RESEARCH ABSTRACT

ANIMAL WELFARE

Title: Evaluation of the relationship between hoof abnormalities and breeding herd female longevity and well-being when housed in gestation and farrowing stalls **– NPB #07-051**

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Scientific Abstract:

The objective of study I was to evaluate the effects of cracks in the outer hoof wall [CK], length differences between the medial and lateral toe of the hoof [TS], and excessive toe growth [OG] on sow lactation performance and behavior in mid-lactation. Sows from each treatment group were assigned a severity score (1 to 3), and control sows were assigned a 0 score. Lactation sow performance from 223 litters was collected over 2 experiments; each experiment was conducted on a different 4200-sow operation using the same protocol and performance data were combined for analyses. Total born, number born alive, stillborn, and mummies were recorded for each sow as well as the farrowing date. Sow behavior was scored continuously for 45 min prior to and 1 h post feeding in experiment 1 (150 sows) and for a 24 hr period in experiment 2 (10 sows). The ethogram contained 4 postures (standing, sitting, kneeling, and lying down) and a maximum of 4 behaviors within each posture (eating, drinking, defecating/urinating, or other). Performance and behavior data were analyzed using a multiple linear regression. Sows of each treatment began the experiment with similar litter weights ($P > 0.15$) and number of piglets per litter ($P > 0.15$). A significant, negative partial regression coefficient was observed for piglets weaned per litter for sows in the CK and TS groups. A trend ($P = 0.10$) was observed for the association of sows in the CK group to wean -0.21 fewer piglets per litter than control sows. An increase in OG lesion severity score was associated with lighter adjusted litter wean weights compared to control sows. Sows in the control group spent 18.9 % (19.9 min) of the 105 min observation period standing and 12.7 % (13.3 min) of the total time standing and eating. The amount of time spent standing and eating before

feed presentation was negatively associated with time spent eating after feeding (b = -0.24, $P < 0.01$); that is, for each percent increase in time spent eating prior to feeding was associated with a 79 % decrease in time spent standing and eating post feeding. Sows with overgrown toes spent 50 % less time kneeling for each incremental increase in OG lesion score. Post feeding, each OG lesion score increase was associated with a 40.0 % decrease in time spent standing and eating. This observation held true for total time spent standing and eating during the observation period [Odds Ratio (OR) = 0.45]. In Experiment 2, sows were observed standing and eating between 3.3 and 9.1 % of the observation period, and, of the variables collected, eating was the primary activity performed while standing. Sows spent a very small percentage of their time kneeling (0.11 %). Results from this study demonstrate that foot lesions can impair productivity and behavior of lactating sows. The degree to which foot lesions impair production and behavior is dependent on lesion type and severity.

The objective of study II was to collect pictures and illustrations of hoof abnormalities to be used as a future training tool for pork producers to visually score overgrown hind hooves, uneven toes and cracked hooves in parity matched sows. Images of normal and abnormal hooves were collected throughout the previously reported study. Images collected during the study illustrate the range in severity of hoof cracks, overgrown toes, and toe size differences. At least two quality images were obtained for each severity score within each lesion. Images obtained during the present study will be utilized in extension presentations and publications to educate swine producers on the type and severity of hoof lesions present in swine herds. Further, the pictures will be used in future classification of these specific lesions in an attempt to standardize the lesion identification and scoring process. Also, unique observations were made while photographing sow hooves. In some cases, the lateral claw was observed to be placed between concrete slats in the gestation stalls or between mesh flooring connections in the farrowing stalls. In these cases, sows may use these gaps as anchor points when slipping which may cause hoof cracks. The image library will be maintained at Iowa State University and image requests can be made through the National Pork Board.

The objective of study III was to determine the relationship between hoof abnormalities and breeding herd female longevity when housed in gestation and farrowing stalls. The systematic review process is recognized in human medicine to evaluate available research on specific medical conditions. The systematic review process is becoming more accepted in agricultural and veterinary research as well. The systematic review process allows for transparent and repeatable evaluation of studies. The systematic review process includes: developing a targeted question, conducting a comprehensive literature search from appropriate sources, identification of relevant articles, conducting a quality screen of all relevant articles, extraction of data from selected studies which meet relevance and quality criteria, and then subsequently summarizing the extracted data in a concise format. This systematic approach helps to reduce bias in the final selection of the studies for analysis and sets this approach apart from a narrative review. A comprehensive search of PubMed (1965-2009), CAB Abstracts (1910-2009), AGRIS (1975-2009), AGRICOLA (1970-2009), BioSis Previews

(1980-2009), Biological and Agricultural Index (1983-2009) and Medline (1950-2009) and the 2006 Swine Information CD compiled by the American Association of Swine Veterinarians identified 1560 articles for analysis. Following removal of the duplicates, the 1146 unique articles were reviewed for relevance. The relevance screen eliminated all but five articles. The five relevant articles were subjected to select quality screening criteria. A single article met all of the quality criteria. Wentz et al, detailed the treatment and control populations, the prevalence and severity of lameness at the onset and completion of the trial, and utilized a field setting for this study. The trial reported by Wentz et al randomized penned groups of sows between two treatments. The intervention treatment utilized a 10% formalin footbath, two or three times a week, applied to the exterior anatomy of the hoof for a five week period. The control group received no footbath treatment. Results showed significant differences in the increased prevalence of sows without clinical lameness ($P < 0.05$) and a reduction of 'severe category' clinical lameness ($P < 0.05$). Clearly there is a need for more rigorous evaluation of a number of potential lameness interventions to investigate potential tools for caretakers to employ with confidence.