

hypothalamus. Prepubertal gilts were ovariectomized and at 150 d of age fed to either gain (full-fed; $n = 6$) or lose (restricted; $n = 6$) BW for 11 d. On day 10, serial blood samples were collected every 12 min for 6 h to quantify LH pulses. On day 11, hypothalami were collected to quantify gene expression using isotopic *in situ* hybridization. Differences ($P < 0.0001$) in BW were achieved by day 5 and maintained for the remainder of the study. Mean concentrations ($P < 0.01$) of LH were greater in restricted gilts than in full-fed gilts (1.76 ± 0.09 ng/mL vs 1.41 ± 0.08 ng/mL, respectively), but basal concentrations of LH were not different ($P = 0.59$). Number of LH pulses (6.5 ± 0.5) were not different ($P = 0.12$), but LH pulse amplitude was greater ($P < 0.001$) in restricted gilts than full-fed gilts (2.32 ± 0.15 ng/mL vs 1.02 ± 0.14 ng/mL, respectively). Expression of Kiss1 mRNA was greater ($P < 0.02$) in the more caudal sections of the mARC, but treatment did not affect expression of Kiss1. Expression of NKB mRNA was greater ($P < 0.0001$) in the more caudal sections of the mARC, and expression of NKB was greater ($P < 0.05$) in restricted gilts when compared with full-fed gilts. The lack of treatment effect on expression of Kiss1 in the mARC or LH pulse frequency is consistent with the idea that hypothalamic expression of Kiss1 is correlated with the number of LH pulse. Although NKB is thought to be associated with LH pulse frequency, these data indicate that amplitude of LH pulses may be regulated by NKB in the gilt. AFRI (2001-67015; CAL). USDA is an equal opportunity provider and employer.

Key Words: Pig, LH, Hypothalamic peptides

-
- 395 Exploring Causal Biological Relationships between Reproductive Traits in High-Performing Gilts and Sows.** K. Chitakasempornkul^{*1}, M. B. Menegat¹, M. A. D. Goncalves², S. S. Dritz¹, A. Jager¹, M. D. Tokach¹, R. D. Goodband¹, N. M. Bello¹, ¹*Kansas State University, Manhattan, KS*, ²*Genus PIC, Hendersonville, TN*

Efficient swine production requires integration of management and complex reproductive physiological mechanisms in females. The study objective was to explore potential causal biological relationships between reproductive traits in high-producing gilts and sows. Data consisted of weight gain during late gestation, total number born and number born alive in a litter, born alive average birth weight, wean-to-estrous interval, and total litter size born in the subsequent farrowing, from a designed swine nutrition experiment. A total of 200 sows and 440 gilts were arranged in weight blocks and randomly assigned on d 90 of gestation to nutritional

treatments at a commercial swine farm in northern Ohio. Preliminary analyses indicated that marginal correlation amongst reproductive traits diverged between gilts and sows, thereby suggesting potential differences in the nature of the relationships. Structural equation models combined with structure-learning algorithms adapted to a hierarchical Bayesian framework were employed to search for and quantify causal networks between reproductive traits within each parity group after accounting for dietary effects. Results indicated distinct networks for gilts and sows. First, relationships between reproductive traits differed in nature whereby more direct effects were apparent in gilts relative to sows. Second, the direction of the causal claim between born alive average birth weight and born alive was reversed between sows and gilts. For sows, a 100 g increase in born alive average birth weight resulted in a decrease of 0.59 (95% highest posterior density (HPD) interval = [0.41, 0.79]) in number of born alive, whereas for gilts, a 1 pig increase in born alive resulted in a 36 g (95% HPD = [21, 48]) decrease in born alive average birth weight. Third, both gilts and sows showed a direct effect from born alive to total number born, though the estimated effects differed in magnitude: a 1 pig increase in born alive per litter resulted in an increase in total number born of 0.96 (95% HPD = [0.89, 1.02]) in sows and of 0.89 [0.85, 0.94] in gilts. In summary, our results indicate distinctly heterogeneous networks of reproductive traits for gilts and sows, consistent with differences in their reproductive physiological mechanisms. These findings have potential practical implications for differential management of gilts and sows to improve efficiency of swine production systems.

Key Words: hierarchical Bayesian models, structural equation model, swine reproductive physiology

-
- 396 Climatic and Lunar Effects on Boar Ejaculate Traits.** J. Chinchilla Vargas^{*1}, K. Kerns^{2,3}, M. F. Rothschild¹, ¹*Department of Animal Science, Iowa State University, Ames, IA*, ²*International Boar Semen, Eldora, IA*, ³*Division of Animal Science, University of Missouri, Columbia, MO*

There is evidence that phases of the moon affect wild animal behaviors including reproduction. However, there is little evidence of moon phase effects on domestic livestock behavior. This study investigated the effects of moon phase and climatic variables on boar ejaculate traits. Records of 4,149 semen collections from boars of 9 different breeds were used. The response variables were volume of ejaculate, concentration of sperm in the ejaculate, and number of doses obtained per ejaculate.