RESEARCH ABSTRACT

ANIMAL WELFARE

Title: Impact of early weaning and photoperiod manipulation on sow and piglet welfare- **NPB # 03-111**

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Abstract: These experiments were designed to determine the effect of (1) photoperiod manipulation pre- and post-gestation on sow and piglet performance and immune response and (2) photoperiod manipulation on early weaning success in piglets. In Exp 1, sows were exposed to either long day (LD; 16L:8D) or short day (SD; 8L:16D) photoperiod at d 90 of gestation. At farrowing, half of the sows remained on their gestation trt (LD:LD; SD:SD) and the other half were switched to the opposite trt (LD:SD or SD:LD). Blood samples were taken at d 0, 7, 14 and 21 post-trt. Piglet samples were taken at d 7 and 21. During gestation, there were significant trt×day interactions for several immune measures including N:L ratio and lymphocyte proliferation. On d 7 LD sows had higher N:L ratio ($P = 0.05$) and SD sows had higher ($P < 0.05$) T- and B-cell proliferation. On d 14 post-trt, LD sows had higher ($P < 0.05$) T- and B-cell proliferation. At 24h post-farrowing, sows on LD:SD had higher ($P < 0.05$) total WBC counts than all other groups. At weaning, sows on LD:LD had higher ($P < 0.05$) T-cell proliferation. There were significant linear trends for gestation trt on immune measures such that gestation trt significantly influenced immune responses in 7 d old piglets. Piglets from LD sows had higher ($P < 0.05$) CORT, WBC, and plasma IgG. At weaning, piglets from SD:SD sows had higher T-cell proliferation ($P < 0.001$) and CORT ($P = 0.054$), whereas, those from LD:LD had higher ($P < 0.005$) PHAG. There were significant sex effects on and trt×sex for CORT and immune measures. In addition, SD sows tended ($P = 0.07$) to have more piglets born alive, but LD sows had higher ($P = .002$) birth weights.

In Exp 2, all sows were subjected to SD from d 90 of gestation until the end of lactation. Piglets were weaned at 14, 21, and 28 d of age and assigned to either LD or SD until 10 wk of age. Blood samples were obtained from piglets at weaning and every 2 wk until 10 wk of age. There were significant trt effects on immune measures including NK, PHAG and proliferation. Piglets weaned at 21 and 28 d had higher NK cytotoxicity. 14 d weaned pigs had significantly higher B-cell proliferation and 21 d had higher ($P < 0.0001$) PHAG. There were significant trtxage interactions for total NE and LY, NK, and proliferation.

Specifically, at 6 wk, piglets weaned at 14 and 21 d and kept on LD had significantly higher NK, whereas, 28 d weaned piglets kept on LD, regardless of age had the lowest NK. B-cell proliferation was higher ($P < 0.05$) among 28 d weaned piglets kept on SD. Piglets on LD and weaned at 28 d had significantly lower PHAG at 6 wk of age but higher at 8 wk. Also, there were significant trt effects on and trtxage for body weight. Overall, piglets weaned at 28 d and kept on LD were heavier throughout the experiment, whereas, 14 d weaned pigs kept on SD had the lowest body weight. It appears that photoperiod can manipulate sow physiology and productivity and may have an impact on piglet's immune response. More importantly, photoperiod influences immune responses in piglets that are weaned at different ages. In fact, one may be able to use photoperiod manipulation to counteract the negative impact of various stressors such as weaning stress. Further research is needed to determine the precise effects of photoperiod on gestational sows and their piglets.