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Cover Design
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Welfare problems in stall-housing of gestating sows

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The major housing system in the US for pregnant sows is individual stalls. Approximately 60-70% of sows in the US are housed in individual stalls throughout gestation (Barnett et al., 2001), followed by group housing. Deep-bedded hoop systems for gestating sows are, however, relatively new to US pork producers and account for a very small proportion of pig production. All these systems have advantages and disadvantages. Savings in terms of space, labor, and energy, combined with the possibility of reducing aggression and increasing the ease of inspection have made the stall-housing system attractive to pork producers. Nevertheless, the stall system for gestating sows has been the focal point of welfare criticisms, owing mainly to the apparent lack of freedom of movement. Further, the rigorous selection procedure to improve meat production has changed the body shape of modern domestic pigs (Whittemore, 1994), adding to the difficulty in standing up and lying down in restricted space. The fact that a female pig spends almost its entire life in confinement is concern to some people. In fact, the stall housing system for gestating sows has become a concern for animal welfare movements all over the world, including in US. The state of Florida has already banned the use of gestation stalls. There is pressure from the public in many states in the US to change rules in line with the Florida legislation.

The adverse welfare implications of stall housing have been a subject of study in many previous reports (Clough, 1984; Barnett et al., 1985; Lawrence et al., 1994; Boyle et al., 1999). Depriving animals of opportunities to walk and turn around may affect their health, performance, and overall well-being. The lack of space may be expressed in terms of the reduction in frequency of postural behavior. Lack of space may lead to suppression or displacement of one or more activities, causing aberrant behavior and physiological changes which can lead to poor welfare (Petherick, 1983). While addressing the issue of space restriction in stalls, it is important to note that the adequacy of area is dependent on the space availability relative to the size of the pig. However, sows and gilts housed in individual stalls require space in excess of lying area to move between standing and lying postures (Hurnik and Lewis, 1991). The size of sows varies considerably, depending on age, genetics, feeding level, and stage of gestation, and the effective space available to the sow may be inadequate. Nevertheless, most of the commercially available stalls provide only the minimum space required for average sized sows and have similar designs and measurements. Many of the studies dealing with the welfare implications of the stall system have made direct and indirect comparisons of confined housing with non-confined systems, and the differences are obvious. However, what is equally important is to know how the welfare status of the sow in a stall changes due to changes in body size, weight, and other physiological changes associated with pregnancy.

The health and welfare of gestating sows has always been a primary concern of pig producers. At the same time, the reactions of governments and the public may force producers to change their production systems in ways to meet possible concerns raised by the consumers who ultimately are the deciding factor in a competitive market. It is important to have a scientific understanding of the welfare issues associated with each housing system in question. Understanding welfare in scientific terms is an essential pre-requisite for setting up standards for comparing farms and/or housing systems. Such an understanding can be reached only by evaluating all possible welfare parameters, such as performance and health, behavior, physiology, longevity, and cost (McGlone, 2001). It is a widely accepted fact that welfare assessment based on a single criterion can be awfully misleading. However, assessing animal welfare is difficult given its multi-dimensional nature and lack of validation of the measures. Assessing different welfare indicators will help to provide a reasonable evaluation of the welfare status of the animal in question.

In one initial study, we evaluated the welfare status of sows housed in stalls in terms of indicators such as injury levels; salivary cortisol concentration; and behaviors during the initial, mid, and late stages of gestation. We summarize our findings below.

Methods

The study was conducted at the University of Minnesota, Southern Research and Outreach Center at Waseca, MN, USA. Behavior, salivary cortisol concentrations, injury levels, and body weight of 25 stall-housed sows were as-

sessed on days 5, 56, and 108 of gestation. A time-lapse video recorder was used to videotape the behavior of the sows. Saliva samples were analyzed for cortisol concentration using radioimmunoassy. Injuries were scored based on frequency and severity. The data were analyzed using appropriate statistical methods. Since poor welfare is ultimately reflected on the performance and longevity of sows, we also contrasted the performance and longevity of stall-housed sows with sows of similar characteristics from two other systems, deep-bedded hoops and pens with electronic sow feeding (ESF).

Results and discussion

Our findings suggested that the sows in stalls were relatively more stressed during initial- and late-gestation compared to mid-gestation. The cortisol concentration was the lowest at mid-gestation. Weaning, changes in the type of housing, feeding patterns in the early stages, and physiological changes associated with advancement of gestation could have been responsible for the increase in cortisol concentration at early and late-gestation, respectively. A higher proportion of time was spent lying towards late-gestation while the proportion of time spent in active/exploratory behavior was significantly higher during mid-gestation; this suggests welfare is less compromised during mid-gestation, as exploratory behavior is taken as an indication of positive welfare (Wood-Gush and Vestergaard, 1993). The total injury score was also significantly higher during late-gestation. The overall frequency of postural changes was higher during initial-gestation compared to the other two stages. The time taken for postural change from sitting to lying was significantly higher at late-gestation than mid-gestation. In an earlier study (Anil et al., 2002) we demonstrated that, when the length and height of the sow increase in relation to stall length and stall width, respectively, the injury score increased significantly. The chances for injuries are higher when the sow attempts to make postural changes within a limited space. The relative space availability decreases towards late gestation when the body weight increases with advancement of gestation. The space restriction could be responsible for the increase in time taken for postural change from sitting to lying at late gestation. The space restriction could have been stressful as evidenced from the higher cortisol concentration at late-gestation. However, the higher cortisol level at late-gestation may be more of a physiological response in preparation for farrowing than of a housing effect. There was no increase in body weight or reduction in relative space availability and consequent difficulty in postural changes by day 56 of gestation compared to day five. Sitting-to-lying can be viewed as a part of the postural change from standing-to-lying. The ease of lying has been suggested to be indicative of sow comfort (Clough, 1984; Baxter 1991) and, therefore, the longer time taken for sitting-to-lying on days five and 108 indicated that sows were less compromised on day 56. Frequent postural changes at initial-gestation were indicative of stress (Taylor et al., 1988). However, a reduction in the frequency of overall postural changes observed on day 108 may reflect a reduction in space availability and not necessarily lack of stress.

The higher injury scores at late-gestation were mainly due to the udder injuries. The engorged udder in late-gestation was more susceptible to injuries, especially while lying down. Also, during lateral recumbency the udder extended to the neighboring stall due to inadequate stall-width and was stepped on by the adjacent sow.

A higher conception rate and lower removal rate compared to pens with ESF was observed in stalls. Stall-housed sows had fewer mummies/litter than group-housed sows. The number of sows removed was also less in stalls. Pre-weaning mortality was lower in sows in pens with ESF. The incidence of lameness was more in sows in pens with ESF than in stalls, although both had slatted floor without any bedding. Obviously the common causes for lameness in group houses, such as chasing and injuries during aggression, were absent in stalls. A higher farrowing percentage and lower removal rate compared to hoops was observed in stalls. The average litter size, born alive/litter, and average litter birth weight were higher in hoops. However, stillborn/litter was less in stall-housed sows.

Conclusion

As expected, there are benefits and challenges in all sow housing systems. By their nature, stalls provide protection from aggression. However, stalls impose severe restriction in postural changes, especially towards late-gestation, sufficient to cause notable injuries. The production data indicated a higher conception rate and lower sow removals in stall-housed sows, which identifies the benefit of gestation stalls. The disadvantage of slatted floor could be aggravated in group housing especially as a cause for lameness. As we have suggested in a previous report, adverse welfare implication of stall housing systems could be minimized by providing stalls which take into account the size of the sow, making the edges of the iron bars smooth, and/or selecting genotypes based on maturation size, although none of these options can address the issue of lack of freedom of movement.

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