

ANIMAL WELFARE

Title: The effect of alleyway width on sow behavior and welfare in a free-access gestation stall system – NPB - #07-083 (revised)

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Scientific Abstract

Free-access stalls allow sows to choose the protection of a stall or use of a shared alley. This study investigated the effect of alley width in a free-access stall system on physiology, behavior, and production in gestating sows. At gestational day (GD) 35 ± 2.3 , 9 replicates of 21 sows ($N = 189$) were assigned to 1 of 3 pens. Each pen contained 7 free-access stalls and a shared alley of 0.91, 2.13, or 3.05 m wide. Sows remained in pens until being moved to farrowing crates at GD 104 ± 3.5 . Back fat depth at the tenth rib (BF), body weight (BW), body condition score (BCS), and lameness (LAM) were measured on experimental day (ED) 0, 5, 35, and 70. Additional BW was collected 1 d post-farrowing and on weaning day. Sows' body lesions were scored on ED 0, 3, and 6 during wk 1 and weekly afterward. Blood samples were collected on ED -1, 1, 36, and 75 for immune function and cortisol concentration analysis. Behavior was recorded 24 hr/d during wk 1 and 1x/wk for 24 hr during the remainder of the experiment and scored using 10 min scan samples. Farrow rate, days to next estrus (ESTR), percentage of sows rebred (RBRD), and cull rate (CULL) of the sows were calculated. Litter data collected were total litter size, live litter size, and litter weight. Data were analyzed in SAS 9.2 using PROC GLIMMIX with a post-hoc Tukey-Kramer adjustment. Alley width did not affect BW, BF, BCS, or lesion scores ($P > 0.05$). At wk 1, sows with 0.91 m alleys tended to have smaller lameness scores than sows with 2.13 m alleys ($0.05 \leq P \leq 0.10$); however this trend was reversed at wk 6 ($0.05 \leq P \leq 0.10$) and no longer existed at wk 11 ($P > 0.05$). Neither leukocyte populations nor cortisol concentration differed between alley widths ($P > 0.05$). The relative abundance of CD 14, a component of the lipopolysaccharide receptor complex and the level of opsonized phagocytosis tended to be greater in sows with 0.91 m alleys than 2.13 m ($0.05 \leq P \leq 0.10$) with sows from 3.05 m alleys intermediate. No other immune measure varied between treatments. As gestation progressed, sows used stalls less frequently ($P < 0.001$) and alley more frequently ($P < 0.0001$) with alley use lowest and increasing least in pens with 0.91 m alleys ($P < 0.01$). The percentage observations standing was greater in sows with 2.13 and 3.05 m alleys than 0.91 m at wk 3 ($P < 0.05$) and wk 5 ($P < 0.01$) but not overall, while lying was greatest in sows with 3.05 m at wk 1 and 4 ($P < 0.05$) and with 0.91 m at wk 5 ($P < 0.01$). Sows with 0.91 m performed oronasal facial pen investigation less than sows with 2.13 and 3.05 m ($P < 0.05$). Sows with 0.91 m were less frequently observed in groups than sows with 2.13 or 3.05 m ($P < 0.0001$) and group size was smaller ($P < 0.001$). Aggressive interactions did not vary between the alley widths. Farrow rate, RBRD, ESTR, CULL, and litter size did not vary with alley width ($P > 0.05$). Litters from sows from 0.91 m alleys weighed more than litters from sows with 3.05 m with 2.13 m intermediate ($P < 0.05$). In conclusion, there were very few differences in the physiology and productivity of the sows in the three alley widths. However sows from 0.91 m alleys behaved differently than sows in the larger 2 alleys suggesting 0.91 m is not a sufficiently large alley width for full behavioral expression a component of animal welfare.

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