EXAMINATION OF STOCKING DENSITY AND MARKETING STRATEGIES IN A COMMERCIAL PRODUCTION ENVIRONMENT[1]

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Summary

The influence of stocking density (7.4 or 6.6 sq ft per pig) and marketing strategy (0, 1, or 2 sorts before closeout) was examined in a commercial production environment. No interaction between stocking density and marketing strategy was observed. Higher stocking density had no negative effects on growth performance or carcass characteristics. The major advantage of one or two sorts was a reduction in sort loss of $.27/cwt carcass ($.52/pig) compared to no sorts. No differences were found between one and two sorts under the packer matrix used in this study.

(Key Words: Stocking Density, Growth Marketing, Carcass Characteristics.)

Introduction

The influence of stocking density on growth has been characterized relatively well and indicates that growth rate is slower because of reduced feed intake as pigs are raised in more crowded conditions. However, economic analysis usually indicates that the more crowded conditions result in lower fixed facility costs. This is because the greater throughput from additional pigs offsets the decreased growth. Marketing strategy is highly dependent on the premium and weight discount grid for a particular packer. Marketing multiple times from a barn incurs added sorting costs. The removal of pigs from a pen prior to closeout may have both positive and negative biological effects on the performance of the remaining pigs in the pen. A positive effect may result from the reduced stocking density and a negative effect from the reestablishment of social order.

Therefore, our objective was to examine the interaction between stocking density and marketing strategy on growth performance and carcass characteristics.

Procedures

A total of 1,272 pigs (PIC C-22 × 337) was used in this experiment. Pigs were housed in a 48-pen finishing barn. Pens were blocked according to location in the barn and randomly assigned to treatment within block. The pigs initially averaged 64.6 lb. The trial was a 2 × 2 × 3 factorial randomized complete block design. The main effects were gender, stocking density, and marketing strategy. The two stocking densities were 25 (7.4 sq ft) or 28 (6.6 sq ft) pigs per pen at initial placement. The three marketing strategies were: a control treatment in which all pigs were marketed at the same time; a second treatment in which the heaviest four pigs per pen (visual appraisal) were marketed 21 d prior to closeout (1 sort); and a third treatment in which the heaviest two pigs per pen were marketed at 27 d, and the heaviest three

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pigs were marketed at 14 d prior to closeout (2 sorts).

The finishing barn was a double curtain-sided, deep pit barn. It operates on natural ventilation during warm weather and is equipped with automatic ventilation for cold weather. The floor was totally slatted concrete. Pens were equipped with one 4-hole self-feeder and one cup waterer. Pen dimensions were 10 ft × 18.5 ft to provide 7.4 and 6.6 sq ft per pig for pigs housed 25 and 28 pigs per pen, respectively. Pen size or number was not adjusted if a pig died or was removed from that pen.

Group weights of all the pigs in each pen were obtained every 2 weeks. Diet phase changes occurred at 4-week intervals. Feeders were vacuumed on the day that diet phases were changed, and the remaining amounts of feed recorded. Pigs in all pens were weighed at market before shipping to the processing plant. The pigs in each pen were marked with a different tattoo prior to marketing to allow carcass data to be collected and attributed back to each pen. Standard carcass criteria were measured including carcass weight, fat depth, loin depth, lean percentage, and fat-free lean index. The proportion of top market pigs was calculated. These were pigs that were acceptable to the packers. Acceptability was based on weight (> 165 lb) and absence of physical deformities.

All diets were corn-soybean meal based. Diets were formulated in five phase weight ranges for each gender consisting of 60 to 105, 105 to 145, 145 to 180, 180 to 210, and 210 lb to market for phases one to five, respectively. For the first two phases, 90 lb per pig of each diet were fed, then 100 lb per pig were fed in the next two phases, and the last phase until market. The diets fed during phases one, two, and three contained 6% added choice white grease. Diets fed during the other phases did not contain any added fat. The total dietary lysine levels fed were 1.22, 1.05, .90, .72, and .62 for barrows and 1.22, 1.10, .95, .75, and .65 for gilts for the five phases, respectively. Vitamin and trace mineral levels were similar to KSU recommendations.

Results and Discussion

No 2- or 3-way interactions were detected between stocking density and marketing strategy. Therefore, main effect means are listed in Table 1. As expected, there were several significant differences occurred between barrows and gilts for growth performance. The effects of stocking density and marketing strategy can be compared to the magnitude of the gender effect to gauge the relative strength of these effects.

As expected, the average total pen weight was heavier (P<.05) for the pens initially stocked with 28 pigs compared to the pens stocked with 25 pigs. On d 90 when the first pigs were marketed, the barrow pens tended (P<.08) to be heavier than the gilt pens. The pens initially stocked with 28 pigs were approximately 600 lb heavier (P<.01) than the pens stocked with 25 pigs on d 90. The total weight of pigs in the pen sold as tops was greater (P<.01) for barrows compared to gilts and for pens with 28 pigs compared to those with 25 pigs. Also as expected, the average numbers of pigs per pen on d 90 and sold as tops at market were higher (P<.01) for the pens initially stocked with 28 pigs compared to those with 25 pigs. Survivability at d 90 was not influenced by treatment. The percentage of barrow that reached acceptable market weight (tops) was higher (P<.05) compared to gilts. Because survivability was similar across gender to d 90, this indicates that a greater number of gilts were classified as culls because of light weight at market.

Barrows had a greater (P<.05) average weight on d 90 and for pigs sold as tops compared to gilts. The marketing strategy without sorting resulted in heavier (P<.05) pigs at market compared to the two-sort strategy, and the one-sort strategy resulted in intermediate weight pigs. The heavier average pig weight was caused by the heavy weights attained by the fastest growing pigs in this treatment. These faster growing pigs were sorted and marketed earlier in the one-and two- sort treatments. Barrows grew faster (P<.05) than gilts from d 0 to 90. From d 90 to the last day that pigs were in the barn (d 117), pigs on the no-sort strategy grew slower (P<.05) compared to pigs in the one-sort strategy, and the pigs in the two-sort strategy had intermediate ADG.

Also as expected, gilts had less fat depth, larger loin depth, and a greater percent lean (P<.05) than barrows. In contrast, the number of pigs per pen or marketing strategy had no influence on carcass characteristics. Because they were leaner, the gilts had a higher (P<.05) lean premium. However, the no- sort marketing strategy did result in a higher (P<.05) sort loss penalty compared to the other two strategies. The sort loss or weight discount for the no-sort strategy probably was due to heavy weight pigs being out the top range of the packer matrix. The two-sort strategy appears to lack any advantage over the one-sort strategy and, in fact, may be detrimental to growth performance.

In general, the increased number of pigs per pen in the high stocking density group had little effect on survivability, number of tops, growth performance, or carcass value. Several other research reports have established that growth rate decreases linearly as stocking density increases. Although we did not observe a difference in our study, we believe that the difference in the square footage of the two treatments was not large enough to elicit a detectable response. Nonetheless, the increased pounds of pork produced per square foot of facility will lower fixed cost by approximately $1.50 per pig. This assumes a facility cost of $36 per 7.4 sq ft. The increased number of pigs per pen in this study lead to a significant reduction in fixed costs with no detectable influence on growth performance.

Producers and veterinarians often argue that increased stocking density will aggravate disease outbreaks or other environmental stresses. However, recent research suggests that multiple stresses are additive and not antagonistic and that the crowding will not aggravate disease outbreaks.

It is not surprising that the no- sort marketing strategy had the poorest growth performance from d 90 to 117, likely because these pigs became more crowed as they gained weight. However, the two-sort strategy with the potentially least crowed treatment group had intermediate ADG. We speculate that two sorts led to more disruption in social order but gained some benefit of the decreased crowding. The percentage of tops increased numerically with the number of sorts. Thus, even though average weight of the tops decreased significantly, similar total pounds of tops were marketed from each pen. This study illustrates that marketing strategy can impact growth performance and weight discount during the marketing period but has little effect on carcass characteristics.

Table 1. Influence of Gender, Pigs per Pen, and Marketing Strategy on Performance and Market Returns

	Gender		Pigs/Pen			Sorts[a]			
Item	Barrow	Gilt	25	28	SEM	0	1	2	SEM
Pen Weight, lb									
d 0	1,714	1,713	1,616^{b}	1,810^{c}	1	1,711	1,714	1,715	2
d 90	5,534	5,368	5,143^{b}	5,758^{c}	65	5,403	5,490	5,460	80
Tops at market	6,227^{b}	5,811^{c}	5,677^{b}	6,362^{c}	93	5,955	6,031	6,072	114
Inventory									
d 90, pigs/pen	25.3	25.1	23.7^{b}	26.7^{c}	0.3	24.8	25.3	25.4	0.4
Tops, pigs/pen	23.9	22.8	21.9^{b}	24.8^{c}	0.4	22.8	23.5	23.8	0.5
Survivability to d 90, %	95.6	94.6	94.8	95.4	1.1	93.7	95.7	95.9	1.3
Tops, %	90.2^{b}	86.2^{c}	87.8	88.6	1.4	85.9	88.7	89.9	1.8
Average Pig Weight, lb									
d 90	218.6^{b}	214.3^{c}	217.1	215.9	1.3	217.9	216.7	214.8	1.5
Tops at market	261.0^{b}	254.6^{c}	258.8	256.8	2.1	262.2^{b}	256.5^{bc}	254.7^{c}	2.5
D 0 to 90									
ADG, lb	1.71^{b}	1.66^{c}	1.69	1.68	0.01	1.70	1.69	1.67	0.02
D 90 to 117									
ADG, lb	1.49	1.43	1.48	1.44	0.03	1.40^{b}	1.52^{c}	1.47b^{c}	0.04
ADFI, lb	5.57^{b}	5.14^{c}	5.39	5.32	0.07	5.27	5.41	5.39	0.08
F/G	3.75	3.63	3.65	3.73	0.07	3.78	3.59	3.70	0.09
Carcass Characteristics									
Fat depth, in	0.69^{b}	0.54^{c}	0.62	0.61	0.01	0.61	0.62	0.61	0.01
Loin depth, in	2.30^{b}	2.40^{c}	2.36	2.34	0.02	2.36	2.33	2.35	0.02
Lean, %	55.20^{b}	57.70^{c}	56.40	56.50	0.10	56.50	56.30	56.60	0.10
Fat-free lean index	49.90^{b}	51.50^{c}	50.70	50.70	0.10	50.80	50.60	50.70	0.10
Carcass Value									
Lean premium, $/cwt	4.33^{b}	6.01^{c}	5.14	5.20	0.07	5.22	5.04	5.26	0.09
Sort discount, $/cwt	0.66	0.49	0.61	0.54	0.07	0.76^{b}	0.49^{c}	0.48^{c}	0.08

[a]Marketing events occurred on d 90, 103, and 117 for groups with two sorts, on d 96 and 117 for groups with one sort, and d 117 for groups with no sorts.

[b,c]Means within row and main effect of gender, density, or sort are different.