

ANIMAL WELFARE

TITLE: Comparison of Housing Systems for Gestating Sows - NPB #02-164

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II. Abstract

The objectives of this study were to measure the putative well-being indices in sow-housing systems, to compare these along with the costs of using and refining these systems and to provide guidance to producers and other members of the pork chain in discussing these issues. The study assessed the welfare status of gestating sows of mixed parities (0-6) housed in individual stalls (n=176), group pens (n=206) with electronic sow feeders (ESF) and groups in deep bedded hoops (n=60) in terms of injury levels, cortisol concentration and behavior along with longevity and production performance. Data were collected at different time points during the stay of the sows in their respective housing systems. The total injury scores (TIS) of sows in pens with ESF were higher at the time of mixing than at other stages of gestation ($P<0.05$) and in stall-housed sows TIS was the highest at late gestation ($P<0.05$). The TIS and salivary cortisol concentration were lower ($P<0.05$) in stall-housed sows compared to sows in pens with ESF during gestation. The cortisol concentration was not correlated with TIS in both systems. As parity increased, the likelihood for higher median TIS decreased ($P<0.05$) in sows in pens with ESF and increased ($P>0.05$) in stall-housed sows. The TIS of sows in pens with ESF was negatively ($P<0.05$) correlated with body weight and backfat and in sows in stalls it was positively ($P<0.01$) correlated. Aggressions performed and received and number of queuing were higher ($P<0.05$) at late gestation and were similar to that at the time of second mixing among sows in pens with ESF. Aggressions performed and received were positively correlated ($P<0.05$) with proportion of time spent queuing, queuing number and ESF entry. Cortisol was positively correlated with aggressions performed and received ($P<0.05$). The proportion of time spent lying was higher on day 108 of gestation than days 5 and 56 ($P<0.05$ for both) in stall-housed sows. Proportion of time spent on exploration was higher ($P<0.05$) on day 56 than the other stages in stall-housed sows. The median frequency of overall postural change and the median of frequencies of standing to lying, sitting to lying, lying to standing, and lying to sitting were higher on day 5 than at mid and late gestation ($P<0.05$ for all) in stall-housed sows. There was no significant difference among sows from both systems in terms of number of squares entered, time to have the first interaction and number of interactions with the novel arena/object. Stalls and pens with ESF did not differ in terms of litter size, born alive/litter and stillborn/litter. Proportion of sows removed from the pens with ESF was significantly higher ($P<0.05$) than sows in stalls and the major removal reason was lameness though both systems had fully slatted floors.

The hoop-housed sows had lower injury levels and cortisol concentrations and higher litter size ($P<0.05$) than stall-housed sows. Overall cost comparisons were inconclusive due to two factors. The first is that the capital costs for university herds do not reflect normal costs in the industry. Particularly in the case of hoop structures, there are opportunities to use local resources on farms. This includes flexible labor, straw as a grain production byproduct, and nightly inspections. The second reason for the lack of differentiation was the design requirements superimposed on the facility by the University of Minnesota. In conclusion, stalls indicated a benefit in terms of production and welfare at the expense of freedom of movement. The possibility of injuries consequent to aggression both at mixing and at the feeder made the group pen system with ESF also a stressful type of accommodation for gestating sows. The deep-bedded hoop barns, another alternative to individual confinement, may be welfare friendly in terms of lower salivary cortisol concentration and injury levels, though it needs special attention to sort out the issues of higher return rate, smaller group size, labor requirement and waste management.

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