SORTING GROWING-FINISHING PIGS BY WEIGHT FAILS TO IMPROVE GROWTH PERFORMANCE OR WEIGHT VARIATION

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Summary

A trial was conducted to determine the effects of sorting pigs by body weight at placement on growth performance and weight variation at finishing. Unsorted pigs and heavy sorted pigs had higher ADG than medium or light sorted pigs. By the end of the trial, final body weights ranked in the following descending order: heavy sorted, unsorted, medium sorted, and light sorted. Final weights of unsorted pigs were heavier than the average final weight of all sorted pigs. Additionally, differences in body weight variation were not detectable by the end of the study. These data suggest that sorting pigs uniformly by weight to pens has little effect on final variability in individual body weights and placing pigs into pens regardless of weight may increase the amount of pork produced from a system and reduce turnaround time in barns.

(Key Words: Growing-Finishing Pigs, Sorting, Growth Performance, Weight Variation.)

Introduction

Sorting and grouping pigs by similar body weights is a common management technique thought to minimize variation in final pig body weights. Therefore, sorting by weight is thought to achieve packer weight specifications more efficiently. However, few data are available to support these assumptions. Therefore, this study was undertaken to determine the effects of initial within-pen weight variation on growth performance and weight variation at marketing.

Procedures

Two sequential trials were conducted. In each trial, we allotted 192 crossbred (PIC L326 or 327 boars × C22 sows) barrows and gilts, approximately 14 weeks of age and 75 lb, to one of four experimental groups:

Uniformly heavy; initially weighing 81.7±3.09 lb;

Uniformly medium; initially weighing 75.0±1.71 lb;

Uniformly light; initially weighing 66.5±4.47 lb;

High variation, medium weight (Unsorted), initially weighing 74.6 ± 6.96 lb (intended to have beginning weight similar to that of uniformly medium pigs but quadruple the initial variation in weight).

In each trial, approximately 250 pigs were available to select from, and in each case, pigs weighing more than three standard deviations from the group average (about 12 pigs) were removed from consideration. Thus, extremely heavy or extremely light pigs were not used. The remaining pigs not used in the study were selected across the weight groups so as not to disrupt the normal weight distribution. In each trial, pigs were utilized from a single farrowing group that farrowed over a 7-d period. Sex and ancestry were balanced within and across blocks

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of pens. Pigs were allocated to experimental groups in the following manner. Barrows and gilts were sorted separately according to body weight and divided into three weight groups (heavy, medium, and light). The unsorted pens were created by taking equal thirds from each of the uniformly heavy, medium, and light groups. Sex was balanced such that each third of the unsorted pens and the corresponding third of each sorted pen contained equal numbers of barrows and gilts. Thus, comparisons could be made (without confounding by age, sex, or ancestry) between sorted and unsorted pens and among the heavy, medium, and light thirds of the unsorted pens to the corresponding uniformly heavy, medium, and light pens. Pigs were housed in a modified open-front finishing barn with 6 ft × 16 ft partially slatted pens (50% slatted and 50% solid). Each pen contained a single nipple waterer and a two-hole self-feeder to allow pigs ad libitum access to water and feed, respectively. Each trial consisted of four blocks of the four experimental groups with pigs housed 12 per pen providing 8 sq ft/pig. Thus, the overall experiment included eight observations per treatment group.

Pigs were fed nutritionally adequate grain sorghum-soybean meal-based diets in three phases with decreasing nutrient density as pig weight increased. Pigs and feeders were weighed upon initiation of the trials and again at d 7, 14, 21, 28, 56, 70, and 91 for the determination of pen ADG, ADFI, and F/G. Within-pen variation (standard deviation) in individual body weight also was determined for each pen.

Data are reported as LS means and were analyzed as a randomized complete block with pen as the experimental unit using the GLM procedure of SAS. Means were separated using the Least Significant Difference (LSD) procedure of SAS. A preplanned nonorthogonal contrast was used to compare the average weight of the three sorted-pen categories of pigs against that of the unsorted pens of pigs.

A second statistical model was used to compare the ADGs of the heavy, medium, and light thirds of the unsorted pens of pigs to their respective sorted counterpart pens. Therefore, the experimental unit for the unsorted pigs was four pigs per pen corresponding to the three uniformly sorted weight categories and pen for the uniformly sorted groups. Again, the ADGs of these six groups were compared statistically also by the LSD procedure. All probability values were considered significant at $P<.05$.

Results and Discussion

The uniformly heavy and medium pigs and the unsorted pigs had similar ($P>.05$) ADG and ADFI from d 0 to 14 and d 0 to 28 (Table 1). However, both uniformly heavy and unsorted pigs grew faster ($P<.05$) than uniformly light pigs, with uniformly medium pigs being intermediate during these same time intervals. Growth performance was similar ($P>.05$) between sorted and unsorted pigs during these two periods. For the overall growth period (d 0 to 91), uniformly heavy and unsorted pigs had similar ADG ($P>.05$), and both were higher ($P<.05$) than ADG of the uniformly medium and light pigs, which were similar ($P>.05$). Additionally, the ADG of unsorted pigs was higher ($P = .03$) than the mean ADG of sorted pigs. No differences ($P>.05$) were observed for ADFI over the total trial, and F/Gs were similar ($P>.05$) for uniformly heavy and medium and unsorted pigs, lowest for uniformly light pigs, and intermediate for uniformly medium pigs.

As expected, average pig weights at d 0 were highest ($P<.05$) for uniformly heavy pigs, lowest for uniformly light pigs, and similar and intermediate for uniformly medium and unsorted pigs (Table 1). This trend continued through d 70. However, at the termination of the study (d 91), uniformly heavy pigs were heaviest, followed by unsorted, uniformly medium, and uniformly light pigs. All four groups were significantly ($P<.05$) different, and the final weight of unsorted pigs was heavier ($P=.03$) than the average final weight of all sorted pigs.

Within-pen variation (Table 2) followed a pattern similar to that of body weights.

Initial variation was smallest (P<.05) for uniformly medium pigs, reflecting the average of the total population of pigs. Additionally, the variations of the four experimental groups were significantly different (P<.05). As time on test progressed, differences in within-pen variation among the three sorted groups diminished.

An examination of the matched groupings of pigs for ADG (Table 3) revealed that sorting pigs by similar body weights may not be necessary to achieve maximal production from a barn of finishing pigs. From d 0 to 91, uniformly heavy pigs and the heavy and medium thirds of the unsorted pens had the highest (P<.05) ADG. The uniformly medium pigs were intermediate, and the uniformly light pigs and light third of the unsorted pens had the lowest ADG.

These data indicate that sorting pigs uniformly by weight may not be necessary for maximum growth performance. Endpoint variability in individual pig weights within a pen is unaffected by sorting strategy. Additionally, eliminating sorting of finishing pigs upon placement may improve throughput (amount of pork produced) within a production system. The definitive reason for these observations is not readily apparent. However, the shifting in the population was primarily due to the growth performance of the medium pigs in the unsorted pens of pigs. The medium pigs in pens containing light and heavy pigs grew substantially faster than medium pigs penned uniformly by body weight. Thus, these responses could potentially be due to the development of a social hierarchy. However, additional research is needed to confirm this hypothesis.

Table 1. Growth Performance and Average Pig Weights[a]

	Sorted Pens					Probability
Item	Heavy	Medium	Light	Unsorted	CV	Sorted vs Unsorted
day 0 to 14						
ADG, lb	2.29[b]	2.23[bc]	2.15[c]	2.27[b]	3.84	.24
ADFI, lb	4.76[b]	5.18[bc]	5.39[c]	5.15[bc]	8.71	.84
F/G	2.07[b]	2.32[cd]	2.50[d]	2.28[c]	8.57	.81
day 0 to 28						
ADG, lb	2.25[b]	2.18[bc]	2.13[c]	2.23[b]	3.73	.20
ADFI, lb	5.14[b]	5.44[bc]	5.58[c]	5.44[bc]	6.33	.72
F/G	2.32[b]	2.53[bc]	2.66[c]	2.46[bc]	9.32	.71
day 0 to 91						
ADG, lb	2.08[b]	2.02[c]	2.00[c]	2.08[b]	2.08	.03
ADFI, lb	5.89	5.87	6.02	5.95	5.37	.84
F/G	2.85[b]	2.93[bc]	3.02[c]	2.88[bc]	5.46	.46
Average Pig Weights on Day, lb						
0	81.7[b]	75.0[c]	66.5[d]	74.6[c]	1.29	.64
7	99.0[b]	91.9[c]	82.8[d]	91.9[c]	1.71	.30
14	115.0[b]	107.3[c]	97.7[d]	107.6[c]	1.56	.20
21	130.0[b]	122.1[c]	112.2[d]	122.2[c]	1.77	.39
28	145.6[b]	137.0[c]	127.0[d]	138.0[c]	2.04	.22
56	206.9[b]	195.4[c]	185.8[d]	197.4[c]	1.46	.27
70	232.9[b]	222.1[c]	211.7[d]	224.7[c]	2.35	.26
91	272.1[b]	259.7[c]	249.6[d]	264.4[e]	1.58	.03

[a]Values are means of eight replicate pens (with 12 pigs per pen) per treatment (initial average pen weight of 74.5 lb). The CV reported represents variation among pen means. The probability for sorted vs unsorted was determined by means of a nonorthognal contrast comparing the mean of the heavy, medium, and light pens to that of the sorted pens.
[b,c,d,e]Means in a row with different superscripts differ (P<.05).

Table 2. Average Within-Pen Weight Variation (SD)[a]

	Sorted Pens					Probability
Time	Heavy	Medium	Light	Unsorted	CV	Sorted vs Unsorted
day 0	3.09[b]	1.71[c]	4.47[d]	6.96[e]	15.61	.0001
day 7	4.55[bc]	3.13[c]	5.85[d]	8.50[e]	25.34	.0001
day 14	5.29[b]	4.04[c]	6.21[b]	9.17[d]	18.98	.0001
day 21	6.37[bc]	5.15[c]	7.26[b]	9.76[d]	19.48	.0001
day 28	7.84[bc]	6.34[c]	8.69[b]	11.01[d]	18.16	.0001
day 56	10.88[bc]	9.97[c]	13.15[bd]	15.11[d]	22.01	.003
day 70	12.52	13.24	15.47	16.50	26.60	.09
day 91	16.24	16.67	20.40	19.22	28.64	.50

[a]The SD values are the means of eight replicate pens (with 12 pigs per pen) per treatment (initial average pen weight of 74.5 lb). The CV reported represents variation among pen means. The probability for sorted vs unsorted was determined by means of a nonorthognal contrast comparing the means of the heavy, medium, and light pens to that of the sorted pens.
[b,c,d,e]Means in a row with different superscripts differ (P<.05).

Table 3. Average Daily Gains (lb) of Sorted Pens or Heavy, Medium, and Light Thirds of Unsorted Pens[a]

	Sorted Pens			Unsorted Groups			
Time	Heavy	Medium	Light	Heavy	Medium	Light	CV
day 0 to 14	2.29[bc]	2.23[bcd]	2.15[cd]	2.34[b]	2.32[b]	2.16[cd]	5.79
day 0 to 28	2.25[b]	2.18[bc]	2.13[c]	2.27[b]	2.25[b]	2.08[c]	5.24
day 0 to 91	2.08[bc]	2.02[cd]	2.00[d]	2.11[b]	2.13[b]	1.99[d]	3.56

[a]Values are means of eight replicate pens (with 12 pigs per pen for the sorted pens and 4 pigs per pen for the unsorted pens.) per treatment. The CV reported represents variation among pen means. The probability for sorted vs unsorted was determined by means of a nonorthognal contrast comparing the mean of the heavy, medium, and light pens to that of the sorted pens. The unsorted groups refer to the heavy, medium, and light thirds of each unsorted pen, respectively.
[b,c,d]Means in a row with different superscripts differ (P<.05).