Animal Behavior and Well-Being: Focus on Physiological Response

151 Utilizing a multidisciplinary approach to assess livestock welfare. J. Johnson*, *USDA-ARS Livestock Behavior Research Unit, West Lafayette, IN.*

Animal agriculture sustainability is being challenged by a rapidly increasing global human population, environmental pressures such as climate change, and a push toward reducing or eliminating antibiotic use. As a result, livestock producers are tasked with producing more animal products with less inputs and technologies while ensuring that appropriate animal welfare standards are maintained. The belief that distress should be limited for livestock to improve welfare is widely accepted by producers, scientists, and the public, and as such, farm animal welfare is an important societal issue. However, the correct way to assess the welfare state of livestock is often debated and using sound science to define what constitutes "good" animal welfare is a key component of developing animal husbandry practices and mitigation strategies to improve animal welfare while maintaining economic sustainability. The study of animal welfare is unique in that it often incorporates multiple scientific disciplines (i.e., stress physiology, behavior, immunology, nutrition) to evaluate the impact of various stressors on animal welfare and understand the interactions between differing biological systems under stressful conditions. Therefore, a multidisciplinary assessment of livestock welfare allows scientists to determine the relationships between animal behavior and physiology that can affect welfare states and ultimately influence animal performance and production efficiency.

Key Words: animal welfare, livestock, multidisciplinary

152 Using drool as an indicator of heat load in dairy cattle. A. M. Drwencke*[1], G. Tresoldi[2], and C. B. Tucker[1], [1]*Center for Animal Welfare, Department of Animal Science, University of California, Davis, Davis, CA,* [2]*College of Agriculture, California State University, Chico, Chico, CA.*

Heat stress is a prominent issue in the dairy industry that results in approximately $800 million in production losses each year. Signs of heat stress include higher respiration rates and body temperature as well as panting, a combination of drooling and breathing through an open mouth. Identification of early signs of heat stress is important for effective abatement, but the thresholds of when onset occurs are not well defined. Drooling could be a way to identify early signs of increasing heat load. Our objective was to identify the respiration rate and body temperature of cattle at 3 time points: 1) when cows initially began drooling in a day (ID), 2) during other drooling events following the first occurrence in a day (OD) and 3) when they were not drooling (ND). Twenty-four Holstein cows averaging (±SD) 37.5 ± 4.5 kg/d of milk were observed over the course of a summer (12 d/cow; 6 cows at a time; total of 48 d of observation). Respiration rate and signs of drooling, breathing with their mouth open and tongue extended past the teeth were taken every 30 min from 1000 to 1900 h. Body temperature was recorded every 3 min 24 h/d using vaginal loggers. To evaluate body temperature alongside drooling, all readings of vaginal temperature within 10 min of a respiration rate and panting data collection event were averaged and assigned to that time point. During the time period of observation, air temperature averaged 33.3 ± 4.0°C or THI 79 ± 3.2. Least squares means within a mixed model were used to obtain average values. Respiration rates in breaths/min were: ID = 73 ± 2; OD = 76 ± 2; ND = 60 ± 2 ($P < 0.001$). Body temperature averaged: ID = 38.8 ± 0.05; OD = 39.0 ± 0.05; ND = 38.7 ± 0.05°C ($P < 0.001$). Taken together, these results indicate that the first occurrence of drool in a day is an early indicator of increased heat load. Drooling occurs at higher respiration rates and body temperature than when no drool is present. Finally, within this data set, any occurrence of drooling could have been utilized by producers as an indicator of increased heat load in cattle.

Key Words: heat stress, drooling, panting

153 Efficacy of pain control for caustic paste disbudding in very young calves. C. N. Reedman*[1], T. F. Duffield[1], T. J. DeVries[2], K. D. Lissemore[1], N. Karrow[2], Z. Li[2], and C. B. Winder[1], [1]*Department of Population Medicine, University of Guelph, Guelph, ON, Canada,* [2]*Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada.*

Dairy producers disbudding calves with caustic paste are less likely to provide pain control than those using cautery. Little research has been conducted on pain control for this method and no studies have specifically examined calves under a week of age although producers will commonly apply this product at this time. The objective of this study was to evaluate the efficacy of local anesthesia and nonsteroidal anti-inflammatory drug (NSAID) analgesia in very young dairy calves. 140 heifer calves aged 1–9 d were enrolled into 28 blocks and randomly allocated to 1 of 5 interventions: sham control; positive control (no pain control); lidocaine cornual block; meloxicam; and lidocaine cornual block and meloxicam. Data were analyzed using mixed models with a fixed effect for baseline values and a random effect for trial block. Compared with no local anesthetic, lidocaine reduced serum cortisol at 15, 30, 45, and 60 min post-disbudding (60 min; −138 pg/mL, 95% CI: −200 to −76 pg/mL). Cortisol values were not different between lidocaine treated calves and sham controls at these time points. At 60, 90, 120, and 180 min post-disbudding, calves treated with lidocaine and meloxicam had reduced cortisol compared with lidocaine alone (180 min post disbudding, −61 pg/mL, 95% CI −112 to −10 pg/mL), and values did not differ between lidocaine/meloxicam treated calves and sham controls at these time points. At 3–4 d post-disbudding, treatment with lidocaine and meloxicam tended to reduce haptoglobin (+0.16 mg/mL, 95% CI 0.00 to 0.32), but no differences were found between groups at 3 h and 6–7 d post-disbudding. At 60, 90, and 120 min post-disbudding, lidocaine treated calves had decreased pressure sensitivity (90 min, −2.26 kgf, 95% CI −3.15 to −1.37). No differences were seen in pressure sensitivity between groups at 180 min, 3–4- or 6–7-d post-disbudding. These findings suggest that the combination of local anesthesia with NSAID analgesia are beneficial at reducing pain indicators and inflammation in very young calves disbudded with caustic paste.

Key Words: welfare, anesthesia, analgesia

154 Effects of environmental enrichment on behaviors, growth, and stress in limit fed Holstein heifers. K. M. Kelly*[1], S. H. Ward[1], J. H. C. Costa[2], G. W. Smith[1], and A. J. Geiger[3], [1]*North Carolina State University, Raleigh, NC,* [2]*University of Kentucky, Lexington, KY,* [3]*Zinpro Corporation, Eden Prairie, MN.*

The objective of this study is to determine if the addition of environmental enrichment will prevent the negative behaviors exhibited by limit-fed heifers. Twenty-four Holstein heifers (161.9 ± 33d of age) were randomly assigned to a split-plot design and housed in 2 sets of 3 pens containing a brush (BR), ball (BA) or no enrichment (NO).