Effects of Mixing Late-Finishing Pigs Just Before Marketing on Growth Performance[1]

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Summary
A total of 512 commercial finishing pigs were used in a 15-d trial to determine the effects of mixing late-finishing pigs from 1 or 2 barns at different stocking densities on pig performance prior to marketing. Close-to-market-weight pigs from 2 barns (north barn or south barn) were placed in 32 single-sex pens in the north barn at densities of either 12 or 20 pigs per pen. Pens of pigs were allotted to 1 of 4 mixing treatments (8 pens per treatment). Mixing treatments were: (1) nonmixed pens with 12 north barn pigs (control), (2) mixing 6 north barn pigs with 6 south barn pigs (Mix 1), (3) mixing 10 north barn pigs with 10 south barn pigs (Mix 2), and (4) mixing 10 north barn pigs with 10 more north barn pigs (Mix 3). All pigs were fed a common diet during the trial. Pens of pigs were weighed and feed disappearance determined on d 0, 8, and 15 to determine ADG, ADFI, and F/G. All response criteria were adjusted to a common initial weight in the analysis. Results from this trial indicate that pen inventories had a large impact on performance, with pigs stocked at 12 pigs per pen having greater ADG ($P \leq 0.06$) and ADFI ($P \leq 0.02$) than those stocked at 20 pigs per pen. Overall, there was no difference in performance for nonmixed control pigs and mixed pigs when stocked at a similar density (12 pigs per pen). These data indicate, in the 2 wk prior to market, increasing the number of pigs per pen had a larger effect on performance than mixing pigs. Although performance was negatively affected immediately after mixing, overall performance of mixed pigs was not different than that of nonmixed pigs. Therefore, given adequate time to adjust to a new environment and establish a new social order, mixing pigs does not appear to affect overall performance.

Key words: growth, management at marketing, mixing

Introduction
Variation in pig weights within barns managed on an all/in-all/out basis has led to adoption of strategies to minimize profit loss due to marketing of lightweight pigs. Mixing or combining pens of pigs around the time of marketing has become a common practice to assist with pig flow. This allows space to be emptied for washing and refilling while allowing remaining pigs to be held for additional weight gain. Past research has shown that mixing of grow-finish pigs negatively affects ADG immediately after mixing. Some reports also indicate that, with enough time allowed, mixed pigs may experience compensatory gain that mitigates the negative effects of mixing.

The objective of this trial was to determine the effects on pig performance of mixing different numbers of close-to-market-weight pigs from 1 or 2 barns prior to marketing.

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Procedures

The Kansas State University (K-State) Institutional Animal Care and Use Committee approved procedures used in this study. This trial was conducted in a double-curtain-sided research finishing barn (north barn) in northeast Kansas. Pens were 10 × 18 ft and equipped with a single-sided dry, 3-hole, stainless-steel feeder (AP-3WFS-QA; Automated Production Systems, Assumption, IL) and a double-nipple swinging waterer (Trojan Plastic Waterswing, Trojan Specialty Products, Dodge City, KS), allowing pigs to have ad libitum access to water and feed. The barn was equipped with an automated feeding system (FeedPro; Feedlogic Corp., Willmar, MN) that recorded feed delivery to individual pens. Pigs for this trial were sourced from 2 barns (north barn and south barn), each stocked with pigs of similar ages. The second barn (south barn) was identical to the north barn in construction and equipment and was connected to the north barn by a curtain-sided hallway containing a pen-sized scale.

A total of 512 late-finishing pigs (average initial BW: 256 lb) were used in a 15-d trial to determine the effects of mixing pigs at different stocking densities on growth performance of pigs remaining in the barn after topping (first marketing) and second marketing. Pigs used in this trial were from 2, 50-pen barns on the same site, with pigs from 2 sources (south barn: maternal line only; north barn: terminal and maternal lines). Pigs had been previously marketed out of both barns, with the last loads having been marketed the morning the trial began (d 0). A total of 32 pens of pigs were allotted to 1 of 4 mixing treatments on d 0, and no additional marketing occurred from the barn until the trial was completed. Mixing treatments were: (1) nonmixed pens with 12 north barn pigs (control), (2) mixing 6 north barn pigs with 6 south barn pigs within a pen (Mix 1), (3) mixing 10 north barn pigs with 10 south barn pigs within a pen (Mix 2), and (4) mixing 10 north barn pigs with 10 north barn pigs within a pen (Mix 3). There were 4 barrow and 4 gilt pens per treatment (8 pens per mixing treatment).

On d 0, pigs remaining in each barn were inventoried, and control pens were determined by using 8 north barn pens (4 barrow and 4 gilt pens), which contained a minimum of 12 remaining pigs. When necessary, some pigs were removed from these pens to create stocking densities of 12 pigs per pen. Mixing within gender an equal number of north or south barn pigs, in accordance with the appropriate sources and stocking density for the assigned treatment, created the pens for the 3 mixed-pen treatments. There were no standard conditions set on how many pens of pigs could be mixed to make the required numbers, so some variation occurred in the number of original pens used to create the new mixed pens. However, each new pen was sourced from a minimum of 2 pens, ensuring that social rank in each mixed pen was disrupted.

For the duration of the trial, a common diet was fed in meal form without the addition of ractopamine hydrochloride. Pens of pigs were weighed and feed disappearance determined on d 0, 8, and 15. From these data, ADG, ADFI, and F/G were calculated.

Data were analyzed using the GLIMMIX procedure in SAS (SAS Institute, Inc., Cary, NC), with pen as the experimental unit. The model included mixing treatment as a fixed effect and initial average pen weight as a covariate because there were numeric differences in initial average pig weight. For this study, gender was potentially confounded with genetic background, thus gender was used as a random effect to account for variation between barrow and gilt pens. Differences between treatments were determined by using least squares means ($P < 0.05$).

Results and Discussion

In the 8 d after mixing pigs, despite ADG being similar ($P = 0.13$; Table 1) among the treatments, all 3 mixed-pig treatments demonstrated numerically lower ADG than the nonmixed control pigs. Some of the numerical reduction in growth rate can be attributed to the differences in ADFI during the first 8 d. Control pigs had increased ($P < 0.01$) ADFI compared with Mix 2 or Mix 3 pigs, while the Mix 1 pigs had intermediate feed intake. Feed to gain, although similar ($P = 0.50$) among treatments, was numerically poorer for the 3 mixed-pig treatments compared with the control pigs. The intake reduction coupled with a poorer feed efficiency explains the numerically lower ADG for the mixed pigs in the first few days after mixing, as pigs established their new social order and adapted to new surroundings. In addition, a portion of the negative effects on ADG, ADFI, and F/G may be attributable to the higher stocking density or reduced feeder space per pig for the Mix 2 and Mix 3 treatments compared with the control and Mix 1 treatments. Pens stocked with 12 pigs had 3.5 in. of feeder space and 15.0 ft^2 of pen space per pig. In contrast, pens stocked with 20 pigs allowed 2.1 in. of feeder space per pig and 9.0 ft^2 per pig of pen space.

From d 8 to 15, control and Mix 1 pigs had greater ($P \leq 0.04$) ADG than the Mix 3 pigs, with Mix 2 pigs intermediate. Pens stocked at 12 pigs each (the non-mixed control and Mix 1 pens) had increased ($P \leq 0.02$) ADFI compared with both mixed pens stocked at 20 pigs per pen. These differences may be associated with stocking density, because the low-density mixed pens (Mix 1) had similar ($P = 0.69$) intake compared with the non-mixed control pens. There was no treatment ($P = 0.13$) effect on F/G from d 8 to 15, though F/G was numerically improved from the previous period.

The results from d 0 to 8 and d 8 to 15 suggest that the number of pigs per pen had a large impact on performance. Overall, ADFI was lower ($P \leq 0.02$) for the higher stocking-density pens (20 vs. 12 pigs per pen). Because of the difference in ADFI, overall ADG was decreased ($P < 0.01$) and off-test weight lighter ($P \leq 0.005$) for the Mix 3 treatment (20 pigs per pen) than for the control and Mix 1 (both stocked at 12 pigs per pen). Mix 2 (20 pigs per pen) tended to have lower ($P \leq 0.06$) ADG and weigh less ($P \geq 0.07$) compared with treatments stocked at 12 pigs per pen.

These data indicate that increasing the number of pigs per pen had a greater effect on performance than mixing pigs. Despite early numerical negative effects of mixing, overall, there was no difference in performance for mixed pigs and nonmixed control pigs when stocked at a similar density (12 pigs per pen). Therefore, mixing of pigs prior to market does not appear to affect overall performance as long as pigs are allowed time to adjust to the environment and establish a new social structure.

Table 1. Effect of mixing pigs from multiple barn sources on performance of late-finishing pigs just before marketing[1]

Item	Control[2]	Mix 1	Mix 2	Mix 3	SEM[3]	Probability, $P <$
Counts						
Pens, no.	8	8	8	8	---	---
Pigs per pen, no.	12	12	20	20	---	---
Source barns per pen, no.	1	2	2	1	---	---
d 0 to 8[4]						
ADG, lb	1.90	1.76	1.58	1.46	0.201	0.13
ADFI, lb	7.29[a]	6.82[ab]	6.25[b]	6.35[b]	0.282	0.02
F/G	3.85	4.06	4.29	4.44	0.410	0.50
d 8 to 15[4]						
ADG, lb	2.16[ab]	2.32[a]	1.97[bc]	1.87[c]	0.097	0.01
ADFI, lb	7.92[a]	8.04[a]	7.23[b]	7.11[b]	0.234	0.003
F/G	3.71	3.50	3.70	3.82	0.138	0.41
d 0 to 15[4]						
ADG, lb	2.02[a]	2.02[a]	1.76[ab]	1.65[b]	0.123	0.01
ADFI, lb	7.59[a]	7.39[a]	6.70[b]	6.71[b]	0.251	0.006
F/G	3.78	3.67	3.89	4.08	0.152	0.13
Weight, lb[5]						
d 8	271.0	269.9	268.4	267.4	1.60	0.12
d 15	286.2[a]	286.1[a]	282.6[ab]	280.5[b]	1.74	0.01

[abc] Within a row, means without a common superscript differ ($P < 0.05$).
[1] Initially, a total of 512 late-finishing pigs (barrows and gilts with initial average BW of 256 lb) with 12 or 20 pigs per pen sourced from 1 or 2 barns (north barn or south barn) were used in a 15-d growth trial.
[2] Mixing treatments were: (1) nonmixed control pens with 12 north barn pigs (control), (2) mixing 6 north barn pigs with 6 south barn pigs (Mix 1), (3) mixing 10 north barn pigs with 10 south barn pigs (Mix 2), and (4) mixing 10 north barn pigs with 10 more north barn pigs (Mix 3).
[3] Due to initial weight adjustment, the SEM varied among treatments. The highest SEM among the treatments is reported.
[4] ADG, ADFI, and F/G were adjusted to a common d 0 weight.
[5] Weights for d 8 and 15 were adjusted to a common d 0 weight.