

The Influence of Small Versus Large Pen Design on Health and Lesion Scores of the Grow-finisher Pig

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Summary and Implications

The objective of this study was to determine the effects of raising pigs in small versus large pens during the grow-finish period on health and number of lesions of the finisher pig. The experiment was conducted from April to July, 2009. One wean to finish site within a large Midwestern commercial production system was used. There were four rooms on this site. A total of 3,162 pigs were used to compare health status and frequency of lesions. Within each room, one side of the aisle was set-up with the small pen treatment (SP; n = 45 pens; [34 pigs/pen]), while the other side was set-up with the large pen treatment (LP; n = 6 pens; [272 pigs/pen]). Therefore, both treatments were represented in each room. All pigs were kept in smaller pen configurations for 4 weeks and then the back gates of eight consecutive pens in the LP treatment were opened. Pens were mixed sexed and when the first market group of pigs reached targeted market weight the trial was terminated. One day prior to trial termination, a total of 316 pigs (10% of the population) were visually assessed by two observers for the frequency of lesions. Lesions were defined per the PQA Plus definition of skin lesions (NPB, 2007), as "...breaks that completely penetrate the skin, such as bites or other lesions that penetrate through the skin." Lesion scores were analyzed using the PROC GLIMMIX procedure of SAS. When a pig was identified within their home pen as requiring medication, the drug type, number of pigs treated, the dose amount and cost per dose were recorded and this information will be presented descriptively. There were differences in lesion frequency with pigs housed in large pens having a higher ($P < 0.05$) number of lesions compared to pigs in the small treatment. This was consistent across all locations on the pig. More pigs were treated in the large pen (n = 198) compared to the small pen (n = 158) and

consequently a higher drug cost was noted for large pens (\$127.63 vs. \$95.47). Therefore in conclusion, larger pens had higher lesion frequency and higher drug treatment costs.

Introduction

In recent years, several production systems in the United States have gone from housing grow-finish pigs in small pens of <30 pigs to much large pens of >100 pigs per pen. Recent industry accounts, however, suggest that these large pen configurations may have negative aspects on growth performance of the pigs and morbidity / mortality. In addition, little is known about how these large pen configurations affect the welfare of the pig in general. The objective of this study was to determine the effects of raising pigs in small versus large pens during the grow-finish period on health and lesion frequency for the finisher pig.

Materials and Methods

Experimental design: The protocol for this experiment was approved by the Iowa State University Institutional Animal Care and Use Committee (4-09-6716-S). The experiment was conducted from April to July, 2009. The experimental design for lesion frequency in this study was a randomized complete design, with pen as the experimental unit.

Animals, housing and feeding: One wean to finish site within a large Midwestern commercial production system was used. The building was divided into two naturally tunnel ventilated buildings that had two rooms. Each room had fully slatted (2.5 cm × 1.3 m) concrete floors, an 81-cm-wide center aisle, and pens (7.1 m × 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. This feature allowed the investigators to make single pens or to combine multiple pens. Pigs were fed a standard grow-finish diet that met the nutritional requirements of the pigs for these phases and BW (NRC, 1998). Feed was delivered on demand to a dry four hole feeder (91 cm high × 53 cm wide × 1.4 m long, with a 15-cm-deep pan; Nol Thorp Equipment, Inc. Stainless Steel N14160 County Rd M, Thorp, WI 54771-7715). Two nipple cup bowl drinkers were located in each pen. The drinkers were 20 cm long and 30 cm high. Pigs were observed daily during the morning (0800 h) to ensure pig health and facility maintenance.

Treatments: Within each room, one side of the aisle was set-up with the small pen treatment (SP; n = 45 pens; [34

pigs/pen]), while the other side was set-up with the large pen treatment (LP; n= 6 pens; [272 pigs/pen]). Therefore, both treatments were represented in each room. All pigs were kept in smaller pen configurations for 4 weeks; after which the back gates of eight consecutive pens in the pre-determined LP treatment pens were opened allowing pigs' access to eight pens. Pens were mixed sexed and when the first market group of pigs reached targeted market weight the trial was terminated.

Lesion frequency: A total of 316 pigs (158 per treatment; 79 barrows and 79 gilts; 10% of the population) were lesion scored one day prior to trial termination. Each pig was randomly chosen and identified by sex and approximate weight. These pigs were then visually assessed by two trained 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), as "...breaks that completely penetrate the skin, such as bites or other lesions that penetrate through the skin." A lesion was included in the count if the scab was tightly adhered to it and covered it. If the scab was ready to fall off it was not included. Pigs were scored for all lesions present on the visible portions when standing (e.g., lesions on the underbelly or inside the ears, which are not normally visible on standing pig, would not have been included). 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.

Health: A total of 3,162 crossbred pigs were used to compare differences in pen designs in drug administration. When a pig was identified within their home pen as requiring medication, the type of drug used, along with the number of pigs treated and dose amount were recorded. An estimated cost per dose of each drug administered was later

determined and this information will be presented descriptively.

Statistical Analysis

Lesion scores were evaluated for normality of their distribution, an assumption of ANOVA, before analysis using UNIVARIATE procedure (SAS Institute Inc., Cary, NC). Data failed to meet the assumption of normality and these data were analyzed using PROC GLIMMIX of SAS (SAS Inst. Inc., Cary, NC). Treatment (LP vs. SP pen), sex (barrow and gilt), pen and room (n = 4) were used in the class statement. The model included the fixed effect of location (head, neck, middle and behind) and the random effects of room nested within pen and treatment. Sex of the pig and sex by treatment interaction were not significant and were removed from the final model. A Poisson distribution was noted and used in the evaluation using the GLIMMIX procedures. Further, the I-Link option was used to within a deck transform the mean and standard error values back to the original units of measure in order to better understand the results.

Results and Discussion

There were differences in lesion frequency with pigs from large pen designs having higher lesion scores compared to pigs in the small pen design treatment. This was consistent across all locations on the pig (Figure 1). More pigs were treated in the large pen (n = 198) compared to the small pen (n = 158) and consequently a higher drug cost was reported for large pens (\$127.63 vs. \$95.47; Table 1). Therefore in conclusion, large pen designs had a higher lesion frequency and higher drug treatment cost. In conclusion, large pens may yield some unfavorable economic and welfare implications for the pig industry. Further research needs to be carried out; however, to more fully understand the affects of large pen designs on health and welfare measures as well as other measures.

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Table 1. Drugs used and the cost over the trial for pigs housed in small and large pens.

Treatment	Measure				
	Drug	No. pigs	Dose / pig (cc)	Cost / dose (\$)	Total cost (\$)
Large					
	Excede	110	1.5	0.79	86.90
	Excenel	68	1.5	0.59	40.12
	Penicillin	20	5	0.03	0.60
Small					
	Excede	84	1.5	0.79	66.36
	Excenel	48	1.5	0.59	28.32
	Penicillin	25	5	0.03	0.75
	Duramyclin	1	1.5	0.04	0.04
Total					
Large					127.63
Small					95.47

Figure 1. Lesion scores for location on the pig by housing treatment Least squares means (\pm SE). Comparisons were made within region between the large and small pens. Pigs housed in the large pens had higher ($P < 0.05$) lesion frequency for each region compared to pigs in small pens.

