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## POSTER PRESENTATIONS

### Animal Behavior and Well-Being: Dairy Cattle, Housing Management and Stress

#### **W1 The effect of social hierarchy on lactating cows during relocation.**

K. J. Pence\*, K. F. Knowlton, F. C. Gwazdauskas, R. E. Pearson, C. S. Wilson, L. Harris, C. O. Wilkes, S. R. Hill, and A. M. Hurt, *Virginia Polytechnic Institute and State University, Blacksburg.*

The objective of this study was to determine the effect of social hierarchy on plasma cortisol concentration, milk yield (MY), and behavioral changes in lactating cows during relocation. Social hierarchy was determined by forced competition in 17 lactating Holsteins 1 mo prior to relocation. Each of the cows was paired once with each of the other cows over a 4-d test period. The pair of cows were offered a bucket with 0.5 kg of grain for 3 min. The total amount of time each cow had access to the grain over the 4-d test period was analyzed to determine dominance rank. The 8 cows that had the longest total access time were classified as the dominant cows, while the 9 cows that had access for the shortest total time were classified as the subordinate cows. Days in milk (DIM), BW, MY, or age were not different between dominant and subordinate animals. Blood samples were collected on d -7, -1, 0, 1, 2, 7, 14, and 21 relative to relocation. Milk production was analyzed in three periods; PD1 = pre-move, PD2 = wk 1-2 following relocation, and PD3 = wk 3-4 following relocation. Also, three 24 h observation periods (5 d prior to relocation, 1 d following relocation, and 12 d following relocation) were conducted to determine behavioral differences. Behaviors recorded included location, primary activity, urinations, defecations, and stereotypies. The effects of dominance rank, period and their interaction were evaluated with Proc MIXED of SAS. Plasma cortisol concentration (mean = 4.5 ng/ml) and observed behaviors were not influenced by dominance rank, period or the interaction. Milk yield was reduced following relocation in subordinate cows (PD1 = 26.3 kg/d, PD2 = 25.6 kg/d, PD3 = 21.6 kg/d), but not dominant cows (mean = 25.9 kg/d). Changes in post-move MY indicate that subordinate cows did not adapt to relocation as well as dominant cows.

**Key Words:** Social Hierarchy, Relocation, Lactation

#### **W2 Effect of freestall size and surface on frequency and type of use by lactating dairy cows.** K. Cummins\*, L. Carlson, J. Grubbs, and B. Rickman, *Auburn University, Auburn.*

A study was done to compare 5 different commercially available freestall mats and two different stall sizes. Stall sizes were: Small, 1.22 m wide, 1.14 m height mattress to neck rail, and 1.68 m curb to brisket board, and Large, 1.27 m wide, 1.27 m height mattress to neck rail, and 1.78 m curb to brisket board. Cows were randomly assigned to one of three groups, two with the large

and one with the small freestall size, each with access to stalls using each of the mat types. Equal numbers of mature Holstein cows (n=40) were in each group. Each group had access to 35 stalls (7 mats of each type) approximately 12 h per day in two 6 h periods. Cows were observed from 1100 to 1300 h each of 5 consecutive days. At this time, cows were in the freestall barn, had eaten freshly-offered feed, and were resting before milking at 1330 h. Every 5 minutes the stalls were observed and those in use recorded and the type of use (posture) noted: lying down, standing, or standing half in and half out with just the front feet in the stalls. Data was analyzed using the PROC CHISQ procedure of SAS for chi-square analysis of differences in frequency distribution of type of use and type of mat. Mattress type had no effect on stall use (P>.1). Cows used all

mattress types with the same frequency. There was a significant effect of stall size on frequency of use. Total stall use was increased by stall size (92.9, 97.6 percent use for large stalls vs. 49.6 for small stalls, P<.05) Posture adopted by the cows was affected by stall size. (P<.05). Cows in large stalls adopted a lying posture more frequently than in small stalls (69.0, 57.3 vs. 24.1 percent of stall use, P<.05). Standing postures, whether half in and half out or fully in the stall were not significantly affected by stall size (P>.1). We conclude that mattress type had no effect on stall use, but that stall size had a significant effect on both frequency and manner of stall use. Changes as small as 0.1 m can significantly alter cow useage.

**Key Words:** Behavior, Freestall

#### **W3 Regrouping dairy cattle and subsequent effects on dominance rank and milk production.** B. Sandmann\*, J. Swanson, J. Shirley, and J. Smith, *Kansas State University, Manhattan.*

Dairy producers commonly regroup cattle for milk production, reproduction, sickness and/or injury purposes. Eighty Holstein cows (40 multiparous and 40 primiparous) were used to determine the effect of regrouping on dominance rank and milk yield. Cows were regrouped both within and across parity. Dominance rank was determined from the number of interactions between animals, via a two way matrix. Three regroupings were done at three week intervals and cows were observed for the first two weeks after each regrouping, twice daily for one hour following milking. Animals in each pen were classified as either moved animals (n=9), that moved to another pen, or remaining animals (n=11), that remained in a home pen. Moved groups contained three most dominant rank, three middle rank and three most subordinate rank cows from each pen. Upon regrouping, a new dominance rank was determined for each new pen. Regrouping disrupted the social hierarchy; an increase in agonistic activity was seen in all pens following regrouping until the formation of a new social hierarchy. Change in dominance rank was observed for animals that moved as well as animals that remained in the home pen. Dominant individuals had the most notable decrease in milk production during each phase and across the study (phase 1 P < 0.01; phase 2 P < 0.01; phase 3 P < 0.01). Milk yield from middle rank cows decreased after the first (P < 0.01) and second (P < 0.04) regrouping but subordinate cows experienced decreased milk yield only during the second regrouping (P < 0.01). Regrouping affected dominance ranking but not milk yield in primiparous cows. Our results indicate that regrouping disrupts the social hierarchy and has a negative effect on milk yield by multiparous cows, particularly in dominant cows.

**Key Words:** Regrouping, Milk Production, Dominance Rank

#### **W4 The effect of diet on lactating dairy cows during relocation.** K. J. Pence\*, K. F. Knowlton, F. C. Gwazdauskas, R. E. Pearson, C. O. Wilkes, A. M. Hurt, S. R. Hill, M. Hollmann, and C. S. Wilson, *Virginia Polytechnic Institute and State University, Blacksburg.*

The objective of this study was to determine dietary effects on stress in lactating dairy cows during relocation to a new dairy facility. Twenty-three lactating

Holsteins were assigned to one of three dietary treatments 3 wk prior to and 9 wk following relocation. The three treatments consisted of a basal total mixed ration consisting of alfalfa and corn silage, ground corn and barley, soybean meal, and pressed brewer's grains (TMR); the TMR plus orchard grass hay as 10% of the DM offered; and the TMR plus alfalfa hay as 10% of DM offered. All cows were fed in Calan doors. Plasma cortisol concentrations, lameness scores, DMI, and milk yield (MY) were monitored. Blood samples were collected between 1400 and 1600 h on d -7, -1, 0, 1, 2, 7, 14, and 21 relative to relocation. Lameness scores, DMI, and MY data were analyzed in three periods; PD1 = pre-move, PD2 = wk 1-4 following relocation, and PD3 = wk 5-9. The effects of diet, period and their interaction were evaluated with Proc MIXED of SAS. The interaction of diet by period was significant ( $P < 0.01$ ) for plasma cortisol and lameness score. Plasma cortisol concentrations were affected by diet on the day of relocation only. On that day, plasma cortisol was lower in cows offered the TMR than cows offered the orchard grass hay or alfalfa hay diets (6.7, 12.1, and 12.7 ng/mL). Lameness scores increased following relocation for cows on the TMR (PD1 = 1.5, PD2 = 1.6, PD3 = 2.0) and alfalfa hay (PD1 = 1.5, PD2 = 1.7, PD3 = 2.6) diets, but did not change in cows fed grass hay (PD1 = 1.5, PD2 = 1.6, PD3 = 1.8). No interaction of diet and period was observed for DMI and MY, but cows offered grass hay had lower DMI than cows offered alfalfa hay ( $P < 0.03$ ). Offering lactating cows orchard grass hay during relocation may decrease lameness while cows are adapting to a new facility, but offering alfalfa hay did not improve production or measures of well-being.

**Key Words:** Relocation, Cortisol, Lactation

**W5 The effect of relocation on milking parlor behavior and stress in dairy cows.** C. O. Wilkes\*, F. C. Gwazdauskas, M. L. McGilliard, K. J. Pence, A. M. Hurt, and O. Becvar, *Virginia Polytechnic Institute and State University, Blacksburg.*

The objective of this study was to examine how relocation affects cow behavior and measures of stress in the milking parlor. In an attempt to assess stress cows at the Virginia Tech Dairy Center were allocated to 3 groups in separate pens: 1) access to a rubber mat in the feedbunk area (MAT;  $n = 18$ ); 2) no access to a mat in the feedbunk area (NOMAT;  $n = 22$ ); and 3) two breeds (BREED;  $n = 22$  Holsteins housed with 22 Jerseys). Parity was balanced across groups. Milking parlor behaviors observed were reaction to milk claw fitting (RMCF), latency to enter the parlor (LAT), and plasma cortisol (CORT). RMCF was a numeric scale (0 = ideal milker to 3 = steps and kicks frequently) to define behavior during udder preparation and claw fitting. LAT was the time necessary for each cow to enter the milking parlor. CORT was assessed by RIA. Data were grouped by period with d -14 and -7 as pre-move; d 0 as relocation day; d 1 and 2 as the immediate post-move; and d 5, 7, and 14 as the final period. Data were analyzed using the Mixed Model procedures of SAS. MAT had RMCF of  $0.37 \pm 0.09$ , while NOMAT had a mean of  $0.65 \pm 0.08$  ( $P < 0.05$ ). Relocation caused an increase ( $P < 0.05$ ) in RMCF among all groups, however there was a decline on d 1 and 2. There was an increase ( $P < 0.05$ ) in LAT the day of relocation in all groups, but the NOMAT cows older than first lactation had greater LAT the day of relocation and were more hesitant to enter the parlor in subsequent periods than first parity cows ( $P < 0.05$ ). LAT was  $9.2 \pm 0.5$  for Holsteins vs.  $6.2 \pm 1.0$  s for Jerseys ( $P < 0.05$ ). Holsteins averaged  $5.8 \pm 0.3$  vs.  $4.2 \pm 0.5$  ng/mL CORT for Jerseys ( $P < 0.05$ ). Treatment by period interaction indicates that MAT had a less dramatic change in RMCF on the day of relocation with respect to NOMAT. MAT adapted easier to relocation, older cows were more reluctant to enter the new facility, and Holsteins were more stressed than Jerseys during relocation.

**Key Words:** Relocation, Parlor Reactivity, Stress

## Animal Behavior and Well-Being: Sow Housing, Management and Stress

**W6 Analysis of the association between farrowing and lactation factors and sow removal.** S. S. Anil<sup>\*1</sup>, L. Anil<sup>1</sup>, J. Deen<sup>1</sup>, S. K. Baidoo<sup>2</sup>, and R. D. Walker<sup>2</sup>, <sup>1</sup>University of Minnesota, Saint Paul, <sup>2</sup>SROC, University of Minnesota, Waseca.

Farrowing performance and body condition affect sow removals in breeding herds. A study was conducted at the University of Minnesota, Southern Research and Outreach Center, Waseca, MN with 507 sows (GAP, English Belle, BW  $220.69 \pm 1.12$  kg) of parities 1-8. The objective of the study was to assess the association of farrowing and lactation factors on the likelihood for removal of sows from the herd before next parity. The farrowing factors considered were parity, litter birth weight, mummies and stillborn. The lactation factors included lactation length, average lactation feed intake and body condition in terms of body weight and backfat thickness at day 108 of gestation. Removal from the herd was defined as cull, death or euthanasia. Data were obtained from the sow records and the PigCHAMP database of the research unit. Logistic regression analysis with removal as the binary outcome variable (full model, Proc Logistic, SAS) was performed to analyze the data. For analysis, parity was categorized into three as parities 1 and 2, 3 to 5 and  $\geq 6$  and mummies and stillborn were categorized as either present or absent. Average lactation feed intake, body weight and backfat at day 108 of gestation, lactation length and litter birth weight were included in the model as continuous variables. The likelihood for removal decreased ( $P \leq 0.05$ ) with increase in backfat thickness at day 108 of gestation (Odds Ratio: 0.846, Confidential Interval: 0.783 and 0.915). As the average lactation feed intake increased, the likelihood for removal from the herd decreased (Odds Ratio: 0.543, Confidence Interval: 0.424 and 0.695,  $P \leq 0.05$ ). Body weight at day 108 of gestation, lactation length, litter birth weight, parity and presence of mummies and stillborn did not have significant association with the likelihood for removal. The results indicated that sows with low

backfat thickness at the time of farrowing and low lactation feed intake were more likely to be removed from the herd before next farrowing.

**Key Words:** Lactation Feed Intake, Sow Removal

**W7 Evaluation of the effect of group size and structure of gestation housing on production performance and removal of sows in pens with electronic sow feeders (ESFs).** L. Anil<sup>\*1</sup>, S. S. Anil<sup>1</sup>, J. Deen<sup>1</sup>, S. K. Baidoo<sup>2</sup>, and R. D. Walker<sup>2</sup>, <sup>1</sup>University of Minnesota, Saint Paul, <sup>2</sup>SROC, University of Minnesota, Waseca.

Group size and structure of gestation housing may affect the production performance and removal of sows. The objective of the study was to compare production performance and removal of sows housed during gestation in dynamic (D), two-time mixing (TM) and static (S) groups of different group sizes in pens with electronic sow feeder (ESF). The study was conducted at Southern Research and Outreach Center, of the University of Minnesota. A total of 400 pregnant sows (GAP, English Belle; BW  $224 \pm 1.87$  kg; parities 0-7) were used. Sows were weaned after  $18.8 \pm 0.2$  d lactation, every 2 weeks. Each weaned batch consisted of 20-30 sows and was allotted to pens with ESF. Four weaning batches of 20-30 sows were introduced at bi-weekly intervals to a large pen ( $12.75 \times 13.5$  m with 2 ESFs) to form the D group (total 98 sows). The TM treatment was formed by adding 2 batches to a pen ( $12.75 \times 6.75$  m with 1 ESF) at bi-weekly interval and 2 such pens were maintained (total 109 sows). A single batch of S group was housed in one half of a pen by regulating access to an ESF and 4 such groups were maintained (total 103 sows). All sows were moved to their respective housing systems prior to implantation (day 5 of gestation) and