Animal Behavior and Well-Being III

613 Measurement time required to detect sow lameness using an embedded microcomputer-based force plate system. B. M. McNeil*[1], C. E. Abell[1], J. D. Stock[1], S. T. Millman[2], A. K. Johnson[1], L. A. Karriker[2], and K. J. Stalder[1], [1]*Department of Animal Science, Iowa State University, Ames,* [2]*Swine Medicine Education Center, College of Veterinary Medicine, Iowa State University, Ames.*

Sow lameness is a key reason for sow removal from the breeding herd. Current sow lameness measures are subjective and therefore, biased. Efficient objective lameness measures are needed to improve diagnosis. It has been shown that an embedded microcomputer-based force plate system can detect lameness by measuring sow weight distribution. The objective of this study was to identify time required to adequately assess sow weight distribution on an embedded microcomputer-based force plate. Sound and lame states were examined to ensure that time requirements were the same for all lameness stages. Lameness was induced in 12 mature mixed parity sows on d 0 using a chemical synovitis model, applied to 1 of 2 randomized injection sites, left rear claws (LR) or right rear claws (RR) with 3 replicates per sow. There was a 2-wk time period between subsequent injections. A static force plate was used to measure the weight applied to each foot twice per second for 15 min on d −1, +1, +6 and +10 relative to lameness induction. Data were analyzed using a mixed model with time fitted as a fixed effect and a random sow effect. Results indicate mean and standard deviation force plate weight recordings after 5 min are not different ($P \geq 0.05$) when compared with those taken for 10 and 15 min, respectively. The maximum difference observed between the weight placed on each foot averaged over 5 and 15 min was 2.22 kg and 2.07 kg, for lame and sound sows, respectively. In conclusion, the force plate can discriminate weight distribution differences for sows when sound and acutely lame within 5 min. The results of this research can be used to improve the efficiency of using the force plate to objectively measure sow lameness by increasing the number of sows that can be measured within a given time period.

Key Words: sow, lameness, weight distribution

614 Embedded micro-computer based force plate as an objective tool to measure painful and non-painful hoof lameness states in multiparous sows. C. Mohling*[1], A. Johnson[1], C. Abell[1], H. Coetzee[2], S. Millman[3], L. Karriker[4], and K. Stalder[1], [1]*Animal Science, Iowa State University, Ames,* [2]*Cyclone Custom Analyte Detection Service, Iowa State University, Ames,* [3]*Veterinary Diagnostic and Animal Production Medicine, Iowa State University, Ames,* [4]*Swine Medicine Education Center, Iowa State University, Ames.*

Lameness diagnosis using subjective gait scoring may not be repeatable and reliable. Weight distribution is one tool that might provide objective measures to determine the severity of lameness. The objective of this study was to compare differences in weight placed on each limb from sows in painful and non-painful hoof lameness states. Twelve mixed parity sows weighing 228.51 ± 18.08 kg (mean BW ± SD) were individually housed. On d 0, lameness was induced on a randomized rear hoof using a chemical synovitis model. After completion of the first round, sows were given a 7d rest period and then the trial was repeated with lameness induced in the other rear hoof. Three treatment days were compared (1) sound (1 d before induction), (2) most lame (first day after induction of transient lameness) and (3) resolved (sixth day after induction). Sows stood individually on an embedded force plate for 15 min, and weight on each hoof was measured independently. Data were analyzed using the PROC MIXED procedure in SAS with sow as the experimental unit in a crossover design. Weight distributions were compared between sound, most lame and resolved days. On the most lame day, sows exhibited less weight bearing on the injected hoof compared with sound and resolved days ($P < 0.0001$). On the resolved days, sows placed less weight on the lame hoof compared with the sound day ($P < 0.0001$). Regardless of which hoof was injected, sow weight distribution did not vary between the injected hooves ($P = 0.62$) or between rounds ($P = 0.97$). In conclusion, the embedded microcomputer force plate was a sensitive tool detecting acute hoof lameness in mature sows.

Key Words: force plate, lameness, swine

615 Porcine reproductive and respiratory syndrome virus (PRRSV) causes neuroinflammation and cognitive impairment in neonatal piglets. M. Elmore[1], M. Burton[1], M. Conrad[1], J. Rytych[1], W. Van Alstine[2], and R. Johnson*[1], [1]*University of Illinois, Urbana,* [2]*Purdue University, West Lafayette, IN.*

Inflammatory cytokines produced during infection affect the developing brain. This is important to animal agriculture because developmental events may program behavioral and physiological systems that affect production and well-being. Unfortunately, little is known in agricultural animals about how neonatal infection affects brain development and behavior. To begin addressing this issue, piglets obtained 48 h after birth were placed in disease containment chambers where they received a nutritionally complete piglet milk replacer. At 7 d of age, piglets were inoculated with PRRSV or sterile PBS. Throughout the study, body weight, rectal temperature, and sickness behaviors were measured daily. At 2-wk of age, piglets were trained to locate a reward in a constant place and location using extra-maze visual cues in a T-maze. After behavioral testing, piglets were euthanized (~4 wks of age) for tissue collection. RT-PCR was used to assess expression of a panel of genes in the hippocampus that served as markers of inflammation, oxidative homeostasis, and synaptic plasticity. Microglia were isolated from the hippocampus and stained with antibodies to confirm cell type (CD11b and CD45) and indicate cell activation (MHC II). PRRSV piglets had a higher average daily temperature ($P < 0.0001$), were less likely to consume their first meal each day ($P < 0.0001$), and had lower average body weights at the end of the study ($P = 0.0022$) compared with control piglets. Maze performance was affected by treatment ($P = 0.003$), with PRRSV piglets taking longer to reach performance criterion than controls. PRRSV piglets had significantly higher levels of activated microglia ($43.18 \pm 5.91\%$) compared with controls ($2.52 \pm 6.93\%$; $P = 0.0003$). This was accompanied by a general increase in inflammatory gene expression. Overall, these data demonstrate that piglets infected with PRRSV exhibit cognitive impairment and a marked increase in activated microglia in the hippocampus. This heightened neuroinflammatory response likely explains the cognitive deficits observed following PRRSV infection.

Key Words: infection, microglia, swine

616 Automatic lameness detection by computer vision and behaviour and performance sensing. T. Van Hertem*[1,2], S. Viazzi[2], C. E. B. Romanini[2], C. Bahr[2], D. Berckmans[2], A. Schlageter-Tello[3], C. Lokhorst[3], D. Rozen[4], A. Antler[1], V. Alchanatis[1], E. Maltz[1], and I. Halachmi[1], [1]*Institute of Agricultural Engineering - Agricultural Research Organization (ARO) - the Volcani Center, Bet-Dagan, Israel,* [2]*Division M3-BIORES: Measure, Model & Manage Bioresponses, KU Leuven,*

J. Anim. Sci. Vol. 91, E-Suppl. 2/J. Dairy Sci. Vol. 96, E-Suppl. 1

645

Heverlee, Belgium, [3]*WageningenUR Livestock Research, Lelystad, Netherlands,* [4]*Fellow in the EU BioBusiness project.*

The objective was to develop a reliable automatic lameness detection method based on consecutive daily automatic measurements of cow's back posture, behavioral and performance variables. The experimental setup was located in a commercial Israeli dairy farm of 1,100 Israeli Holstein cows. All cows were housed in open, roofed cowsheds with dried manure bedding and no stalls. All cows were equipped with a commercial neck activity and ruminating time data logger. Milk yield was measured with a milk flow sensor. Cow gait recordings were made during 4 consecutive nighttime milking sessions with a depth image camera. From the videos, the "inverse radius" of the back posture contour and the "body movement pattern" were extracted. The reference in this study was a daily live locomotion score of the animals. A dataset of 186 cows with 4 video-based lameness scores and 4 live locomotion scores was built. A logistic regression model was built with the highest correlated behavioral and performance variables. Model validation was done with 10-fold cross-validation. The analysis of the video-based scores as independent observations lead to a correct classification rate of 53.0% and a misclassification rate of 9.8% on a 5-point level scale. A multinomial logistic regression model based on 4 consecutive "body movement pattern"-scores and "inverse radius"-scores obtained a correct classification rate of 60.8% and a misclassification rate of 9.1%. Binary classification to lame vs. not-lame categories reached 76.5% sensitivity, 97.8% specificity and 91.9% accuracy with a multinomial logistic regression model. The logistic regression model based on the behavioral and performance data reached a sensitivity of 89%, and a specificity of 85%. The use of consecutive video measurements improved the correct classification rate with 7.8% and misclassification rate with 0.7% compared to the independent analysis of the observations. The combination of image processing and behavioral monitoring is believed to further improve the lameness detection accuracy. This study is part of the Marie Curie Initial Training Network BioBusiness (FP7-PEOPLE-ITN-2008).

Key Words: lameness, computer vision, behavior and performance sensing

617 Effect of dystocia on daily activity patterns prior to parturition in Holstein dairy cows. M. Titler*, M. G. Maquivar, S. Bas, E. Gordon, P. J. Rajala-Schultz, K. McCullough, and G. M. Schuenemann, *Department of Veterinary Preventive Medicine, The Ohio State University, Columbus.*

Dystocia increases the risk for health disorders or mortality, and reduces performance of both the dam and calf. The objective of the present study was to assess the effect of dystocia on cow activity behavior 4 d before calving. A total of 147 Holstein cows (PRIM and MULT) housed in free-stall barns from 3 dairy herds were used. All cows were housed in similar facilities using a close-up pen 15 d before the expected calving date and a contiguous individual maternity pen for parturition. Electronic data loggers (IceQube, IceRobotics, Edinburgh, Scotland) were placed on the hind leg of periparturient dairy cows at 7 ± 3 d before the expected calving date and 14 ± 3 DIM. Calving ease (CE; scale 1–4), parity, calving date and time, and stillbirth (born dead or died within 24 h) were recorded. The number of steps, standing time (min), number of lying bouts (LB), and mean duration of LB (min) were recorded. Unassisted cows (n = 132; CE score of 1) were compared with assisted cows (n = 15; CE scores of 2–3). Data were analyzed using MIXED (activity patterns) and GLIMMIX (stillbirth) procedures of SAS. Activity patterns for assisted or unassisted cows were adjusted for the effect of herd, parity, and CE. Cows with assisted births spent more time standing (18.6%; ($P < 0.05$), had similar number of LB ($P >$

0.05), but LB of longer duration (42.6%; ($P < 0.05$) 24 h before birth compared with unassisted cows. These findings provided evidence that cows experiencing difficult births showed distinct activity behavior 1 d before calving. Recognizing early warning signs (restless activity) of dystocia before birth may help identify those cows most at risk and pre-plan a triage as opposed to waiting for the usual signs of intervention. Monitoring cow activity along with proactive management practices around the time of calving should improve the overall survival and welfare of both the dam and calf.

Key Words: dystocia, stillbirth, dairy cow welfare

618 Rumination and feeding behavior before calving can identify cows at risk for metritis and subclinical ketosis after calving. K. Schirmann*[1,2], N. Chapinal[1], W. Heuwieser[2], D. M. Weary[1], and M. A. G. von Keyserlingk[1], [1]*Animal Welfare Program, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC, Canada,* [2]*Clinic for Animal Reproduction, Faculty of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany.*

The objective of this study was to investigate differences in rumination and feeding activity between healthy and sick animals in the transition period. Cows were monitored from 10 d before to 21 d after calving. Daily rumination and feeding activity were recorded electronically and cows were subject to daily health checks. Twice a week cows were examined for vaginal discharge, and 3 times a week blood was sampled for β-hydroxybutyric acid concentration (BHBA). Cows were diagnosed as metritic when they had purulent (>50% pus visible) or fetid, watery discharge. Subclinical ketosis (SCK) was classified at a BHBA concentration of ≥1.0 mmol/L during the week after calving or ≥1.4 mmol/L during the following week. Cows with BHBA >3.0 mmol/L at any time throughout the study were classified as ketotic. Cows that were healthy (n = 19) were compared with those that had metritis (n = 16), SCK (n = 9), or both metritis and SCK (n = 10) using mixed models in SAS, including health status as a fixed effect. The contrast statement was used to test for differences between the LSM. Compared with healthy cows, those with SCK or metritis and SCK spent less time ruminating in the prepartum period (−88.3 ± 27.0 min/d; and −42.2 ± 25.3 min/d, respectively). There were no differences between healthy and any of the sick groups in time spent ruminating after calving. Dry matter intake before calving was lower for all 3 classes of sick animals (metritic: −0.8 ± 1.1 kg/d; SCK: −2.5 ± 1.2 kg/d; metritic and SCK: −3.1 ± 1.2 kg/d) relative to healthy cows; theses differences were no longer evident after calving. Cows with SCK spent less time feeding than healthy cows before calving (SCK: −60.0 ± 18.8 min/d) and after calving (−30.8 ± 14.8 min/d), but there was no difference between healthy cows and those with metritis or metritis and SCK in either period. In conclusion, electronic recordings of rumination and feeding behavior before calving show promise in identifying cows at risk for metritis and SCK after calving.

Key Words: welfare, rumination, postpartum disease

619 Detecting post-calving ketosis by sensors and models. M. Steensels*[1,2], E. Maltz[1], C. Bahr[2], D. Berckmans[2], A. Antler[1], and I. Halachmi[1], [1]*Institute of Agricultural Engineering - Agricultural Research Organization (ARO) - the Volcani Center, Bet-Dagan, Israel,* [2]*Division M3-BIORES: Measure, Model & Manage Bioresponses, KU Leuven, Heverlee, Belgium.*

The aims were to analyze behavior (lying time, lying bouts, rumination time, activity) and performance (milk yield and composition) variables

646

J. Anim. Sci. Vol. 91, E-Suppl. 2/J. Dairy Sci. Vol. 96, E-Suppl. 1

of multiparous cows in early lactation in relation to post-calving ketosis and to develop a model to detect post-calving ketosis based on these variables. Every cow between 5 to 12 days after calving was examined for ketosis. A cow with a Ketostix test result higher than 1,470 μmol AcAc/L was considered as ketotic. Six commerical Israeli dairy farms contributed to the research. Two were equipped with behavior sensors that recorded maximal number of steps per hour, lying bouts and lying time. In the analysis, 39 ketotic and 118 healthy cows were used. Four were equipped with rumination and neck activity sensors. In the analysis, 203 ketotic and 503 healthy cows were used. Daily behavior and performance data for the first three weeks after calving were analyzed using a repeated measures procedure and then, a logistic regression model was developed for post-calving ketosis detection. Lying time was higher in ketotic (546 ± 4 min/d; mean ± standard error) than in healthy (503 ± 2 min/d) cows. Maximal number of steps per hour was not different in ketotic and healthy cows. Rumination time was lower in ketotic (36.3 ± 0.6 min/2 hour) than in healthy (39.1 ± 0.4 min/2 hour) cows. Neck activity was lower in ketotic (27.9 ± 0.5 units/2 hour) than in healthy (30.0 ± 0.3 units/2 hour) cows. Milk yield was lower in ketotic (34.4 ± 1.0 kg/d) than in healthy (38.9 ± 0.6 kg/d) cows. For post-calving ketosis detection, the best model results were obtained when calibration and validation were performed on data from the same farm: sensitivity ranged from 78% to 90% and specificity ranged from 71% to 74%. It was concluded that behavior and performance variables in early lactation (rumination time, activity and milk yield) can be used to detect post-calving ketosis. Other diseases might show similar patterns. Between-farm differences can affect model robustness and it is suggested that including more variables from other sensors into the model could improve model quality.

Key Words: ketosis, behavior and performance sensing, logistic regression model

620   Effect of metritis on daily activity patterns in lactating Holstein dairy cows. M. Titler*, M. G. Maquivar, S. Bas, E. Gordon, P. J. Rajala-Schultz, K. McCullough, and G. M. Schuenemann, *Department of Veterinary Preventive Medicine, The Ohio State University, Columbus.*

Metritis increases the risk for mortality and reduces milk yield and reproductive performance of lactating dairy cows. The objective of the present study was to assess the effect of metritis on activity behavior 3 d before and after diagnosis. A total of 15 lactating Holstein cows diagnosed with metritis (MET) were matched with 15 non-MET lactating Holstein cows. All cows were housed in free-stall barns and calved during the same week. Electronic data loggers (IceQube, IceRobotics, Edinburgh, UK) were placed on the hind leg of periparturient dairy cows at approximately 7 ± 3 d before the expected calving date and remained until 14 ± 3 DIM. Metritis was defined as a fetid red-brown watery vaginal discharge with systemic signs of illness within 14 DIM. Calving ease (CE; scale 1–4) of cows, parity, and stillbirth (born dead or died within 24 h) were recorded. The number of steps, standing time (min), number of lying bouts (LB), and mean duration of LB (min) were recorded. Activity patterns of MET cows were compared with non-MET cows. Data were analyzed using MIXED procedures of SAS. Activity patterns for MET or non-MET cows were adjusted for the effect of herd, parity, and CE. MET cows spent more time standing (4–28%), had fewer steps (12–35%) and LB (23%), and LB of longer duration (22–28%) 1–3 d before and after diagnosis compared with non-MET cows ($P < 0.05$). These findings provided evidence that cows experiencing MET showed distinct behavioral activity patterns 1–3 d before diagnosis. Although proactive management practices to prevention MET should be a top priority for dairy herds, monitoring transition cow activity may help identify those cows at risk of MET before developing the clinical signs and improve the overall survival and welfare of MET cows.

Key Words: transition cow management, metritis, dairy herd welfare

621   Cow activity around diagnosis of naturally occurring clinical mastitis. P. J. Rajala-Schultz*, K. E. McCullough, P. N. Gott, G. M. Schuenemann, and M. Titler, *Department of Veterinary Preventive Medicine, The Ohio State University, Columbus.*

As the most common disease of dairy cows worldwide, mastitis causes considerable economic losses in dairy herds and it is also an animal welfare issue. Early diagnosis and treatment could mitigate these negative effects. Dairy cows display classic sickness behavior after experimentally induced mastitis, but behavioral changes in naturally occurring cases of clinical mastitis (CM) have rarely been reported. The objective of this study was to describe sickness behavior in cows with naturally occurring CM. Activity monitors (IceQube, IceRobotics, Edinburgh, UK) were placed on a hind leg of 80 pregnant dairy cows about a week before expected calving and kept for 14–21 d after freshening in 2 Ohio dairy herds during July and August of 2011 and of 2012. CM cases were diagnosed by farm personnel according their standard operating procedures. The monitors measured number of steps taken and lying bouts, and lying and standing time. Data were analyzed with PROC MIXED in SAS (SAS Institute Inc., Cary, NC). Daily summaries of the different activity parameters were used as outcomes and days with respect to CM diagnosis was the main variable of interest. Day 5 before diagnosis was used as the baseline level in the analysis. Days in milk at CM diagnosis, herd and parity were tested in the models as potential confounders. During the study periods, 12 cows were diagnosed with CM only (no other diseases) and were included in statistical analysis. Preliminary results indicate that an average length of a lying bout was significantly shorter 3 and 2 d before CM diagnosis (by 34 min, $P = 0.0063$ and 37 min, $P = 0.0048$, respectively). Also, overall standing time was 2.2 h longer ($P = 0.0293$) 2 d earlier compared with the day of CM diagnosis. These preliminary results suggest that cow activity is altered around CM occurrence and before herd personnel is able to make a diagnosis of CM. As this type of technology becomes more readily available on farms, monitoring of behavioral changes could assist in early diagnosis of CM and alert herd personnel to more careful examination of high risk cows.

Key Words: cow activity, clinical mastitis, sickness behavior

622   Use of accelerometers for early detection of hoof lesions and lameness in dairy cows. J. H. Higginson Cutler*[1], S. T. Millman[2], G. Cramer[1,3], K. E. Leslie[1], A. M. B. de Passille[4], T. F. Duffield[1], and D. F. Kelton[1], [1]*University of Guelph, Guelph, ON, Canada,* [2]*Iowa State University, Ames,* [3]*Cramer Mobile Bovine Veterinary Services, Stratford, ON, Canada,* [4]*Agriculture and Agri-Food Canada, Agassiz, BC, Canada.*

Lameness is considered one of the primary welfare concerns in the dairy industry. Early identification of lameness has been suggested as one method for decreasing the prevalence of lameness. The objective of this research was to determine differences in activity and lying behavior in lame and sound cows as well during development of hoof lesions could be observed with accelerometers. All cows on a research farm (n = 234) were fitted with Afikim Pedometer Plus accelerometers. All cows had their hooves examined every 3–4 mo at which time lesions were identified, video of gait was taken for locomotion scoring, and trimming was performed if necessary. Cows with a locomotion score

J. Anim. Sci. Vol. 91, E-Suppl. 2/J. Dairy Sci. Vol. 96, E-Suppl. 1

647

of 3 or above on a 5-point scale were considered lame. To determine if activity and lying differed between lame and sound cows, linear mixed models were built. To determine if changes could be observed within cow but comparing periods of time where individual cows were sound and lame, a generalized linear mixed model was used to assess change between the 2 time periods (approximately 3–4 mo apart). Eleven cows with ulcers, one cow with digital dermatitis, and 3 cows with both ulcers and digital dermatitis were observed lame and included in analysis. Lame cows were significantly less active ($P = 0.01$) and had greater lying duration ($P = 0.04$) compared with sound cows. When comparing data for cows in periods where they were sound and periods where painful lesions were present, data was available for 22 cases of ulcers, 10 cases of digital dermatitis, and 8 cows with both ulcers and digital dermatitis. Lying duration differed between the 2 time periods, with cows lying for 55 min more when a painful ulcer was present compared with when they did not have a painful lesion ($P = 0.03$). This accelerometer can be used to detect changes both between lame and sound cows and within cow when comparing periods of time when cows were sound to periods when a painful lesion was present. Early detection could allow for timely treatment and decrease the prevalence of lameness in dairy cattle.

Key Words: lameness, accelerometer, hoof lesion

623   Pheromone/Interomone effects of behavior of foals after weaning. K. A. Guay*, M. D. May, and J. J. McGlone, *Texas Tech University, Lubbock.*

Weaning can be stressful to both the mother and offspring. This was a preliminary study to determine if calming pheromones had an effect on foal behavior immediately after the weaning process. After weaning, foals vocalize, pace, increase aggression and show increased activity. The pig pheromone (androstenone) was shown in our laboratory to reduce head-shy behavior of horses. The rabbit maternal pheromone (2-methylbut-2-enal) was shown to reduce anxious behaviors in dogs. Both the pig and rabbit pheromones act as interomones on other species. Ten foals were selected and randomly assigned to a treatment group. Twelve foals (6 to 8 mo of age) from a large commercial ranch in West Texas were weaned on a single day. All subjects were stock type ranch horses (Quarter Horse). Foals were randomly assigned a treatment, n = 4 (pig pheromone; PP, rabbit pheromone; RP, or Control; CON). Treatments were administered as a gel to the nose of the animal and then separated into non-adjacent, group pens. Stress behavior such as vocalizations, pawing, fighting, headshaking, defecation, pacing and sweating were recorded for 15 min post weaning. Analysis was done by 2 × 2 Chi-squared. The CON group paced more ($P < 0.01$) than RP or PP groups (70.8, 15.7, 13.4%, respectively). The RP-treated foals vocalized more ($P < 0.01$) compared with CON (52.0 vs. 30.0%) and CON vocalized more than PP-treated foals (30.0, 18.0%, respectively). The CON group displayed more ($P < 0.001$) aggressive/fighting behav-

ior than RP and PP (59.3, 7.3, 33.33%, respectively), and PP fought more than RP (33.33 vs. 7.3%, respectively). Our findings suggest pheromones/interomones may reduce some negative behavioral effects observed at weaning. The RP and PP may calm weaned horses. More research is needed to describe behavioral and physiological influences of interomones on horses in stressful situations.

Key Words: horse, pheromone, interomone

624   Relationships of temperament, exit velocity and rectal temperature of crossbred steers challenged with bovine viral diarrhea virus. X. Fang*[1], E. Downey[1], C. A. Runyan[1], J. E. Sawyer[2], T. B. Hairgrove[1], J. F. Ridpath[3], W. Mwangi[1], C. A. Gill[1], and A. D. Herring[1], [1]*Texs A&M University, College Station,* [2]*Texas Agrilife Extension, College Station,* [3]*USDA-ARS, Ames, IA.*

The objective of this study was to investigate genetic influences of temperament that may affect health-related measures in cattle. Angus-Nelore F_2 and F_3 yearling steers born in 2009–2011 were stratified by breed composition and sire across bovine respiratory disease vaccine strategies of killed (2009 n = 28, 2010 n = 32, 2011 n = 35), modified live (MLV) (2009 n = 25, 2010 n = 36, 2011 n = 35) or no vaccine (2009 n = 25, 2010 n = 36, 2011 n = 36). Prior to vaccination, temperament score (TS) was assessed through a 1-to-9 scoring of system shortly after weaning (approximately 8 mo age) by 4 evaluators. Following vaccination (25 to 35 d), with killed booster or single MLV, steers were challenged intranasally with a strain of type 1b bovine viral diarrhea virus (BVDV). Exit velocity (EV, m/s) and rectal temperature (RT) were collected on vaccination days, BVDV challenge day (d 0), and d 3, 7, 10, 14, 28, and 42 d following challenge. Pearson correlations among TS, EV and RT were evaluated. Mean TS was 4.2, 5.9 and 4.5 in 2009, 2010 and 2011-born steers, respectively; some sires were only represented in one year. Correlations (0.17 to 0.37, $P < 0.05$) between TS and EV were observed after first vaccination day. Correlations (0.19 to 0.31, $P < 0.005$) between TS and RT were observed. Correlations (-0.12 to -0.28, $P < 0.005$) between EV and RT on the same day were observed after 7 d following challenge. Mixed model analyses of EV and RT as repeated measures incorporated fixed effects of year (YR), vaccine group (VAC), sire nested within YR, pen nested within YR, and day, along with potential interactions involving YR, VAC and day. Sire, YR and day were significant influences on EV and RT. VAC × day influenced RT, but not EV. The interaction of YR × VAC × day influenced both EV and RT, but without obvious patterns. In these cattle it appears temperament may be a primary influence on rectal temperature. Interpretation of rectal temperature for cattle health is complex and should perhaps involve assessment of temperament score and/or exit velocity, at least in some circumstances.

Key Words: temperament, exit velocity, BVDV challenge

648

J. Anim. Sci. Vol. 91, E-Suppl. 2/J. Dairy Sci. Vol. 96, E-Suppl. 1