

ANIMAL WELFARE

Title: The influence of small versus large pens on the welfare of the grow-finisher pig (revised)

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Scientific Abstract

In 2004, the National Pork Board conducted a workshop to review the current scientific literature pertaining to the welfare of the finisher pig during transportation. The scientific experts concluded that “*At the farm, major factors impacting behavioral and physiological responses of the pig during transport include genetics, slaughter weight, environmental conditions (temperature and humidity), health status, marketing strategy, time off feed, pre-transport experiences, facility design, and nature of handling during loading*” (Ritter et al., 2005). Industry accounts have suggested that growth performance traits and morbidity / mortality may be compromised when pigs are reared in large pen configurations. Therefore, the objective of this study was to determine the effects of small (32 pigs per pen) versus large (256 pigs per pen) pen configurations on the performance, behavior and welfare of the pig during the grow-finish period. One wean-to-finish site within a large Midwestern commercial production system was used for both replications. The site was divided into two naturally tunnel ventilated buildings that each had two rooms. Each room had fully slatted concrete floors, an 81 cm-wide center aisle, and pens (7.1 m long × 3.2 m wide) that provided 0.69 m²/pig of pen floor space. Pens were divided by steel gates (91 cm height), and the back gates of each pen had the ability to swing freely or to be locked in a closed position. Pigs were fed a standard grow-finish diet that met or exceeded the nutritional requirements of the pigs for each phase/weight (NRC, 1998). Feed was delivered on demand to a dry four hole feeder and two nipple cup bowl drinkers were located in each pen. Pigs were observed daily at 0800 h to ensure pig health and facility maintenance. The protocol for this experiment was approved by the Iowa State University Institutional Animal Care and Use Committee (4-09-6716-S). Two treatments were compared a small pen treatment (SP) and a large pen treatment (LP). In both treatments there was the same number of pigs (n = 35 / pen) with the same space allowance (0.69 m²/pig of pen floor space). Both treatments were represented in each room. All pigs were kept in smaller pen configurations for ~8 wks and then the back gates of eight consecutive small pens were opened to form one large pen. Pens were mixed sexed and when the first market group of pigs reached targeted market weight in both treatments the trial was terminated. The following measures were collected; climate, (relative humidity and temperature). Performance (start and end weights, ADG, removals, death and drug usage). Behavior (total of 192 pigs in double-stocked pens (96 barrows and 96 gilts), live observations using an instantaneous 10 min scan sample for 2-hour duration (0800 to 1000-h). Pigs received a unique colored ear tag in their left ear (n = 4 barrows and 4 gilts per small pen that would be opened to a large pen). The number of pigs at their home feeder or home drinker was recorded along with pigs that were using a new feeder and new drinker respectively. Lesions (total of 316 pigs [158 per treatment; 79 barrows and

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79 gilts]) were lesion scored. Each candidate pig was identified by sex and market weight. These pigs were then visually assessed by two observers and once scored; the pig received a mark on their back with an animal safe paint stick. Lesions were defined per the PQA Plus definition of skin lesions (NPB, 2007). The pig's body was divided into 4 regions. Region 1 was the head, jowl and neck, including the snout and ears. Region 2 was the withers, shoulders and front legs. Region 3 consisted of the trunk of the pig, which included the back, chest, loin, abdomen and flank. Region 4 was the rump, thigh and back legs. Each region received a score of 0 to 3. A 0 indicated there were no lesions present in that region of the gilt. A score of 1 indicated there were 1 or 2 lesions in that region. A score of 2 indicated 3 or 4 lesions present, and a score of 3 indicated that there were 5 or more lesions present. Small penned pigs had a higher ADG ($P = 0.004$) and overall gain ($P = 0.05$) than large penned pigs. The average temperature over the trial (April to August 2009) was fairly consistent, ranging between 23.2 and 23.9 °C respectively. This temperature was on the upper end of the optimal thermal environment recommended for a grow-finish pig in the Swine Care handbook (2003). Relative humidity varied more from 47.2 % in May to 70.9 % in August. Pigs raised in small pens throughout the grow-to-finish period had a higher average daily gain ($P = 0.004$) and overall gain ($P = 0.05$) compared to pigs in the large pen configurations. Within the first 2-h, pigs did not prefer to visit their "home feeder and drinker but the majority of pigs at each scan sample were engaged in other behavioral activities within their home pen. When comparing treatment within region, pigs in the large pen design scored higher or more severe lesions over the head (region 1), withers, shoulders and front legs (region 2), trunk of the pig, which included the back, chest, loin, abdomen and flank (region 3) and rump, thigh and back legs (region 4). A total of 24 pigs died on trial. 15 pigs died in the large pen (0.47%) and 9 pigs died in the small (0.28%). A total of 39 pigs were removed off trial and placed into hospital pens. A total of 23 pigs were removed from the large pen (0.72%) and 16 were removed from the small pens (0.50%). The cost for drugs used over this trial was \$127.63 vs. \$95.47 for larger vs. small. Applying this knowledge to the commercial swine industry may yield several advantages for the producer; including decreased feed costs and fewer days for pigs to reach market weight.