EFFECT OF MIXING PIGS OR MAINTAINING PEN INTEGRITY ON THE RESPONSE TO GROWING-FINISHING SPACE ALLOCATION[1]

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Summary

A cooperative study using 906 pigs was conducted to evaluate either mixing pigs or maintaining pen integrity during the move from nursery to finishing, and its effect on finishing space allowance. Treatments were arranged in a 2 × 2 factorial, with main effects of mixing or maintaining pen integrity as pigs were moved to finishing facilities (BW 54.9 lb) and providing either 6.0 or 8.0 ft^2 per pig. There were 8 pens per block and 7 blocks. In 2 pens, when moving from nursery to finishing, pen integrity was maintained and pens were allocated either 6.0 or 8.0 ft^2 per pig. For mixed treatments, pigs from 3 pens were mixed into 3 new pens and were assigned 6.0 ft^2 per pig. Likewise, 3 more pens were mixed and were assigned 8.0 ft^2 per pig. Individual pen was the experimental unit. From d 0 to 14, no treatment effects were observed ($P>0.16$). A mixing by space allocation interaction was observed ($P<0.05$) for overall ADG and F/G. The interactions were a result of mixed pigs at 6.0 ft^2 having better ADG and F/G than unmixed pigs, whereas unmixed pigs had better ADG and F/G at 8.0 ft^2. Despite the interactions, the actual differences between treatment groups were relatively small. Overall (d 0 to 118), maintaining pen integrity did not affect ADG or ADFI, compared with mixing pigs (1.92 and 5.20 vs. 1.93 and 5.20 lb/d, respectively). But pigs provided 6.0 ft^2 had decreased ADG ($P<0.01$) and ADFI ($P<0.01$), compared with those of pigs provided 8.0 ft^2 (1.90 and 5.16 vs. 1.95 and 5.25 lb/d, respectively). These results confirm expected reductions in growth and feed intake of pigs restricted in space. In this study, maintaining pen integrity when moving pigs from nursery to finishing facilities had no beneficial effect on pig performance, compared with mixing pigs into new social groups.

(Key Words: Mixing, Pigs, Space.)

Introduction

The NCERA-89 Committee on Swine Management is a multi-state committee that focuses on applied swine management issues related to animal welfare and performance. Previous NCERA-89 studies suggest that when pigs are mixed into new social groups

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after the nursery phase, space restrictions during the growing-finishing phase result in a decrease in daily feed and daily gain. When the social group remained intact during the move from nursery to growing-finishing, space restrictions during the growing-finishing phase had no effect on daily feed or daily gain. If maintaining social hierarchy (pen integrity) during the move from nursery to growing-finishing alters the response to space allocation, this could have a tremendous impact on producer profitability, as well as redefining animal welfare implications and recommendations. Weaning-to-finishing production systems rely on maintenance of pen integrity from weaning to slaughter. Space allocation recommendations for weaning-to-finishing currently are based on data sets derived from studies moving pigs from nursery to growing-finishing. It's possible that the maintenance of social hierarchy common to weaning-to-finishing production systems alters the response to space allocation in a similar manner to that hypothesized for pigs moved from nursery to growing-finishing facilities. Therefore, the objective of this study was to determine the effect of maintaining social hierarchy (pen integrity) on space requirements for growing-finishing pigs reared in conventional nurseries and moved to growing-finishing facilities, and for pigs reared in weaning-to-finishing facilities.

Procedures

This study was conducted in facilities at the University of Nebraska, Concord; The University of Minnesota, Morris; and the University of Tennessee, Jackson. Nebraska and Minnesota contributed two replications and Tennessee contributed three replications.

The experiment was divided into two separate but similar experiments. The first was conducted with conventional nursery and growing-finishing facilities (MN and TN). The other used weaning-to-finishing facilities (NE).

Pens of pigs were assigned to treatment at weaning. The experimental treatments were arranged in a 2 × 2 factorial, with main effects of mixing or maintaining pen integrity as pigs were moved to finishing facilities (BW 54.9 lb) and providing either 6.0 or 8.0 ft^2 per pig. To accomplish this, pigs from 3 pens were evenly distributed from each nursery or weaning-to-finishing pen to 3 finishing pens (Figure 1; one-third of the pigs in the new pen coming from each of the 3 nursery or weaning-to-finishing pens). In addition, 1 pen of pigs was kept intact (no mixing) and moved to finishing facilities. These mixing/no mixing treatments were replicated within growing-finishing space allocation of either 6.0 or 8.0 ft^2. Both space-allocation treatments during the growing-finishing phase had similar numbers of pigs per pen. Pen sizes were adjusted to maintain the appropriate stocking density.

There were 8 pens per block and 7 blocks. In 2 pens, pen integrity was maintained, and pens were allocated to either 6.0 or 8.0 ft^2 per pig. For mixed treatments, pigs from 3 pens were mixed into 3 new pens and assigned to 6.0 ft^2 per pig. Likewise, 3 more pens were mixed and assigned to 8.0 ft^2 per pig. All pigs and feeders were weighed every 2 weeks, and 1 and 2 weeks after mixing to calculate ADG, ADFI, and F/G. The study was terminated at 118 days, when the average pen weight approached 250 lb.

Each experiment station followed its own standard nutrition and management protocols from weaning to approximately 50 lb. From 50 lb to market weight, the same dietary sequence was used, including corn-soybean meal diets formulated to 1.20, 1.00, 0.85, and 0.75% total lysine from 50 to 80, 80 to 150, 150 to 200, and 200 to approximately 250 lb, respectively.

Data were analyzed as a 2 ×2 factorial by using the MIXED procedure of SAS. Main effects of mixing or maintaining pen integrity,

space allowance (6.0 or 8.0 ft^2), and their interactions were evaluated. Mean values of the 3 mixed pens within each space were combined and used as a single observation. Fixed model effects included space allowance, pen integrity, and their interaction, and random effects included experimental station, replication, and their interaction.

Results and Discussion

There were no mixing by space allocation interactions observed (P>0.05), with the exception of overall ADG and F/G (Table 1). The interactions were a result of mixed pigs at 6.0 ft^2 having better ADG and F/G than unmixed pigs, whereas unmixed pigs had better ADG and F/G at 8.0 ft^2. Despite the interactions, the actual differences between treatments groups were relatively small and, therefore, main effects of mixing and space allocation are discussed.

From d 0 to 14 after the mixing and space allocations were implemented, there were no differences (P>0.20) between either mixing pigs or maintaining pen integrity. Furthermore, there were no differences (P>0.75) between pigs allocated 6.0 or 8.0 ft^2. One would not expect a difference in pig performance with either 6.0 or 8.0 ft^2 during the first two weeks of the study. At this weight (54 lb), approximately 4 ft^2 is adequate to optimize pig performance. But any potential differences among pigs due to mixing would be expected to be found these first two weeks. The re-establishment of the pens' social hierarchy, and associated fighting that comes with it, might be expected to decrease ADG among mixed pigs but not in pens where pen integrity was maintained. This was not observed in this study, and if there were a slight decrease in ADG associated with mixing pigs into new pens, they quickly compensated.

For the overall study (d 0 to 118), there were no differences (P>0.94) between pigs that were either mixed or not when moved from nursery to growing-finishing facilities. But pigs allowed 6.0 ft^2 had decreased (P<0.01) ADG and tended to have decreased (P = 0.11) ADFI. This response is consistent with other studies evaluating stocking density and space allocation among pigs, and indicates that pigs require greater than 6.0 ft^2 in the finishing phase for maximum growth performance.

In conclusion, these results confirm expected reductions in growth and feed intake of pigs restricted in space (6.0 vs. 8.0 ft^2), although the reductions were relatively small. In this study, maintaining pen integrity when moving pigs from nursery to finishing facilities had no beneficial effect on pig performance.

Table 1. Effects of Mixing Pigs or Maintaining Pen Integrity and Space Allowance on Pig Performance[a]

	Space Allowance × Pen Integrity						Main Effects							
	Crowded (6 ft^2)		Uncrowded (8 ft^2)				Space Allowance				Pen Integrity			
Item	Mixed	Unmixed	Mixed	Unmixed	SED	Interaction	6 ft^2	8 ft^2	*P*-value	SED	Mixed	Unmixed	P-value	SED
Day 0-14														
ADG, lb	1.79	1.73	1.77	1.72	0.068	0.92	1.76	1.74	0.76	0.048	1.78	1.72	0.25	0.048
ADFI, lb	3.45	3.37	3.52	3.26	0.177	0.46	3.41	3.39	0.88	0.130	3.49	3.32	0.20	0.130
F/G	1.91	1.94	1.99	1.89	0.063	0.16	1.93	1.94	0.75	0.045	1.95	1.92	0.40	0.045
Day 0-118														
ADG, lb	1.92^{bc}	1.88^{b}	1.93^{c}	1.97^{c}	0.025	0.05	1.90	1.95	0.01	0.018	1.93	1.92	0.91	0.018
ADFI, lb	5.17	5.14	5.24	5.26	0.079	0.61	5.16	5.25	0.11	0.056	5.20	5.20	0.95	0.056
F/G	2.69^{bc}	2.73^{b}	2.71^{bc}	2.67^{c}	0.027	0.04	2.71	2.69	0.34	0.019	2.70	2.70	0.94	0.019

[a]Data were analyzed as a 2 × 2 factorial design with the Mixed procedure of SAS as a means-over-block approach (the combined values for the 3 mixed pens within a space allocation were used as a single observation). Fixed model effects included space allowance, pen integrity, and their interaction, and random effects included experimental station, replication, and their interaction. The Kenward-Roger adjustment was used for the degrees of freedom. Pigs were moved from nursery to finishing facilities at approximately 54.9 lb, when they were mixed or not, and moved to pens with either 6 or 8 ft^2.

[b,c]Means in the same row with different superscripts differ (P<0.05).

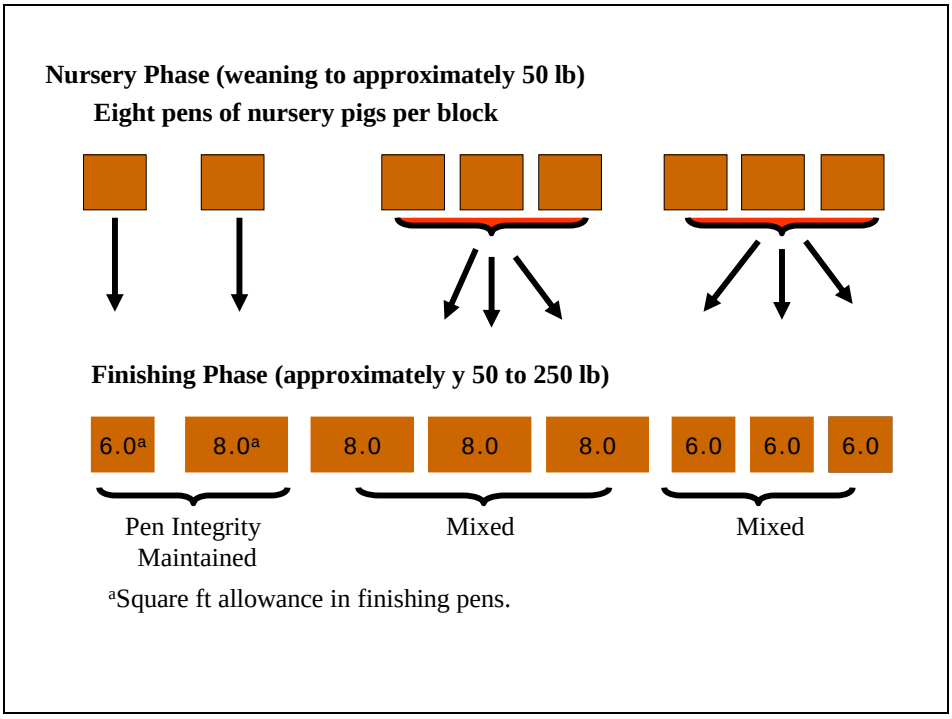

Figure 1. Diagram of Treatment Structure.