RESEARCH ABSTRACT

ANIMAL WELFARE

Title: Retrofit an optimized gestation stall system based on sow well-being: A pilot study – **NPB #07-026**

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Date Submitted: 09/10/2009

Scientific abstract

New housing systems are being implemented without scientifically evaluating the impact these alternative systems have on well-being. Thus, we hypothesize that slight modifications of the stall may influence sow well-being, thus the objective (experiment 1) was to evaluate the effects a modified-gestation stall has on behavior and productive performance of dry sows. While the objectives of experiment 2 were to evaluate a) the effects of 3 housing systems on sow physiology and more specifically b) the utilization of individual vs. group space in the free access stall treatment. Exp. 1, on d23±5 of gestation 16 multi-parious sows were allocated to either a standard stall (STALL) or adjustable stall (width only; FLEX); fixed dimensions for STALL; 55.9cm × 218.4cm and FLEX; 48cm × 215.9cm. Sows kept in FLEX stall, once placed in the stall, width was adjusted based on sow body size to achieve 2cm of space between bottom bar and sow's udder while lying in full lateral recumbency at early-gestation, mid-gestation, and late-gestation. Widths were 51.9±0.56 (early-gestation), 57.8±0.64 (mid-gestation), and 62.3±0.61 (late-gestation), respectively; length was constant. Behavior was registered using continuous video-records. Lesions were recorded on d25±5, 45±5, and 112±5 of gestation. In Exp. 2, on d30 of gestation 12 multi-parious sows were allocated to standard crate (STALL; control), adjustable crate (FLEX), or free access stall-pen (FREE). On d89 of gestation, FLEX width was adjusted to achieve 2cm space between sow and stall. Immune and endocrine status was measured on days 0, 30, 31, 89, 90 (FLEX only) and 110 of gestation. For Exp. 2b, live behavioral observations among sows in FREE system were registered for 60-min on d30, 45, 60, 75, 89, and 103 of gestation. Data were analyzed using Proc MIXED with repeated measures (SAS). In Exp. 1 sows in STALL performed more oral-nasal-facial (ONF) and sham-chewing than sows in FLEX ($P<0.0001$). Sows in STALL also performed more stereotypies later in gestation than sows in FLEX ($P<0.0001$). Sows in FLEX sat more often than did sows in STALL ($P<0.05$). Sows in STALL drank more often than did sows in FLEX ($P<0.05$). Body lesions (right side) were greater among sows in FLEX stall than for sows in STALL ($P<0.05$), but lesions decreased from gestation d25 to 112 among all sows ($P<0.05$). Sows in FLEX had more piglets born ($P<0.01$) and tended to have more piglets born alive ($P<0.10$) than did sows in STALL ($P<0.01$). In Exp. 2a, sows in FREE had greater lesions than sows in either STALL or FLEX on d45, 60, 75, and 89 of gestation ($P<0.05$). Sows in FLEX stall and FREE system had more male piglets than sows in STALL ($P < 0.10$). Sows kept in FLEX stall had greater piglet mortality than sows in either STALL or

FREE ($P < 0.05$). On d110, neutrophil phagocytosis was greater ($P<0.05$) among sows in FREE system than sows in FLEX stall. Sows in FREE and FLEX stall had less concanavalin A- ($P<0.001$) and lipopolysaccharide- ($P<0.05$) induced proliferative responses at d31 and throughout gestation. Sows kept in FREE system had greater neutrophil-to-lymphocyte ratio on d31, 89, and 110 of gestation compared to d30 (baseline) of gestation ($P<0.05$). Sows kept in FREE system had greater ($P<0.05$) **c**ortisol on d89 than previous days of gestation. In part b of Exp. 2, regardless of day of gestation, some sows spent a greater ($P<0.05$) amount of time in group-pen area than in individual stall. Later in gestation, fewer sows spent more time in the group-pen than on d30 ($P<0.05$). These data indicate that alternative housing systems can affect performance, productivity, behavior, immune function and physiology of the sow throughout gestation. Thus it is important to assess the impact of housing components on sow-well being with the intent to improve animal welfare.