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The Effects of Feeder Space and Adjustment on Growth Performance of Finishing Pigs

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Summary

A total of 288 pigs (PIC TR4 × 1050, initially 82 lb) were used in a 91-d study to evaluate the effects of feeder trough space (1.75 vs. 3.5 in./pig) and minimum feeder-gap opening of 0.5 in. (narrow), vs. 1.0 in. (wide) on finisher pig performance. Our hypothesis was that at minimal feeder trough space (1.75 in./pig), feeders should be set at a wide gap opening to avoid limiting feed intake and ADG. The feeders were adjusted to the minimum gap setting, but the agitation plate could be moved upward to a maximum gap opening of 0.75 in. or 1.25 in., respectively. The treatments were arranged in a 2 × 2 factorial with 6 replications per treatment. All pens had the same feeder with 2, 14-in.-wide by 4.5-in.-deep feeder holes. Feeder trough space was adjusted by placing 8 or 16 pigs per pen. Gating was adjusted to give each pig 8 ft² of floor space. Pigs had ad libitum access to feed and water. All pigs were fed a corn-soybean meal-based diet containing 20% dried distillers grains with solubles (DDGS) in 4 phases. Pen weights and feed disappearance were measured every 2 wk. Narrow-adjusted feeders averaged approximately 48% coverage, and wide-adjusted feeders averaged approximately 85% coverage. Overall (d 0 to 91) there were no trough space × feeder adjustment interactions observed ($P > 0.10$). However, there was a tendency ($P = 0.08$) for increased ADG as feeder trough space increased from 1.75 to 3.5 in./pig. Pigs fed with the wide feeder-gap setting had increased ($P < 0.01$) feed disappearance and poorer ($P < 0.01$) F/G compared to pigs with the narrow feeder-gap setting. These results suggest that, regardless of feeder trough space, pigs with the wide feeder adjustment appeared to waste more feed, as evidenced by the poorer F/G.

Key words: feeder adjustment, finishing pig, trough space

Introduction

Continued improvements in swine genetics and nutrition have positively affected performance in the finishing stage of growth. However, to capitalize on these advancements, feed must be effectively delivered. Too little feeder space or too narrow feeder adjustment could limit feed intake and potentially decrease performance. Conversely, too much feeder space or too broad a feeder gap could increase feed wastage and decrease efficiency. Our hypothesis for this experiment was that at lower feeder trough space availability per pig, feeders should be set at a wider gap opening to avoid limiting feed intake and ADG. Therefore, the objective of this study was to evaluate the effects of feeder space and feeder setting on the growth performance of finishing pigs.

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Procedures

The Kansas State University (K-State) Institutional Animal Care and Use Committee approved the protocol used in this study. The study was conducted at the K-State Swine Teaching and Research Center, Manhattan, KS.

A total of 288 growing pigs (PIC TR4 $\times$ 1050 initially 82 lb) were used in a 91-d trial. Pigs were randomly allotted to 1 of 4 treatments arranged in a 2 $\times$ 2 factorial with the main effects of feeder space (1.75 in. vs. 3.5 in./pig) and feeder gap setting (narrow 0.5 in. vs. wide 1.00 in.).

For the 3.5 in. of feeder space per pig, pens were stocked with 8 pigs per pen. To achieve the 1.75 in. of feeder space per pig, 2 pens were combined with only 1 feeder for the 16 pigs. To ensure equal floor space among pens of 8 and 16, the gating was adjusted to provide 8 ft²/pig during the study.

All pens had the same feeder with 2, 14-in.-wide by 4.5-in.-deep feeder holes. For each of the feeder gap settings, we calculated an average minimum and maximum opening. For the narrow adjustment, the minimum feeder gap was 0.5 in. with a maximum gap of 0.75 in. For the wide adjustment, the minimum feeder gap was 1.00 in. with a maximum gap of 1.25 in. We calculated maximum gap opening by taking into account the agitation plate, which can be moved upward 0.25 in. by pigs rooting around in the feeder.

Pigs were provided ad libitum access to feed and water. A common diet containing 20% DDGS was fed in four phases, each approximately 28 d in length (Table 1). The diet was formulated to meet or exceed NRC² requirements for finishing pigs. Average daily gain, ADFI, and F/G were determined by weighing pigs and measuring feed disappearance on d 0, 14, 28, 42, 56, 70, 84, and 91. Pictures of feeder pan coverage were taken once during each phase. A panel of 4 then scored the feeder pan pictures by percentage of pan coverage.

Data were analyzed as 2 $\times$ 2 factorial in a completely randomized design with repeated measures over time using the PROC MIXED procedure of SAS (SAS Institute Inc., Cary, NC). Repeated measures were conducted for d 0 to 56 and d 56 to 91. Pen was the experimental unit.

Results and Discussion

Results of the feeder pan coverage evaluations indicated narrow adjusted feeders averaged approximately 48% coverage (Figure 1) and wide adjusted feeders averaged approximately 85% coverage (Figure 2).

From d 0 to 56, there were no feeder adjustment $\times$ trough space interactions observed for ADG (Table 2). However, those pigs exposed to the wide feeder-gap setting increased ($P < 0.01$) ADFI, which resulted in a tendency ($P < 0.09$) for poorer F/G. This suggests that the increase in feed intake with the wider feeder-gap setting was actually an increase in feed wastage.

² NRC. 1998. Nutrient Requirements of Swine. 10th ed. Natl. Acad. Press, Washington, D.C.

From d 56 to 91, there was a tendency ($P < 0.09$) for pigs with 3.5 in. feeder space to have greater ADG compared to pigs with 1.75 in. feeder space. Furthermore, pigs exposed to the wide feeder-gap setting had increased ($P < 0.0001$) ADFI and poorer ($P < 0.0001$) F/G, similar to the response seen during d 0 to 56.

An adjustment $\times$ period interaction was observed for F/G. Even though F/G was poorer for pigs with the wide feeder setting in both periods, the interaction comes from the wide feeder gap having an even poorer feed efficiency during the second period (d 56 to 91) when compared to the first period (d 0 to 56).

Overall (d 0 to 91), no feeder adjustment $\times$ trough space interactions were observed ($P > 0.10$). However, there was a tendency ($P = 0.08$) for increased ADG as feeder trough space increased from 1.75 to 3.5 in./pig. Pigs fed with the wide feeder-gap setting had increased ($P < 0.01$) feed disappearance and poorer ($P < 0.01$) F/G compared to pigs with the narrow feeder-gap setting. These results suggest that, regardless of feeder trough space, pigs with the wide feeder adjustment appeared to waste more feed, as evidenced by the poorer F/G. Further research is needed to assess optimal feeder trough space for finishing pigs.

Table 1. Composition of diets, (as-fed basis)¹

Ingredient, %	Phase 1	Phase 2	Phase 3	Phase 4
Corn	63.25	67.45	70.45	72.40
Soybean meal, (46.5% CP)	14.40	10.40	7.55	5.70
DDGS ²	20.00	20.00	20.00	20.00
Limestone	1.25	1.20	1.13	1.08
Salt	0.35	0.35	0.35	0.35
Vitamin premix	0.15	0.13	0.10	0.08
Trace mineral premix	0.15	0.13	0.10	0.08
Lysine HCl	0.34	0.29	0.27	0.26
Phytase 600	0.14	0.09	0.06	0.04
Total	100.00	100.00	100.00	100.00
Calculated analysis				
SID ³ amino acids, %				
Lysine	0.88	0.75	0.66	0.60
Isoleucine:lysine	66	69	71	73
Methionine:lysine	31	34	37	39
Met & Cys:lysine	34	70	75	80
Threonine:lysine	60	64	67	69
Tryptophan:lysine	16.5	16.5	16.5	16.6
Valine:lysine	80	85	90	94
Total lysine, %	1.02	0.88	0.78	0.72
CP, %	17.8	16.3	15.2	14.5
ME kcal/lb	1,519	1,521	1,524	1,526
Ca, %	0.55	0.52	0.48	0.46
P, %	0.42	0.40	0.39	0.38
Available P, %	0.28	0.25	0.23	0.21

¹ Each dietary phase was fed for approximately 24 days.² Dried distillers grains with solubles.³ Standardized ileal digestible.

Table 2. Effects of trough space and feeder-gap setting (narrow vs. wide) on finishing pig performance¹

Item	Feeder gap: ²	Trough space/pig, in				SED	Probability, P <		
		1.75 in.		3.5 in.			Adjustment × Space	Adjustment	Trough space
		Narrow	Wide	Narrow	Wide				
d 0 to 56									
ADG, lb		2.22	2.27	2.26	2.31	0.046	0.91	0.13	0.18
ADFI, lb		5.99	6.30	6.09	6.45	0.145	0.80	< 0.01	0.18
F/G		2.70	2.78	2.70	2.79	0.071	0.87	0.09	0.90
d 56 to 91									
ADG, lb		2.15	2.18	2.24	2.20	0.046	0.33	0.84	0.14
ADFI, lb		7.56	8.04	7.63	8.20	0.145	0.67	< 0.01	0.33
F/G		3.51	3.70	3.41	3.73	0.071	0.21	< 0.01	0.48
d 0 to 91									
ADG, lb		2.20	2.23	2.25	2.27	0.034	0.68	0.33	0.08
ADFI, lb ³		6.58	6.96	6.68	7.12	0.130	0.75	<0.01	0.18
F/G ³		2.99	3.12	2.97	3.14	0.060	0.57	<0.01	0.86
Feeder coverage score, % ⁴									
		42.9	83.3	54.1	86.5	3.76	0.30		

¹ A total of 228 pigs (PIC TR4 × 1050, initially 82 lb) were used, with either 8 (1.75 in./pig) or 16 (3.5 in./pig) per pen with 6 replications per treatment.

² Narrow = 0.50 in. minimum gap opening. Wide = 1.00 in. minimum gap opening.

³ Adjustment × period interactions ($P < 0.05$).

⁴ Pictures of feeder pan coverage were taken once during each dietary phase. A panel of 4 then scored feeder pan pictures for percentage of pan coverage.

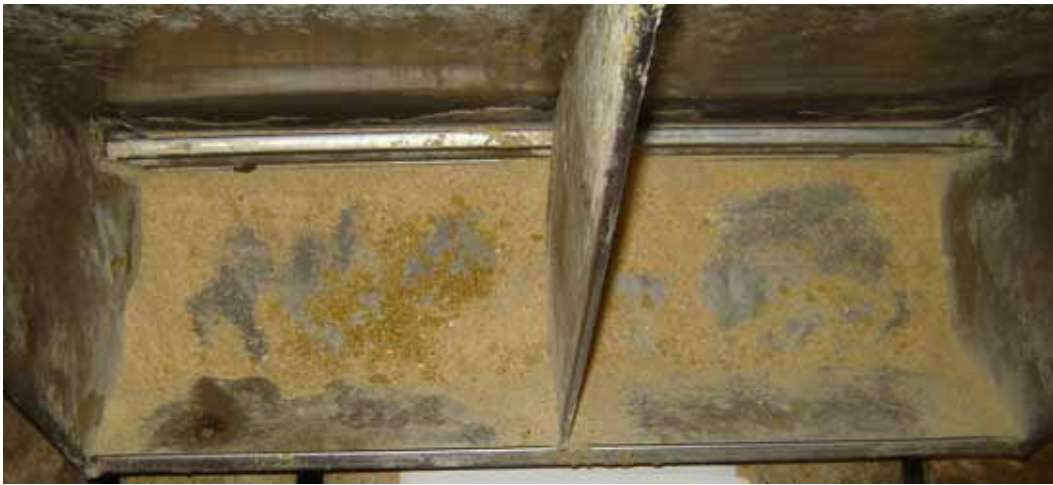


Figure 1. Narrow feeder adjustment (minimum feeder-gap opening was 0.5 in. with a maximum gap of 0.75 in.) averaged 45% feeder pan coverage.



Figure 2. Wide feeder adjustment (minimum feeder-gap opening was 1.00 in. with a maximum gap of 1.25 in.) averaged 83% feeder pan coverage.