Effects of betaine and heat stress on lactation and post-weaning reproductive performance on sows - NPB#15-138

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This study was conducted to evaluate the underlying physiological changes that occur during heat stress and the effect of betaine supplementation in lactating sows. Twenty sows were housed in two rooms (each with 10 sows) to simulate heat stress (HS: 31°C from 8:00 AM to 4:00 PM and 26°C for the rest of the day) or thermoneutral (TN: 22°C during the entire trial) conditions. Treatments were randomly allotted to each sow to receive 0% or 0.22% of a betaine supplement in their diets. Sows were blocked by parity as they entered the farrowing rooms at day 110-112 of gestation. Sows housed in the HS condition had ad-libitum access to feed. Sows housed in the TN condition were pair fed with sows in the HS room. Data were analyzed as a 2 x 2 factorial arrangement of treatments, with 2 levels of room temperatures and 2 dietary betaine levels. Respiration rates, rectal and skin temperatures were recorded every day (7:30 AM and 3:30 PM) from the first day in the farrowing room to weaning. Blood samples from sows were taken at different days during the trial (before move in, day 7, 14, weaning and 3 days post-weaning). Follicle size was measured every 12 hours with a real time ultrasound from weaning to ovulation. Treatment by room interaction was not significant for any variable (P > 0.11). Betaine supplemented sows had 0.23°C lower rectal temperature than control sows (P = 0.048). Respiration rates, rectal and skin temperatures were 35.6 breaths/min, 0.4 and 3.6°C greater under HS than TN conditions, respectively (P < 0.004). Homocysteine and cortisol serum concentrations did not differ between treatments (P > 0.44) or environments (P > 0.25). Betaine supplemented sows had 0.51 mm greater follicle diameter than control sows (P = 0.043). The mean follicle diameter was 0.97 mm smaller under HS than TN conditions (P = 0.003). Regression analysis indicated that room temperature differences in follicular size were due to differences in the time of follicular growth initiation and not in the rate of growth. Interestingly the follicle size at ovulation did not differ between housing conditions (P = 0.79), but the time from weaning to ovulation was 2.1 days greater in HS than TN sows (P = 0.005). Heat stress affects follicle size at the same hours post-weaning, delays the time of ovulation, but does not affect follicle’s size at ovulation.

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