

Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 10 *Swine Day (1968-2014)*

Article 618

1995

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Recommended Citation

Sorrell, P; Burnham, L L.; Kim, I H.; Kennedy, G A.; Hines, Robert H.; and Hancock, Joe D. (1995) "Effects of crowding and intermittent feed intake on growth performance and development of stomach lesions in finishing pigs," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 10. <https://doi.org/10.4148/2378-5977.6458>

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Effects of crowding and intermittent feed intake on growth performance and development of stomach lesions in finishing pigs

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**EFFECTS OF CROWDING AND INTERMITTENT FEED
INTAKE ON GROWTH PERFORMANCE AND DEVELOPMENT
OF STOMACH LESIONS IN FINISHING PIGS**

*P. Sorrell, J. D. Hancock, L. L. Burnham,
I. H. Kim, G. A. Kennedy¹, and R. H. Hines*

Summary

Pigs in uncrowded pens (12 ft²/pig) consumed more feed, gained at a greater rate, and tended to develop fewer stomach lesions than pigs in crowded pens (6 ft²/pig). Pigs with ad libitum access to feed consumed more feed and gained at a greater rate than pigs deprived of feed for 24-h periods twice each week. The resulting intermittent feed intake increased the severity of stomach lesions but only for uncrowded pigs. In conclusion, crowding slowed growth for all pigs and increased the severity of stomach lesions. Intermittent feed intake also slowed growth, but its effects on development of stomach lesions were less consistent.

(Key Words: Finishing, Ulcers, Crowding, Feeding Pattern.)

Introduction

Increased building and equipment costs with small profit margins have influenced swine producers to maximize use of pens and facilities by increasing stocking density. The result is stress from crowding. Additionally, there are anecdotal reports that changes in feed intake resulting from disease, poor feeder management, changes in diet formulation, etc., precipitate death loss from stomach ulcers in pigs. Thus, the experiment reported herein was designed to determine the effects of stocking density and intermittent feed intake on growth performance, carcass measurements, and changes in stomach morphology of finishing pigs.

Procedures

One hundred ninety-two crossbred (Duroc × Yorkshire × Hampshire × Chester White) pigs were allotted with eight pigs per pen (uncrowded) with 6 sq ft/pig or 16 pigs per pen (crowded) with 12 sq ft/pig. These pigs were allowed to consume feed on an ad libitum basis or they were deprived of feed for 24 h on Monday and Thursday of each week. All pigs were fed the same corn-SBM based diet formulated to .65% lysine, .65% calcium, .55% phosphorous, and 1.56 Mcal DE/lb and supplied with 100 g chlortetracycline per ton of diet. The pigs were allotted to treatments on the basis of weight (initial average of 126 lbs), sex (half barrows and half gilts in each pen), and ancestry. The pigs were housed in a modified open-front barn with half slatted concrete and half solid concrete floors. The experiment concluded when the average weight in the heaviest pen group of a weight block was 250 lb. The barrows in each pen were slaughtered for collection of stomachs and carcass measurements.

Response criteria were ADG, ADFI, F/G, last rib backfat thickness, dressing percentage, stomach keratinization score, and stomach ulceration score. The data were analyzed as a randomized complete block design with a 2 × 2 factorial arrangement of treatments. Contrasts were: 1) uncrowded vs crowded; 2) ad libitum vs intermittent feeding; and 3) the interaction between stocking density and feeding regimen. Pen was the experimental unit.

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Results and Discussion

Pigs in the uncrowded pens consumed more feed ($P < .001$) and gained at a greater rate ($P < .001$) (Table 1) than pigs in the crowded pens. Also, pigs given ad libitum access to feed had greater ADG and ADFI than those consuming feed intermittently ($P < .001$). There were no differences in F/G among the pigs or interactions among the stocking density and feeding regimen treatments. The lack of effect on efficiency of growth was unexpected, because slight reductions in feed consumption often result in improved feed efficiency. Alternatively, severe feed restriction (e.g., 24-h periods twice each week) may have decreased the energy available for growth versus maintenance and, thereby, negated the possible efficiency-boosting effects of lower feed intake.

Dressing percentage ($P < .50$) and adjusted backfat thickness ($P < .80$) were not different for uncrowded versus crowded pigs. Pigs allowed to consume feed on an ad

libitum basis had greater slaughter weights ($P < .01$) and dressing percentages ($P < .06$) and tended to have greater adjusted backfat thickness ($P < .06$) compared to those fed intermittently.

The numbers of stomachs given each score for keratinization and ulceration are presented in Table 1. Mean scores indicated that intermittent intake decreased keratinization ($P < .001$). However, intermittent feeding in uncrowded pigs increased ulcers but decreased ulcers in crowded pigs (crowding $\times$ feeding regimen interaction, $P < .004$).

In conclusion, increasing stocking density to minimize housing costs per pen marketed must be balanced with the expected decrease in growth performance. Also, death loss attributed to ulceration was minimal in this experiment, but the increase in keratinization and ulceration score with the stress of overcrowding raises concern about animal husbandry. In contrast, intermittent feed intake had little effect on development of stomach lesions.

Table 1. Effects of Crowding and Intermittent Feed Intake on Growth Performance and Stomach Lesions in Finishing Pigs^a

Item	Uncrowded ^b		Crowded ^c		CV	Contrasts ^d		
	Ad libitum	Intermittent	Ad libitum	Intermittent		1	2	3
ADG	1.96	1.78	1.79	1.55	5.0	.001	.001	.40
ADFI	6.46	5.87	5.72	5.16	4.3	.01	.001	.80
F/G	3.30	3.30	3.20	3.33	5.4	.09	.70	.30
Slaughter wt, lb	265	243	245	229	5.2	— ^e	.01	— ^e
Adjusted backfat, in	1.15	1.10	1.14	1.10	4.0	.80	.06	.70
Dressing percentage	73.6	72.8	74.72	72.4	1.2	.50	.06	.70
Stomach keratinization								
Total observations	14	15	30	28	—	—	—	—
Normal	1	4	1	16	—	—	—	—
Mild	5	4	6	7	—	—	—	—
Moderate	5	6	14	5	—	—	—	—
Severe	3	1	9	0	—	—	—	—
Mean score ^f	1.93	1.51	2.20	.88	23.8	.30	.001	.04
Stomach ulcerations								
Total observations	14	15	30	28	—	—	—	—
Normal	8	6	13	18	—	—	—	—
Erosions	2	3	2	2	—	—	—	—
Ulcerations	2	5	12	8	—	—	—	—
Meal score ^g	.6	1.15	1.30	.72	41.7	.30	.80	.004

^aA total of 192 pigs (average initial wt of 126 lb) was used.

^bUncrowded pens contained 8 pigs/pen (12 ft²/pig).

^cCrowded pens contained 16 pigs/pen (6 ft²/pig).

^dContrasts were 1) crowded vs uncrowded, 2) ad libitum vs intermittent feeding, and 3) interaction vs interaction.

^eDashes indicate $P > .15$.

^fThe scoring system was 0=normal, 1=mild keratinization, 2=moderate keratinization, and 3=severe keratinization.

^gThe scoring system was 0=normal, 1=erosin, 2=ulcers, and 3=severe ulcers.