Effects of Feeder Design (Conventional Dry vs. Wet-Dry) on Growth Performance of 45- to 246-lb pigs[1]

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Summary

A total of 1,253 pigs (PIC 1050 × 337; initially 45 lb) were used in a 104-d study to evaluate the effects of using a wet-dry (WD) or conventional dry (CD) feeder on growth performance of growing-finishing pigs. At the start of the trial, pens of pigs were weighed and randomly allotted to 1 of the 2 feeder types. The CD feeder was a single-sided, 56-in.-wide, stainless steel feeder (Thorp Equipment, Inc., Thorp, WI) with 4 14-in. feeding spaces and a 4.25-in.-deep trough. A cup waterer in pens using CD feeders ensured ad libitum access to water as well as feed. The WD feeder was double-sided (15-in.-wide feeder opening on each side) with a single nipple waterer (Crystal Springs, GroMaster, Inc., Omaha, NE), and the feeder was the only source of water. All pigs were fed the same corn-soybean meal diets containing 30% bakery by-product and 10 to 45% dried distillers grains with solubles (DDGS) during 5 dietary phases. For the overall period, pigs fed with the WD feeder had greater ADG ($P < 0.01$) and ADFI ($P = 0.01$) with no differences in F/G ($P = 0.50$) compared with pigs fed using the CD feeder. This study confirms previous results where pigs fed using a WD feeder have greater ADG and ADFI than those fed with a CD feeder.

Key words: conventional dry feeder, wet-dry feeder, finishing pig

Introduction

Recent studies have demonstrated that finishing pigs fed using WD feeders had improved weight gain, feed intake, and final BW; however, F/G responses were inconsistent among trials. Last year, Nitikanchana et al. (2011[3]) observed improved ADG and F/G in pigs fed using a WD feeder. This result was in contrast to studies in the same facility where poorer or no difference was observed in F/G for pigs fed with a WD compared to a CD feeder[4,5]; therefore, this trial was conducted to validate the response of WD feeder on growth performance and to obtain further data to use in a meta-analysis comparing growth performance and carcass characteristics of pigs fed with CD and WD feeders.

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[3] Nitikanchana et al., Swine Day 2011, Report of Progress 1038, pp. 257–261.

[4] Bergstorm, J.R. 2011. The effect of feeder design, dietary level of dried distrillers' grain with solubles, and gender on the performances and carcass characteristics of finishing pigs. College of Agriculture, Kansas State University. Dissertation.

[5] Myers, A.J. 2011. Effect of diet form and feeder design on growth performance of finishing pigs. College of Agriculture, Kansas State University. Thesis.

Procedures

The Kansas State University Institutional Animal Care and Use Committee approved the protocol used in this experiment. The study was conducted at a commercial research-finishing barn in southwestern Minnesota. The barns were naturally ventilated and double-curtain-sided. Pens had completely slatted flooring and deep pits for manure storage. Twenty-four pens were equipped with a single-sided, 56-in.-wide, conventional dry stainless steel feeders (Thorp Equipment, Inc., Thorp, WI; Figure 1) with 4 14-in feeding spaces and a 4.25-in.-deep trough. A cup waterer in pen using CD feeder ensured ad libitum access to water as well as feed. The remaining 24 pens were equipped with double-sided, stainless steel WD feeders (Crystal Springs, GroMaster, Inc., Omaha, NE; Figure 2) with a 15-in.-wide feeder opening on both sides and a single nipple waterer to provide water. Feeder opening was adjusted throughout the study to accommodate the flowability of feed and to provide unrestricted access to feed with little wastage for both feeder types. Daily feed additions to each pen were accomplished through a robotic feeding system (FeedPro; Feedlogic Corp., Willmar, MN) capable of providing and measuring feed amounts for individual pens.

A total of 1,253 pigs (PIC 1050 × 337) with an initial BW of 45 lb were used in a 104-d study. Pens contained 25 to 27 pigs with equal number of barrows and gilts. At the start of the trial, pens of pigs were weighed and randomly allotted to 1 of the 2 feeder types. All pigs were fed the same corn-soybean meal diets containing 30% bakery by-product and 10 to 45% DDGS during 5 dietary phases from 45 to 70 lb , 70 to 123 lb, 123 to 180 lb, 180 to 205 lb, and 205 to 246 lb (Table 1). Pens of pigs were weighed and feed disappearance was recorded at d 15, 43, 71, 83, and 104 to determine ADG, ADFI, and F/G. The experimental data were analyzed using the MIXED procedure of SAS (SAS Institute, Inc., Cary, NC). Pen was the experimental unit for all data and significance and tendencies were set at $P < 0.05$ and $P < 0.10$, respectively.

Results and discussion

For the overall period, pigs fed with the WD feeders had 3% greater ADG ($P < 0.01$; Table 2) and 4% greater ADFI ($P = 0.01$) than pigs fed with the CD feeders. No differences were observed in F/G ($P = 0.50$) among pigs fed with the WD vs. CD feeder. The improvement in ADG confirms previous results, where pigs fed with a WD feeder had greater ADG than those fed with a CD feeder (Bergstrom, 2011[4]); however, in many of the previous studies, F/G responses varied widely among pigs fed with different feeder types. Many results show that pigs fed with WD feeders have poorer F/G than those fed with CD feeders (Bergstrom et al., 2011[4]). Recent results of a study conducted at the same facility (Nitikanchana et al., 2011[6]) found improved F/G in pigs fed with WD feeders. The variation in response to F/G among trials demonstrates the need for careful feeder management to ensure benefits in ADG are not offset by poorer F/G.

[6] Nitikanchana et al., Swine Day 2011, Report of Progress 1038, pp. 257–261.

Table 1. Diet composition (as-fed basis)[1]

Item	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Ingredient, %					
Corn	17.30	10.38	15.63	37.06	46.76
Soybean meal (46.5% CP)	20.18	12.04	6.88	11.00	11.25
Bakery by-product	30.00	30.00	30.00	30.00	30.00
DDGS[2]	30.00	45.00	45.00	20.00	10.00
Monocalcium P, 21% P	0.05	---	---	---	0.21
Limestone	1.26	1.42	1.39	1.06	0.96
Salt	0.35	0.35	0.35	0.35	0.35
Vitamin premix	0.10	0.10	0.10	0.10	0.09
DL-methionine	---	---	---	---	---
L-threonine	0.035	---	---	---	---
L-lysine sulfate	0.725	0.710	0.650	0.425	0.370
Phytase[3]	0.005	0.005	0.005	0.005	0.005
Total	100	100	100	100	100
Calculated analysis					
Standardized ileal digestible (SID) amino acids, %					
Lysine	1.16	0.99	0.83	0.75	0.70
Isoleucine:lysine	66	71	74	74	72
Leucine:lysine	158	192	215	193	183
Methionine:lysine	29	35	38	35	34
Met & Cys:lysine	60	71	79	73	70
Threonine:lysine	61	65	69	66	64
Tryptophan:lysine	17.0	17.0	16.9	18.4	18.5
Valine:lysine	77	86	92	89	87
Total lysine, %	1.34	1.18	1.01	0.88	0.81
ME, kcal/lb	1,561	1,561	1,562	1,565	1,564
SID lysine:ME, g/Mcal	3.37	2.88	2.41	2.17	2.03
CP, %	22.8	22.5	20.5	17.3	15.4
Ca, %	0.61	0.63	0.61	0.50	0.50
P, %	0.49	0.51	0.49	0.40	0.40
Available P, %	0.30	0.35	0.35	0.22	0.22

[1] The 5 diets were fed from 45 to 70 lb, 70 to 123 lb, 123 to 180 lb, 180 to 205 lb, and 205 to 247 lb.
[2] DDGS: dried distillers grains with solubles from Valero (Aurora, SD).
[3] OptiPhos 2000 (Enzyvia LLC, Sheridan, IN).

Table 2. Effects of feeder design (conventional dry vs. wet-dry) in 45- to 246-lb pigs[1]

Feeder type	Conventional dry[2]	Wet-dry[3]	SEM	Probability, *P*<
d 0 to 104				
ADG, lb	1.90	1.96	0.01	0.01
ADF, lb	4.74	4.92	0.05	0.01
F/G	2.49	2.51	0.02	0.50
BW, lb				
d 0	45.0	45.0	0.87	0.98
d 104	243.4	249.9	1.69	0.01

[1] A total of 1,253 pigs (PIC 1050 × 337, initially 45 lb) were used in a 104-d growing-finishing trial with 25 to 27 pigs per pen and 24 pens per treatment.
[2] Conventional dry feeders (Thorp Equipment, Inc., Thorp, WI) were single-sided, 56-in.-wide, 4-hole stainless steel with a 4.25-in.-deep trough.
[3] A double-sided, stainless steel wet-dry feeder (Crystal Springs, GroMaster, Inc., Omaha, NE) with a 15-in.-wide feeder opening on both sides.

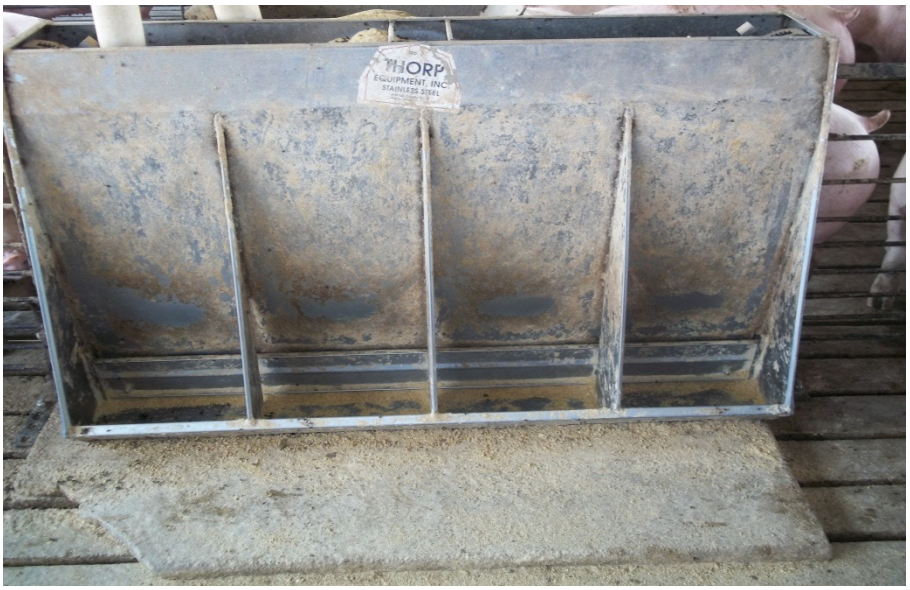

Figure 1. Conventional dry feeder (Thorp Equipment, Inc., Thorp, WI).

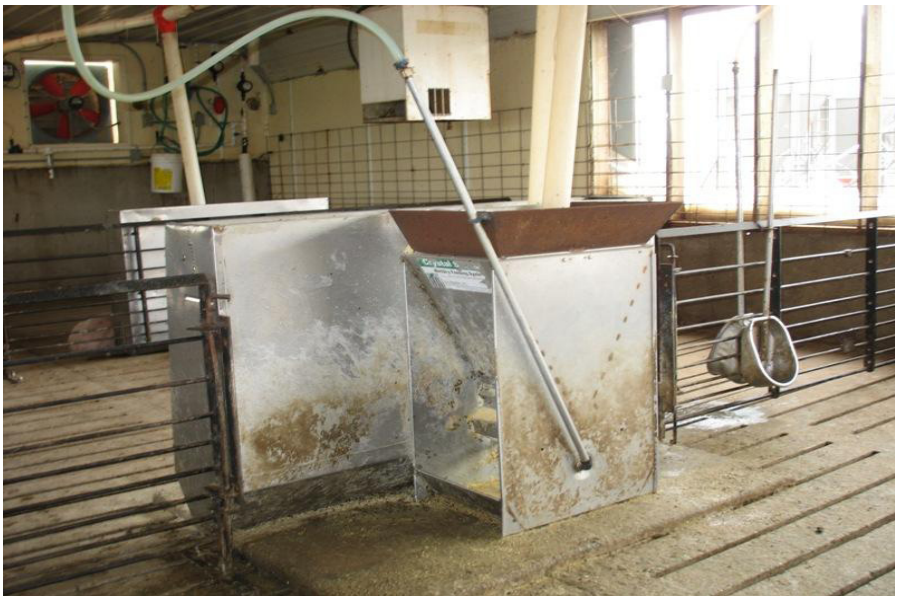

Figure 2. Wet-dry feeder (Crystal Springs, GroMaster, Inc., Omaha, NE).