

ANIMAL WELFARE

Title: Retrofit an optimized gestation stall system based on sow well-being: A pilot study.
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Scientific abstract

Sow housing is one of the most controversial welfare issues facing the swine industry. New housing systems are being implemented without scientifically evaluating the impact these alternative systems have on sow well-being. The objectives of this study were to: a) develop an adjustable sow stow for use in existing sow gestation facilities that will better accommodate the physical size of the sow, b) determine the impact of the adjustable stall on sow well-being by assessing physiological and psychological needs of sow, and c) to determine the impact of providing sow freedom to leave stall on well-being. On d30 of gestation 96 multi-parous sows were allocated to a standard stall (**STALL**; control), an adjustable stall (**FLEX**; width only), or free access stall-pen (**FREE**). For FLEX stall only, on d89 of gestation, FLEX width was adjusted to achieve 4cm space between sow and stall on each side. BW and back-fat depth were measured on d0 (wean), 30, 89, and 110. Lesion severity and BCS were assessed on d0, 30, 45, 60, 75, 89, 103, and 110. Immune and endocrine status was measured on d0, 30, 31, 89, 90 (FLEX only) and 110. Behavior was recorded and registered on d30, 66, 87, and 102. Data were analyzed using Proc MIXED with repeated measures and Proc CORR (SAS). There were treatment \times day of gestation interactions for lesions and swelling scores, immune responses, and oral behaviors (**ONF**). Total wound and swelling scores were greater ($P < 0.05$) among sows kept in FREE from d 45 to 110 of gestation compared to sows kept in either FLEX or STALL; while sows kept in STALL had greater ($P < 0.05$) lesion and swelling on d45 and 60 compared to sows kept in FLEX. Sows kept in FREE had greater ($P < 0.05$) neutrophil counts and CONA induced lymphocyte proliferation on d 31 (24 h post treatment allotment) than sows kept in either STALL or FLEX. On d30 of gestation (day of allotment) sows kept in FREE and FLEX performed greater ($P < 0.05$) bouts of ONF behavior than did sows kept in STALL. Treatment time of day interactions occurred; sows kept in FLEX performed more ($P < 0.05$) sham-chew behavior before (0300-0700), during (0700-1100), and after (1100-1500) feeding than sows kept in STALL or FREE. Housing treatment alone influenced measures of well-being. Sows kept in FREE had greater ($P < 0.05$) mean BW, back-fat depth, and BCS than sows in either STALL or FREE. Total body swelling and wounds were greater ($P < 0.01$) among sows kept in FREE than for sows kept in STALL. Sows kept in FLEX had greater ($P < 0.01$) front leg swelling than did sows kept in STALL; while sows kept in STALL had greater ($P < 0.01$) ear wounds than sows kept in FLEX or FREE. Sows kept in FREE had greater ($P < 0.05$) neutrophil and lymphocyte counts than sows kept in either STALL or FLEX; while T-lymphocyte

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proliferation was greater ($P < 0.05$) among sows kept in STALL than for sows in FLEX or FREE. Sows kept in FLEX performed more ($P < 0.05$) postural changes (stand, sit, lay) than sows kept in either STALL or FREE; while sows kept in STALL performed greater ($P < 0.05$) durations of drinking bouts than did sows kept in FLEX or FREE. Both frequency and duration of sham-chewing was greater ($P < 0.01$) among sows kept in FLEX than for sows in other housing environments. When FLEX stall was expanded an additional 7-8cm on d 89, 24 h after expansion of stall width these sows had greater ($P < 0.05$) lymphocyte counts and lower neutrophil chemotaxis. Within the FREE system social rank was determined and these results imply that submissive sows sit for longer ($P < 0.05$) durations than dominant sows, while drink and sham-chew behaviors were greater ($P < 0.05$) among dominant sows than submissive sows. The group-pen area was utilized more ($P < 0.05$) by dominant sows (70-80%) than submissive sows (40-50%) throughout gestation. However, submissive sows kept in the FREE spent only (18%) of time in pen-area on d30 and late in gestation the submissive sows once again spent less time in pen-area. Results reported herein indicate that alternative housing systems do influence indicators of well-being; however well-being was more influenced by physical, biological, and social components within alternative housing systems than the system itself. Therefore, these data strongly support that housing systems can be optimized when specific components of existing systems have been identified that improve sow well-being.