

perspective of pertinent issues. In contrast, universities seem to be moving on a track which emphasizes biotechnology and income generation from research grants to offset shrinking state and federal dollars. Multiple opportunities exist to achieve educational goals. One model involves teaching management skills through centers of dairy science and management that possess the critical mass of personnel and facilities. Programs are geared towards use of case studies and development of problem solving skills. The Academic Common Market Program in the southeast and the National Student Exchange programs enable students to study at universities with specialized programs and pay lower resident tuition fees. The down side of such centers is that it may weaken support for home state institutions. Fortunately high speed access to the internet has increased attractiveness of distance learning programs which permit live classroom participation at multiple sites. Distance learning programs may not be the panacea as they require considerable development time and resources for which funding can be limited. Combinations of distance learning experiences with intensive onsite programs may provide the best of both worlds. It is becoming increasingly evident that knowledge transfer may best be served from partnerships between academia and dairy industry firms using multiple educational technologies.

**Key Words:** Education, Dairy industry, Students

**510 Design and analysis of pen studies in the animal sciences.** N. R. St-Pierre\*, *The Ohio State University, Columbus.*

Increasingly, research is being performed where animals subjected to a common treatment are also housed in a common pen. Issues have

been raised regarding the proper planning of experiments and conduct of statistical analyses in these instances. This presentation reviews the problems associated with ignoring animal grouping during data analyses, and gives appropriate methods to use when animals are grouped in pens. Using animals as the error term when treatments are applied to pens can cause two types of biases. The first one is one of location, which biases point (parameter) estimates of the treatment effects. The pen effect includes unrecognized, systematic non-random effects other than that of the treatment, which is why pens must be replicated and randomized if treatment effects are to be estimated without biases. Pens also result in non-systematic random effects. These affect the variance of the sub-pen units (cows). That is, cows within a pen have more in common than cows across pens. In essence, pen studies have an implicit split-plot design where the main plots (pens) receive the treatments of interest, while the sub-plots (cows) receive all the same sub-plot treatment. Using the sub-plot error to test the effect of main plot treatment effects causes a second type of bias by creating artificial degrees of freedom, and hence biasing severely the test of significance for the treatment effects. Behind all statistical analyses is a mathematical model with its associated assumptions. The assumption with pen-based treatment is that pens have a random effect. Thus pens, or the interaction of pens with other model elements is/are the correct error term(s). The same statistical designs used with cows as experimental units can be used with pens. The number of experimental units to achieve a given power is considerably less with pens because the variance associated with pens is substantially less than the variance of cows within pens. Pens must be replicated, randomized, and included in the statistical model if treatment effects and their significances are to be estimated without biases.

**Key Words:** Pen studies, Statistical analysis

## Animal Behavior and Well-Being

**511 Behavioral time budget of dry cows: Photoperiod alters distribution of maintenance behaviors.** K. E. Karvetski\*, J. M. Velasco, E. D. Reid, J. L. Salak-Johnson, and G. E. Dahl, *University of Illinois, Urbana.*

In this study, we characterized the effect of photoperiod manipulation on the daily duration and distribution of maintenance and other behaviors during the dry period. Cows (n=22) were assigned to either short day photoperiod (SDPP, 8L:16D) or long day photoperiod (LDPP, 16L:8D) at dry-off, -42d prior to expected calving date. Cows were recorded for 24h at -41d and again at -20d using digital video recording. Using instantaneous scan sampling, individual behavior was classified at 10min intervals as drinking, feeding, lying, perching, standing, or walking. To obtain total daily time (h/d) spent engaged in a behavior, the total frequency of each behavior was calculated as a percentage of total observations and then multiplied by 24. To calculate average duration (in min) per hour of the day of each behavior, the frequency was summed hourly and multiplied by 10. During the dry period, cows spent an average of 14.1h lying, 5.3h standing, 2.2h feeding, 0.6h drinking, and 0.4h walking; there was no effect of photoperiod on total daily time for any behavior. However, LDPP increased total time spent perching from 1.6h at -41d to 2.3h at -20d (p=0.1), whereas SDPP decreased total time spent perching from 3.1h at -41d to 2.3h at -20d (p=0.14). There was a treatment by time of day interaction for feeding behavior (p<0.0001). Access to fresh feed at 1400h resulted in a peak in feeding times for both SDPP and LDPP cows (31.1 and 23.6min, respectively). SDPP cows had a smaller

decline in feeding time afterwards; at 1600h, the SDPP feeding time of 12.1min was higher in SDPP cows than 3.6min for LDPP cows (p<0.05). For 2100 through 2300h, LDPP increased feeding behavior again, as the mean hourly feeding time of 11.8min for LDPP cows was higher than 3.1min for SDPP cows (p<0.05). In summary, photoperiod did not affect total duration of maintenance behaviors. However, the distribution of feeding behavior was affected by photoperiod. These results suggest that an understanding of maintenance behaviors requires consideration in order to improve dry cow management schemes.

**Key Words:** Behavior, Dry cow, Photoperiod

**512 A retrospective video analysis of the behavior of periparturient dairy cattle.** L. Misch, H. Putnam\*, T. Duffield, S. Millman, K. Lissemore, and K. Leslie, *Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada.*

The impact of calving difficulty on the behavior of periparturient dairy cattle has not been reported. The objective of this study was to measure variables associated with difficulty of calving, and to identify the associations of parameters with periparturient behavior. Previously recorded videotapes of 23 cows on day -1, 0 and +1 relative to calving were analyzed. Data included frequency and duration of standing and lying behavior, calving difficulty score, duration of calving and calf body measurements. Calving difficulty was scored as: 0-unassisted,

1-easy pull, 2-hard pull. Video information was analyzed, interpreted and entered. Data was analyzed using logistic and linear regression with Statistix. Heifers were more likely to require assistance during calving ( $P < 0.01$ ). Male calves weighed significantly more than female calves ( $P < 0.05$ ). Cow standing and lying behavior differed on the day of calving. Pre-calving, heifers lie for 18 fewer minutes per lying bout compared to cows ( $37.1 \pm 3.8$  versus  $55.1 \pm 6.4$  minutes per bout,  $P < 0.02$ ). Mean pre-calving lying time was also influenced by calving difficulty, as cows requiring assistance spent 15 minutes less lying down per bout ( $P < 0.05$ ). Post-calving, heifers lie for 13 minutes less per bout than cows ( $40.4 \pm 3.1$  versus  $53.7 \pm 8.8$ ,  $P = 0.09$ ). Cows taking longer to calve lie for fewer minutes each bout ( $P < 0.02$ ). Finally, dams that had hard pulls lie for 12.5 fewer minutes each bout ( $P = 0.11$ ). When mean lying bouts post-calving was analyzed, controlling for pre-calving mean lying time, only calving duration remained significant. Calving duration also positively influenced the number of post-calving lying bouts ( $P = 0.05$ ). Lying behaviour, both pre and post-calving, was the most significant measurement related to calving. Cows with longer calvings spent less time lying down after calving. Differences between lying time for cows and heifers merits further investigation. It is possible that this difference is related to the presence of pain, and that there are opportunities for pain management at calving.

**Key Words:** Calving, Behavior, Lying

**513 Hock lesion and hygiene score by stall bed type in commercial U.S. dairy cows.** W. Fulwider\*, T. Grandin, D. Lamm, N. Dalsted, D. Garrick, and B. Rollin, *Colorado State University, Fort Collins.*

A total of 7,432 cows were scored in 72 dairies from WI, MN, and IA between October 2005 and February 2006 to determine hock lesion incidence and level of hygiene. The data set included 28 rubber-filled mattress, 22 sand, and 22 waterbed dairies. Compost pack dairies were represented by an additional 596 cows on 6 dairies with 399 cows scored. Rubber-filled mattress dairies were represented by herd totals of 24,847 cows. Sand dairies were represented by herd totals of 11,381 cows. Waterbed dairies were represented by herd totals of 7,594 cows. One pen of early lactation cows to include cows in lactation 2 and greater was scored for hock lesions and hygiene on each dairy. *Tarsal* (hock) joints were scored for injury at the lateral and medial surface. The *tuber calcis* (point of hock) was scored at the dorsal, lateral, and medial surface. A score of 1 was hair loss, 2 was moderate, and 3 was severe. Hygiene scores ranged from 1 to 5, with 1 being a clean cow, and 5 being a soiled cow. Differences in lesion percentages between bed types were tested with a one-way analysis of variance by lesion severity and over all lesions. Percentage of cows on rubber-filled mattress dairies with score 1 lesions were  $48.69 \pm 3.97$ ; on sand dairies  $20.33 \pm 4.48$ , and on waterbed dairies  $21.83 \pm 4.48$ . Preliminary analysis indicates that cows on sand or waterbeds had fewer ( $P < 0.0001$ ) score 1 and 2 lesions and fewer ( $P < 0.001$ ) score 3 lesions than those kept on rubber-filled mattresses. The most common lesion site on rubber-filled mattress cows was lateral *tarsal* (43%), and 21% of cows had two or more lesion sites. The lateral *tuber calcis* was the most common lesion site on both sand (8%), and waterbed (19%) cows. Eight percent of cows kept on waterbeds and 4% of cows on sand had more than one lesion site. Cows on compost pack had no lesions with the exception of cows purchased with injury. No significant difference was found for hygiene by bed type or times per day barns were cleaned.

**Key Words:** Stall bed, Injury, Lameness

**514 Dairy farmers' perceptions and attitudes about lameness.**

A. M. Edgecomb\*, C. L. Wickens, A. J. Zanella, and D. K. Beede, *Michigan State University, East Lansing.*

Lameness reduces productivity and welfare of dairy cattle. Incidence rates (IR) and severity of lameness in some herds are unacceptable. Various management strategies are recommended to reduce lameness; however, success is not observed in many instances. Our objective was to try to better understand the perceptions and attitudes of dairy farmers about lameness. A survey was mailed to all Michigan dairy farmers in July ( $n = 1,280$ ) and December ( $n = 1,008$ ). The survey asked four Likert Scale and 22 forced-choice questions. Survey return rate was 33%. Herd size profile of respondents was similar to Michigan's overall herd size profile. Data were analyzed using Statistical Package for the Social Sciences® 13.0. Ninety-nine percent of respondents believed lame cows feel pain. Overall, 43% 'strongly agreed' or 'agreed' that lameness was a problem in their herds; 23% 'neither agreed nor disagreed', and 31% 'disagreed or strongly disagreed'. However, 53% of farmers indicated that their IR was  $< 10\%$ ; 35% believed it was between 11 to 30%; and, only 7% believed their IR was  $\geq 31\%$ , suggesting that lameness was not perceived as a major issue. The actual severity and frequency of lameness in the survey herds was not known. Furthermore, 69% of respondents indicated that they do not use a specific method to record occurrence of lameness. In 38% of herds a professional hoof trimmer was not used, yet only 2% indicated a person on-staff who trimmed hooves. The owner was identified as the main person (79%) responsible for managing lameness; yet, 37% indicated that no other person was responsible to help the owner with lameness in their herd (e.g., no team approach). We conclude based on survey responses that Michigan dairy farmers may underestimate the potential seriousness of lameness on cow productivity and welfare; or, what they might do to reduce lameness. Thus, careful consideration should be given for the best approaches in extension education and research to affect perceptions and attitudes of dairy farmers about lameness to improve animal health, welfare and productivity.

**Key Words:** Dairy lameness, Animal welfare, Farmers' perceptions

**515 Use of pattern recognition to develop an automated animal health classification system.** R. Silasi\*<sup>1,2</sup>, K. S. Schwartzkopf-Genswein<sup>1</sup>, T. A. McAllister<sup>1</sup>, B. Genswein<sup>1</sup>, T. G. Crowe<sup>2</sup>, R. Bolton<sup>2</sup>, and B. Hill<sup>1</sup>, <sup>1</sup>*Agriculture & Agri-Food Canada, Lethbridge, Alberta, Canada,* <sup>2</sup>*University of Saskatchewan, Department of Agricultural and Bioresource Engineering, Saskatoon, Saskatchewan, Canada.*

Computer algorithms are routinely used to aid in the identification of biological patterns not easily detected with standard statistics. Currently, observed changes in normal patterns of feeding behavior (FB) are used to identify morbid feedlot cattle. The objective of this study was to use pattern classification techniques to develop algorithms capable of identifying morbid (M) cattle earlier than traditional pen checking methods. Individual FB was obtained from 384 feedlot steers ( $228 \pm 22.7$  kg, initial BW) in a 226 d trial at a commercial feedlot using an automated feed bunk monitoring system. FB variables collected included feeding duration, inter-meal interval (min., max., avg., SD and total; min/d) and feeding frequency (visits/d). Animal health records including the no. of times treated, d in the hospital and d on feed were also collected. A total of 93 cattle identified as M were categorized into low, medium and high groups based on severity of sickness. The no. of times treated, and d in hospital after first pulled were used to classify severity. Healthy (H) animals were defined as never treated and having no lung lesions or liver abscesses at slaughter.

FB data of 68 (45 medium and 25 high) M animals was processed using principle component analysis resulting in the output of 5 new variables. K-means clustering was applied to the new variables to classify the animals into H or M clusters. The clusters produced resulted in an overall classification accuracy of 83% (73 and 95 % accuracy for H and M, respectively) for animals pulled after the first 5 d in the feedlot (N=80, 40 M and 40 H). Forty-seven percent of M animals were predicted as M 1 to 6 d, and 53%, 7 d prior to being pulled. The application of pattern recognition algorithms to FB shows value as a method of identifying morbid cattle in advance of overt physical signs of morbidity.

**Key Words:** Pattern recognition, Cattle morbidity, Feeding behavior

**516 The effect of small doses of naloxone on sexual behaviour of the anoestrous bitch.** V. O. Fuentes-Hernandez\*<sup>1</sup>, P. I. Fuentes-Castro<sup>2</sup>, and S. Nuño-Hernandez<sup>1</sup>, <sup>1</sup>Universidad de Guadalajara, Tepic, Jalisco Mexico, <sup>2</sup>Hospital PEMEX SUR Alta Especialidad, Periferico Sur, Mexico DF, Mexico.

In previous work, administration of naloxone in low doses produced behavioral changes in female sheep, pigs, goats, and rabbits. The objective of this work was to observe the effect of low doses of naloxone on sexual behavior and vaginal cytology of the domestic dog. Twelve, crossbred bitches, averaging  $1.5 \pm .2$  years of age and weighing  $13 \pm 1.9$  kg were used. Animals were dewormed and individually housed in covered pens with food and water offered ad libitum. Six bitches per group, randomly selected were housed 200 m from the others. Group 1 was administered 0.5 mg naloxone i.m. at 12 h intervals for 15 days. Group 2 was treated similarly using a saline solution. Animals showing changes in anoestrus were not included. Data were analyzed using ANOVA for repeated measurements. Vaginal cytology did not differ ( $P = >0.05$ ) for days 1 to 6 in both groups. During days 7 to 15, vaginal cytology of naloxone treated bitches showed significant ( $P = <0.01$ ) presence of, red blood cells, and white blood cells. The latter cells were not observed in the control group. Initially, both treatments showed aversive and aggressive behaviors when exposed to males. Beginning day 7, naloxone treated bitches were friendly and playful, accepting male company, and on occasion, permitted mounting with no intromission. With the exception of one bitch, vulvar size increased slightly. Control bitches were curious about the males but did not alter their behavior, nor did vulvar size vary across days. This results show that endorphins are important modulators of sexual behavior in the bitch.

**Key Words:** Naloxone, Behaviour, Bitch

**517 Alternative piglet processing procedures given singly affect cortisol, behavior and growth.** J. N. Marchant Forde\*<sup>1</sup>, D. C. Lay Jr.<sup>1</sup>, R. M. Marchant Forde<sup>1</sup>, K. A. McMunn<sup>1</sup>, E. A. Pajor<sup>2</sup>, and H. W. Cheng<sup>1</sup>, <sup>1</sup>USDA-ARS, LBRU, West Lafayette, IN, <sup>2</sup>Purdue University, West Lafayette, IN.

The effects of piglet processing procedures on behavior, growth and cortisol. Soon after birth, piglets undergo procedures that are a likely source of stress. Our aim was to evaluate stress responses evoked by two alternative methods for performing the following processing procedures: 1) teeth resection (TR) – clip vs. grind; 2) tail-docking (TD) – cold- vs. hot-clip; 3) identification (ID) – ear notch vs. tag; 4) iron administration (FE) – inject vs. oral; 5) castration (CA) – cords cut vs. torn. Ten litters of eight 2-3 day-old piglets were assigned to each procedure. Within each litter a male and a female piglet were assigned to one of 4 possible procedures: the two alternative methods,

a sham procedure, and a sham procedure plus blood sampling. Piglets were balanced for weight. Blood was sampled before processing and at 45 min, 4h, 48h, 1wk, and 2wks post-procedure and assayed for cortisol. Procedures were video-taped and analyzed to evaluate time taken to perform the procedure and the number of squeals, grunts and escape attempts exhibited. Piglets were weighed before the procedure and at 24h, 48h, 1wk and 2wks afterwards. Lesions were scored on a 0 to 5 scale on ID, TD and CA pigs at 24h, 1 wk and 2wks post-procedure. Statistical analysis was performed using Proc GLM of SAS. For TR, grinding took about 20s longer than clipping and resulted in higher cortisol levels overall, poorer growth rates and more escape attempts ( $P < 0.05$ ). For TD, hot clipping took longer ( $P < 0.05$ ) and resulted in more squealing ( $P < 0.001$ ). For FE, oral delivery took longer and resulted in more squealing ( $P < 0.05$ ). For ID, notching took longer, resulted in higher lesion scores ( $P < 0.05$ ), more squealing ( $P < 0.001$ ), more escape attempts ( $P < 0.01$ ) and tended to result in higher cortisol concentrations ( $P < 0.1$ ). For CA, tearing took longer and resulted in more squealing and escape attempts ( $P < 0.05$ ). In general, procedures which took longer to perform resulted in the occurrence of more pronounced stress-related responses.

**Key Words:** Piglet processing, Behavior, Stress

**518 Two alternative combinations of pig processing methods affect cortisol and behavior.** D. C. Lay Jr.\*<sup>1</sup>, J. N. Marchant<sup>1</sup>, K. A. McMunn<sup>1</sup>, R. M. Marchant-Forde<sup>1</sup>, E. A. Pajor<sup>2</sup>, and H. W. Cheng<sup>1</sup>, <sup>1</sup>Livestock Behavior Research Unit, Agricultural Research Service -USDA, West Lafayette, IN, <sup>2</sup>Purdue University, West Lafayette, IN.

Pig processing procedures can cause distress to pigs. Alternatives exist for each procedure, thus our objective was to compare a combination of five different procedures. Least aversive procedures compared to the most aversive procedures were determined by previous research. Comparisons were made between processing pigs with the ‘most’ aversive methods (Most): teeth grinding, tail docking with a hot iron, oral administration of iron, ear notching, and castration with cord tearing, as compared to the ‘least’ aversive methods (Least): teeth clipping, tail docking with a cold iron, injection of iron, ear tagging, and castration with cord cutting. Two control groups were included, one which was blood sampled (Control) and another that served merely as a behavioral control and was not blood sampled or processed but was handled. A total of 8 pigs from each of 10 litters were used - one male and one female pig per treatment. Body weights were recorded prior to bleeding, at 24 h, 1 wk and 2 wk relative to application of treatments and blood was collected at 0 h, .75 h, 4 h, 48 h, 1 wk, and 2 wk in order to measure plasma cortisol. Behavioral data were collected to record escape attempts, squeals, and grunts. Body weight did not differ between treatments ( $P > 0.10$ ). Females did not differ in their plasma cortisol response to processing ( $P > 0.10$ ). In contrast, male pigs in both the Most and Least treatments exhibited elevated plasma cortisol at .75 h after processing as compared to Control pigs ( $P < 0.0001$ ). Pigs in the Most treatment performed more squeals as compared to the Least ( $P < 0.01$ ) and the two control treatments ( $P < 0.001$ ). Pigs in the Least treatment performed more squeals than in the two control treatments ( $P < 0.07$ ). However, when adjusted for the amount of time required to perform the two treatments, no treatment differences were noted ( $P > 0.10$ ). These data indicate that both the Most and Least processing approaches reported in this study result robust stress responses as measured by plasma cortisol. In addition, the time required to perform procedures contributes significantly to the stress experienced by the pigs.

**Key Words:** Pig, Physiology, Behavior



**519 Validation of a color automated tracking system for activity and pen location of group housed weanling pigs.** J. W. Dailey\*<sup>1</sup>, N. Krebs<sup>2</sup>, J. A. Carroll<sup>1</sup>, and J. J. McGlone<sup>2</sup>, <sup>1</sup>*Livestock Issues Research Unit, Agricultural Research Service-USDA, Lubbock, TX*, <sup>2</sup>*Texas Tech University, Lubbock*.

Knowing where animals are located throughout the day can be important in some studies. While scan sampling methods can be imprecise, continuous video observation is precise but time-consuming. Commercial automated tracking systems (ATS) quantify animal behavior by assigning an X, Y coordinate for an animal's location at a given time. The objective of this study was to validate an ATS, *Ethovision*, using the 'color' tracking method compared with a human observer using the *Observer 5.0* (HOB). Nursery pigs (n = 44, 1 pig was removed from the study due to technical problems with the HOB) were group housed (n = 4/pen). Each pig in the pen had a different color tape around its shoulders (11 replications/color). Pigs were video recorded continuously for 1 h with color cameras at 30 frames/s. Videos were scored for a 1 h period for the time spent on the right half of the pen. Data obtained with the ATS were compared to data collected by HOB by ANOVA and regression analyses. The following results were obtained using 10 pixels as a parameter of detection in ATS. No difference ( $P = 0.597$ ) was observed between HOB and ATS for the time spent on the right. A linear regression comparing the methods of observation for 'time spent on the right' yielded an  $r^2$  of 0.9102 (or  $r = 0.954$ ,  $P < 0.01$ ) which indicated ATS as an assay was a precise predictor of HOB measurements (using 100 pixels, there was no difference in the means but the  $r^2$  was 0.78). The simple linear regression model was  $HOB = 0.962 \text{ ATS} + 3.6929$  ( $SE_b = 0.047$ ). The number of pixels used in the ATS must be optimized to accurately interpret animal movement. Additionally, the surface area covered by the tape, the color and elasticity of the tape, and the lighting system in the room can also affect the efficiency of the ATS. In conclusion, the ATS generated mean values similar to behavioral data collected by HOB. The  $r^2$  demonstrates that the ATS closely predicted data obtained by HOB. The ATS is recommended for collection of this type of behavioral information.

**Key Words:** Pigs, Behavior, Technique

**520 The effects of prenatal stress on the ano-genital distance and growth hormone immuno-positive cells in the pituitary gland of the pig.** E. L. Schenck\*<sup>4</sup>, D. C. Lay Jr.<sup>1</sup>, H. G. Kattesh<sup>2</sup>, J. E. Cunnick<sup>3</sup>, M. J. Daniels<sup>5</sup>, M. J. Toscano<sup>4,6</sup>, and K. A. McMunn<sup>1</sup>, <sup>1</sup>*USDA-ARS Livestock Behavior Research Unit, West Lafayette, IN*, <sup>2</sup>*University of Tennessee, Knoxville*, <sup>3</sup>*Iowa State University, Ames*, <sup>4</sup>*Purdue University, West Lafayette, IN*, <sup>5</sup>*University of Florida, Gainesville*, <sup>6</sup>*University of Bristol, Bristol, UK*.

Exposing pregnant mammals to prenatal stress has been shown to alter the stress response of their resulting offspring. Research in rodents has shown that prenatal stress can modify aspects of gender behavior and morphology. Ano-genital distance is the distance between the anus and genital area. A decrease in ano-genital distance in males indicates a decrease in masculinization. Our objective was to determine if prenatal stress altered the ano-genital distance and pituitary gland of piglets. Sow treatments consisted of i.v. injections of adrenocorticotrophin (1 IU/kg BW) (ACTH, n=11), exposure to rough handling for a 10-min duration (RH, n=13), or no treatment (CONT, n=13) once a week during d 42 to d 77 of gestation. Ano-genital distance (a ratio of body length:ano-genital distance) was measured after birth in all male piglets. One male piglet per dam was sacrificed at 2-mo of age and the pituitary gland was collected for immunocytochemistry for analysis of growth hormone. Data were analyzed using the GLM procedures of SAS. Male piglets born to dams who received ACTH had a larger ano-genital ratio (a smaller ano-genital distance) compared to piglets from the roughly handled sows or the control sows ( $P < 0.0001$ ;  $2.01 \pm 0.03$ ;  $1.91 \pm 0.3$ ;  $1.87 \pm 0.02$  respectively). There were no differences ( $P > 0.10$ ) among treatment groups in the number of immuno-positive cells for growth hormone in the pituitary gland. Adjusted weaning weight was found to be greater for pigs born to the CONT and RH handled sows as compared to piglets from sows who received ACTH ( $P < 0.05$ ). These data indicate that prenatal stress may decrease masculinization during development and possibly decrease reproductive success later in life. The weight differences in the ACTH group at weaning may be due to the high level of prenatal stress activated by the ACTH injections. The differences in weight may imply that an increase in prenatal stress (ACTH) alters pre-weaning weight gain; however, a 2-mo period appears to be sufficient for the quantity of pituitary cells positive for growth hormone to recover from stress.

**Key Words:** Swine, Prenatal, Gender

## Animal Health II

**521 Effect of maternity pen management on risk of early calfhood diseases in dairy heifer calves during the preweaning period.** P. Pithua\*, S. J. Wells, and S. M. Godden, *University of Minnesota, St. Paul*.

The objective of this study was to determine whether heifer calves born in individual maternity pens will have a lower risk for experiencing calfhood diseases versus heifer calves born in a multiple cow maternity housing area in a randomized clinical trial, conducted between January, 2005 and December, 2005. Four hundred and fifty two dairy heifer calves were recruited into the study from three Minnesota dairy farms. Pregnant cows were randomly allocated to calve in either the individual maternity pen (treatment group) or multiple cow maternity housing area. Fecal material and placental remains were removed from the individual maternity pens between each calving and calves were

separated from their dams and removed from the maternity area, within 2 hours of birth. Calves born in multiple cow pens had varying times of separation from their dams. All calves were housed in individual hutches for 8 weeks and later transferred to group pens of 10 calves each. Calves born in individual calving pens were not commingled with those born in the multiple calving areas during the follow up period. Standard disease monitoring and diagnosis protocols were developed for the study. Disease events (enteritis and pneumonia) experienced by the calves, during the first 3 months of birth and treatments administered, were recorded by the calf managers. Incidence risk of disease and mortality, experienced by calves in either group were compared using Chisq-Test statistic (Table1). Days at risk for calves born in either calving location were compared using product limit estimates of survivor functions and there was no evidence to suggest differences in survival experience between groups (Log-Rank