matter). All fatty liver induction cows became clinically ketotic and developed fatty liver. Abundance of PNPLA3 was greater ( $P = 0.02$ ) during the recovery period compared with the accumulation period (1.12 vs. 0.79  $\pm$  0.09, arbitrary units). Cows with high liver lipids had decreased ( $P < 0.01$ ) PNPLA3 abundance compared with cows with low liver lipids (0.69 vs. 1.0  $\pm$  0.08, arbitrary units). There was a negative correlation ( $P < 0.01$ ;  $r = -0.427$ ) between liver lipid concentration and PNPLA3 abundance. These data indicate that regulation of PNPLA3 may influence liver lipid accumulation and potential recovery from fatty liver disease.

**Key Words:** patatin-like phospholipase domain-containing protein 3, adiponutrin, fatty liver

**M9 Effect of management practices and housing type on somatic cell counts in Kentucky dairy farms.** Mickayla A. Myers\*, Amanda E. Stone, and Jeffrey M. Bewley, *University of Kentucky, Lexington, KY.*

The objective of this research was to compare the effects of management practices and housing types on SCC. Data were acquired for 34 Kentucky dairy herds, participating in the Southeast Quality Milk Initiative project. Herds were grouped into SCC categories where low = 2013 mean bulk tank SCC  $\leq 250,000$  cells/mL ( $n = 16$ ), and high =  $>250,000$  cells/mL ( $n = 18$ ). Herd size ranged from 42 to 660 lactating cows. Thirty-eight percent ( $n = 6$ ) and 50% ( $n = 9$ ) of low and high herds, respectively, were housed in freestalls. Lactating cow bedding of sawdust or wood shavings was most commonly used for low (47%,  $n = 7$ ) and high (53%,  $n = 9$ ) herds. Fans were provided in the parlor and housing for low (75%,  $n = 12$ ) and high (67%,  $n = 12$ ) herds. Mastitis-treated cows were not commonly housed separately from lactating cows for low (75%,  $n = 12$ ) and high (67%,  $n = 12$ ) herds. Lactating cow housing was split into 3 respective groups: total confinement, pasture access for  $<4$  h a day, and pasture access for  $\geq 4$  h a day. Total confinement was used in 50% ( $n = 8$ ) and 33% ( $n = 6$ ) of low and high herds, respectively. Pasture access for  $<4$  h a day was 6% ( $n = 1$ ) and 17% ( $n = 3$ ) for low and high, respectively. Finally, pasture access for  $\geq 4$  h a day was 38% ( $n = 6$ ) and 50% ( $n = 9$ ) for low and high, respectively. Of the herds using freestalls, manure was removed from stalls twice daily in 67% ( $n = 8$ ) and 77% ( $n = 10$ ) for low and high herds, respectively. Soakers were used in 31% ( $n = 5$ ) and 41% ( $n = 7$ ) of low and high herds, respectively. Udder hair was singed or clipped in 25% ( $n = 4$ ) and 39% ( $n = 7$ ) of low and high herds, respectively. Overall system checks of the parlor were performed annually in 31% ( $n = 5$ ) and 53% ( $n = 9$ ) of low and high herds, respectively. Results of this research may be used to help producers improve their dairy operations by understanding the management practices low and high SCC herds implement. This work was supported by a grant award from USDA-NIFA-AFRI (2013-68004-20424).

**Key Words:** low SCC, mastitis management practices, milk quality

**M10 Effect of milking procedures and mastitis detection methods on somatic cell counts for Kentucky dairy herds.** Kerri A. Bochantin\*, Amanda E. Stone, and Jeffrey M. Bewley, *University of Kentucky, Lexington, KY.*

The objective of this research was to compare the effects of milking procedures and mastitis detection methods on SCC. Data were acquired for 34 Kentucky dairy herds participating in the Southeast Quality Milk Initiative project. Herds were grouped into SCC categories where low = 2013 mean bulk tank SCC  $\leq 250,000$  cells/mL ( $n = 16$ ; L), and high  $\geq 250,000$  cells/mL ( $n = 18$ ; H). Herd size ranged from 42 to 660 cows. Fifty six percent ( $n = 10$ ) of H and 38% ( $n = 6$ ) of L herds used the California Mastitis Test (CMT) to detect clinical mastitis. Similarly, 33% of H ( $n = 6$ ) and 31% ( $n = 5$ ) of L herds used CMT to detect subclinical mastitis. All herds pre- and post-dipped ( $n = 34$ ). Pre-dip application methods included pre-dip with a non-return dip cup with commercial disinfectant (H = 94%,  $n = 17$ ; L = 80%,  $n = 12$ ), non-return dip cup with homemade disinfectant (H = 6%,  $n = 1$ ), and applied by sprayer with commercial disinfectant (L = 20%,  $n = 3$ ). Teat drying methods included multiple-use paper towels (H = 6%,  $n = 1$ ; L = 13%,  $n = 2$ ), single-use paper towels (H = 47%,  $n = 8$ ; L = 27%,  $n = 4$ ), multiple-use cloth towels (L = 20%,  $n = 3$ ), and single-use cloth towels (H = 47%,  $n = 8$ ; L = 40%,  $n = 6$ ). Pre-stripping was used in 72% of H ( $n = 13$ ) and 75% of L ( $n = 12$ ) herds. Post-dip application methods included

dip cups with commercial disinfectant (H = 94%, n = 17; L = 94%, n = 15) or homemade disinfectant (H = 6%, n = 1). Wearing latex or nitrile gloves “always” during milking was practiced in 33% of H (n = 6) and 81% of L (n = 13) herds. Producers were asked to estimate the cost of clinical mastitis and answers ranged from \$0 to \$250 (26%, n = 9), \$251 to \$500 (35%, n = 12), \$501 to \$750 (3%, n = 1), \$751 or more (6%, n = 2), or unknown (24%, n = 8). When asked to rate the pain experienced in a mild case of clinical mastitis, responses ranged from 0 to 2 (24%, n = 8), 3 to 5 (62%, n = 21), and 6 to 8 (15%, n = 5), where 1 is no pain and 10 is severe pain. Responses for rating severe clinical mastitis pain included 5 to 8 (32%, n = 11) and 9 to 10 (68%, n = 23). Results of this survey may be used to improve mastitis management in dairy cattle herds in Kentucky.

**Key Words:** mastitis, milking procedure, Kentucky

**M11 Effect of a probiotic on dairy calf diarrhea and growth rate.** Alexis C. Thompson\*, Donna M. Amaral-Phillips, and Jeffrey M. Bewley, *University of Kentucky, Lexington, KY.*

Probiotics may prevent or reduce illness occurrence. The objective of this study was to observe the effects of a probiotic (Protect, Provita Animal Health, Omagh, Northern Ireland) on calf diarrhea incidence and average daily gain. This study was conducted at the University of Kentucky Coldstream Dairy during the winter of 2014 and 2015. All female and male Holstein calves were enrolled at birth, fed a colostrum replacer (Bovine IgG Colostrum Replacer, Land O’Lakes, Shoreview, MN), and did not receive any vaccinations. Calves were housed in individual sawdust-bedded hutches with ad libitum access to water and 18% CP starter until weaning at 8 weeks of age. Calves were fed a 20:20 non-medicated milk replacer (total 0.71 kg powder daily) twice daily. Calves were randomly assigned to one of 3 treatments: 10 g liquid oral probiotics at birth (O, n = 10), 10 g liquid oral probiotics at birth plus 1 g powder probiotic once daily incorporated in morning milk from d 2 to 14 (O+P, n = 9), and a negative control (CON, n = 9). Calves were weighed once weekly using a scale (Cardinal Digital HSDC Series, Cardinal Scale Mfg. Co, Webb City, MO). Feces were scored once weekly, where 1 represented firm feces which settled once hitting the ground, 2 feces that did not hold form well, 3 feces that readily spread, and 4 feces that was liquid and splattered (Larson et al., 1977). A fecal score of 4 indicated diarrhea. The GLM and FREQ procedures of SAS Version 9.3 (SAS Institute Inc., Cary, NC) were used to analyze data. The incidence of an episode of diarrhea was 80% for O, 75% for O+P, and 88% for CON ( $P = 0.79$ ). Mean fecal scores from birth to weaning were  $2.18 \pm 0.55$  for O,  $2.18 \pm 0.35$  for O+P, and  $2.28 \pm 0.52$  for CON ( $P = 0.73$ ). Calves were confirmed with *Rotavirus* and *Coronavirus* through PCR in all treatment groups. Average daily gain during the study was  $0.47 \pm 0.10$  kg/d for O,  $0.52 \pm 0.10$  kg/d for O+P, and  $0.56 \pm 0.10$  kg/d for CON ( $P = 0.42$ ). No significant differences were observed among treatments for average daily gain, fecal score, or incidence of calf diarrhea.

**Key Words:** calf diarrhea, probiotic, growth rate

**M12 Genomic testing of female Holsteins: A resource for selection and improvement.** Kimberly M. Davenport\*, Joshua J. Peak, and Brenda M. Murdoch, *University of Idaho, Moscow, ID.*

Genomic testing is providing a powerful tool for use in dairy management decisions across the United States. While genetic testing has been more broadly implemented for sire selection, its use in selection of

females is only now being applied. The identification of females with the most promising genetic potential can influence selection decisions including replacement heifers and cull cows, as well as identify female candidates for embryo donations. Identifying the genetic potential in both male and female contributors to the herd will accelerate genetic improvement and identify potential problems of disease carrier matings before they occur. The purpose of this study was to (1) confirm pedigree information with genetic parentage, (2) identify females that may carry a disease-associated allele, and (3) compare recorded herd data of cows that have been phenotypically selected for reproduction performance to genomic predictions of the Clarifide test. Purebred Holstein cows (n = 162) were sampled by ear punch. Tissue samples were sent to Zoetis and a low density Clarifide genomic test was used to correct pedigree parentage and evaluate the genomes for several markers associated with common selection parameters. Several traits economically important to dairy herds such as milk yield, milk fat component percentage, and traits related to reproductive efficiency and productive life, were compared with results from the Clarifide genomic tests for each animal. The accuracy of parentage records utilizing the parentage correction tool was used to eliminate animal misidentification. The relative similarity of the genomic prediction to phenotypic data and parentage corrections for these traits suggest all be incorporated into future management decisions to accelerate genetic progress of the herd. The sustainability of the US dairy industry will become more dependent upon the effective implementation and strategic use of genomic selection of desirable complex phenotypic traits.

**Key Words:** genetics, dairy, selection

**M13 Effects of rubber coverings for slatted floor facilities on cattle performance and cleanliness.** Derrick S. Smith\*, Bryant R. Chapman, Colleen N. Curtiss, Monica J. Atkin, Steven R. Rust, and Dan L. Grooms, *Michigan State University, East Lansing, MI.*

Approximately 1 to 3% of steers housed on slatted floors must be removed for lack of mobility and foot problems. The objective of this study was to compare animal performance and hide soiling of cattle housed on slatted floors with (RC) and without (NC) rubber coverings. Angus-based steers (250–300 kg) were randomly assigned to pens with NC (n = 4) or RC (n = 4). Each pen contained 7 steers at a stocking density of 6.9 m<sup>2</sup>/steer. Locomotion scores, tail lesions, left carpal joint circumference, and hoof dimensions were recorded and reported in a companion abstract. Average daily gain, feed conversion efficiency, cleanliness, and carcass traits were collected and reported. Hide cleanliness was graded on a scale of 0 to 9, with 0 being less than 5% soiled and 9 being completely soiled. Cattle housed on the rubber-covered slats had more soiling of the hide ( $P < 0.05$ ) and slightly lower dressing percentages ( $P < 0.13$ ) than steers on concrete slats. Average daily gain, dry matter intake and feed conversion efficiency were similar among treatments. Cattle on NC tended to have more backfat thickness ( $P < 0.06$ ) and high yield grade scores ( $P < 0.05$ ) compared with RC. There were negative correlations between toe angles of the front ( $r = -0.86$ ;  $P = 0.006$ ) and rear ( $r = -0.72$ ;  $P = 0.04$ ) hooves to carcass adjusted feed conversion efficiency. In summary, provision of rubber covers for concrete slats had minor effects on overall cattle performance. Cattle fed on rubber-covered slats may have more soiling of the hide and lower dressing percentages.

**Key Words:** feed conversion efficiency, slatted floor, dressing percent

**M14 Expression of aryl hydrocarbon receptor in the endometrium of dairy heifers during early pregnancy and the estrous cycle.** Michelle C. Hartzell\*, Troy L. Ott, Manasi M. Kamat, and Sreelakshmi Vasudevan, *Pennsylvania State University, State College, PA.*

Early embryo loss in dairy cattle is a major economic cost to dairy producers. A dairy operation with a low herd conception rate must use more feed and resources to be as productive as a herd with a higher conception rate and shorter calving interval. Our overall hypothesis is that a portion of these early embryo losses are mediated by aberrant response of the uterine immune system to the embryo. This research seeks to improve our knowledge of a potential cellular mechanism that may be involved in maintaining pregnancy, the aryl hydrocarbon receptor (AhR). The AhR is a ligand activated transcription factor involved in differentiation of T regulatory cells (T reg). We hypothesize that activation of T reg by AhR causes suppression of the maternal immune response to the allogeneic embryo. Holstein dairy heifers (n = 22) were estrous synchronized and bred by artificial insemination (Day = 0) or remained cyclic. Uterine endometrium was collected from heifers on Day 17 of the estrous cycle (n = 9), and Days 17 (n = 9) and 20 (n = 4) of pregnancy. Total cellular RNA was isolated from endometrial tissue using Trizol. The RNA was converted to cDNA and subjected to PCR using primers designed to recognize the bovine AhR. A single amplicon was visualized by gel electrophoresis and the DNA was excised, purified, and sequenced to confirm its identity. Purified cDNA from the amplicon was used to create a standard curve and a qPCR assay was developed and validated with a slope of -3.5 and efficiency of 93%. Analysis of steady-state mRNA abundance for AhR was conducted using RPL19 as the reference gene. Critical threshold (Ct) data were adjusted for RPL19 and  $2^{-\Delta Ct}$  values were analyzed using PROC Mixed and orthogonal contrasts. Although AhR was abundantly expressed in the endometrium, there was no difference in AhR mRNA abundance between pregnant and nonpregnant heifers nor between d 17 and d 20 pregnant heifers ( $P > 0.1$ ). Studies are ongoing to localize the AhR in endometrial tissue using immunofluorescence analysis. This study confirms the presence of the AhR gene in the bovine endometrium during the estrous cycle and early pregnancy.

**Key Words:** aryl hydrocarbon receptor (AhR), embryo

**M15 Absence of milk residues after using a hydrogen peroxide pre-dip.** Jamie E. Leistner\*, Joey D. Clark, and Jeffrey M. Bewley, *University of Kentucky, Lexington, KY.*

Some pre-dips leave residues in bulk tank after milking. Hydrogen peroxide is digested by lactoperoxidase, an enzyme released from the mammary gland during milking, which would mean this teat dip would not leave residues in the milk. The objective of this study was to determine if hydrogen peroxide-based teat dip a (OxyCide, GEA, Naperville, IL) leaves a residue in the bulk tank milk after use as a pre-dip. The study was conducted using 97 Holstein cattle at the University of Kentucky Coldstream Dairy. Three samples were collected from the bulk tank 20 different times, 10 from the 3:30 a.m. and 10 from the 4:00 p.m. milking sessions; once at the beginning of milking, once during the middle, and once at the end of milking. The bulk tank is collected every other day

so the dates of sampling were determined to have 10 a.m. and 10 p.m. samples before and after the bulk tank was emptied. The pre-dip was applied to the teats using teat dip cups. Then, 236.8 mL of milk from the bulk tank were collected into the same liquid measuring cup each sample. Peroxide test strips (Em Quant, Santa Ana, CA) were used to determine if hydrogen peroxide residues were present in the sample. In all samples collected throughout the study, the test strips tested negative for hydrogen peroxide residue. This study demonstrated that the enzymes in the milk successfully digested all detectable hydrogen peroxide from the pre-dip. This study suggests hydrogen peroxide can be used as a pre-dip to prevent any risk of residue left in the milk after milking.

**Key Words:** milk residue, hydrogen peroxide, pre-dip

**M16 Effects of adding a pasteurized milk balancer on dairy calf growth and performance.** Lydia H. Hoene\*<sup>1</sup>, B. Houin<sup>2</sup>, and Tamilee Nennich<sup>1,3</sup>, <sup>1</sup>*Purdue University, West Lafayette, IN*, <sup>2</sup>*Homestead Dairy, Plymouth, IN*, <sup>3</sup>*Famo Feeds, Freeport, MN.*

Milk is one of the largest costs of raising dairy calves. Therefore, increasing growth performance and efficiency of dairy calves is very important. The objective of this study was to determine the effect of adding a protein based pasteurized milk balancer (PMB) on the growth performance of dairy calves over the summer months. A total of 90 Holstein heifers were randomly assigned at 1 d of age to 1 of 3 treatments. The treatments were (1) 7.6 L/d of pasteurized milk (CONT), (2) 7.6 L/d of pasteurized milk supplemented with a PMB (PMB), and (3) pasteurized milk supplemented with a PMB and fed at a reduced volume amount of 5.4 L/d (LESS). The calves were fed milk 3 times a day and allowed ad libitum access to 20% CP starter. Calves were weighed at birth and measured every 2 wk until 8 wk of age for body weight (BW), hip height, heart girth circumference (HGC), and hip width. Starter intakes were measured weekly. Milk intake of calves was reduced to one-third of their milk allowance at 7 wk and they were weaned at 8 wks. Data were analyzed using Proc Mean of SAS with calf as the experimental unit. At 8 wk, BW were similar ( $P = 0.18$ ) for all calves on the CONT, PMB, and LESS treatments (81.2, 84.9, 84.1 kg of BW, respectively). Average daily gain (ADG) was similar regardless of treatment and averaged 0.78 kg/d over the 8 wk. Total starter DM intake was similar for all treatments ( $P = 0.71$ ) over the 8 wk, resulting in similar overall feed efficiency among treatments ( $P = 0.53$ ) at 0.44, 0.44, and 0.41 kg of starter per kg of gain for CONT, PMB, and LESS, respectively. Hip heights at 8 wk tended ( $P = 0.10$ ) to be greater for LESS compared with CONT (97.6 and 96.0 cm, respectively). There also tended ( $P = 0.09$ ) to be a difference in HGC with PMB calves having a HGC of 104.4 cm compared with 102.3 cm for CONT, with LESS calves being intermediate at 103.4 cm. Hip widths were similar between treatments ( $P = 0.26$ ). At 8 wk of age, supplementing calves with PMB tended to increase the HGC of calves, and feeding calves a reduced amount of milk with PMB added tended to result in taller calves compared with when calves were fed only pasteurized waste milk.

**Key Words:** dairy calves, pasteurized milk balancer, waste milk