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Can augers be used to blend diets on the farm?

Abstract

Growing/finishing gilts were fed two-, three-, four-, or five-phase diet regimens from 77 to 276 lb. The diets were mixed in either a conventional, horizontal ribbon mixer or a 9 ft auger. No interactions occurred among the mixer type and phase-feeding treatments. Pigs fed diets blended with the auger had similar ADG but slightly (4%) worse F/G compared to those fed diets mixed in the mixer. Finally, the three-phase regimen gave the lowest F/G and the lowest cost of gain.; Swine Day, Manhattan, KS, November 16, 1995

Keywords

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CAN AUGERS BE USED TO BLEND DIETS ON THE FARM?

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Summary

Growing/finishing gilts were fed two-, three-, four-, or five-phase diet regimens from 77 to 276 lb. The diets were mixed in either a conventional, horizontal ribbon mixer or a 9 ft auger. No interactions occurred among the mixer type and phase-feeding treatments. Pigs fed diets blended with the auger had similar ADG but slightly (4%) worse F/G compared to those fed diets mixed in the mixer. Finally, the three-phase regimen gave the lowest F/G and the lowest cost of gain.

(Key Words: Phase-Feeding, Finishing, Mixing.)

Introduction

Phase feeding of growing/finishing pigs is recommended to meet nutrient requirements, while minimizing nutrient excesses. This should decrease costs of gain and the excretion of nutrients into the environment. Some poultry producers are experimenting with use of two bins, with a common boot and auger, to blend diets as they are passed into the grower building and to the feeders. With this system, an infinite number of diet changes becomes possible using feed bins containing only two diets. The obvious advantage to this technology is the flexibility in potential number of diet formulations at the farm with the greatly simplified request for number of diets (i.e., two) to be prepared at the feed plant. However, in last year's KSU Swine Days Report, we (Traylor et al.) suggested that improper mixing may decrease growth performance in nursery and finishing pigs. Thus, the objective of the experiment reported herein was to compare growth performance between gilts fed diets blended in an auger or mixed in a mixer. Also of interest were the effects of 2-, 3-, 4-, and 5-phase feeding programs during the growing/finishing period on growth performance and backfat thickness.

Procedures

A total of 80 gilts (average initial wt of 77 lb) was used in a 105-d growth assay (average final wt of 276 lb). The pigs (Hampshire × Chester White × Duroc × Yorkshire rotational cross) were allocated by weight and ancestry, with two per pen (5 ft by 5 ft), in an environmentally controlled building. Two diets (1.0 and .6% lysine) were formulated using sorghum grain and soybean meal (48% CP) as the primary ingredients (Table 1). Appropriate ratios of these diets were mixed for 3 min in a 1.5-ton capacity, horizontal ribbon mixer (Davis®) or by dropping the two diets simultaneously into the hopper of a 9-foot, 4-in diameter (Allied®) auger to give intermediate diets with .9, .8, and .7% lysine. The diets were fed in four combinations to give a 2 × 4 factorial arrangement of treatments (Table 2).

Each pen had a self-feeder and nipple waterer to allow ad libitum consumption of food and water. The pigs and feeders were weighed at initiation and conclusion of the growth assay to allow calculation of ADG, ADFI, and F/G. Last rib backfat thickness measurements were taken at the end of the

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growth assay using a Scanoprobe® ultrasonic fat meter. The fat thickness measurements were adjusted to the same endpoint using final weight as a covariate. All data were analyzed using the GLM procedure of SAS with pen as the experimental unit.

Results and Discussion

Average daily gain for pigs fed auger-blended feed was not different ($P > .21$) from that of pigs fed diets mixed in the mixer (Table 3). However, pigs given the auger-blended feed had greater ADFI ($P < .02$) and worse F/G ($P < .01$) than pigs fed mixed diets. These results suggest that lack of mix uniformity with our auger-blending treatment was sufficient to cause differences in growth performance. However, we used only a 9-ft solid shaft auger. Better results might be obtained when using longer, hollow core (e.g., Flex Auger®) systems that are commonly found at swine operations.

When comparing the phase-feeding regimens, F/G and cost of gain were lowest for pigs fed the three-phase treatment. These results were consistent for both the auger-blended and the mixed treatments, suggesting that the added time and trouble of using four or more diet changes during the growing/finishing phase was not warranted. We should note, however, that our lowest lysine concentration was .6%. More than three phases might be of benefit (i.e., lower cost of gain) if the additional diets were added to minimize nutrient excesses (e.g., reduce lysine to .5% for the last phase). Of course, additional experiments would be needed to ensure that the lower nutrient concentrations would not adversely affect performance or carcass leanness.

No differences for last rib backfat thickness occurred among pigs fed the auger-blended vs mixed diets ($P > .62$). Also, the number of diet changes had no effect ($P > .32$) on backfat thickness.

In conclusion, our results suggest that using an auger system to blend multiple diets in a production swine unit is likely to give satisfactory growth performance with no increase in fat deposition. But, regardless of mixing protocol, the three-phase feeding program gave the best growth performance with minimal nutrient excesses in the diets.

Table 1. Composition of the Basal Diets[a]

Ingredient	1.0% lysine	.6% lysine
Sorghum grain	70.06	83.58
Soybean meal (48% CP)	26.89	13.07
Monocalcium phosphate	1.33	1.58
Limestone	.92	.97
Salt	.35	.35
Vitamins	.20	.20
Trace minerals	.15	.15
Antibiotic[b]	.10	.10

[a]Diets with .9, .8, and .7% lysine were made by mixing the 1.0 and .6% lysine basal diets.
[b]Provided 100 grams of aureomycin per ton of feed.

Table 2. Weeks at Each Lysine Concentration for the Phase Treatments

No of phases	Lysine concentration				
	1.0%	.9%	.8%	.7%	.6%
2	-	-	8 wk	-	7 wk
3	5 wk	-	5 wk	-	5 wk
4	4 wk	4 wk	-	4 wk	3 wk
5	3 wk	3 wk	3 wk	3 wk	3 wk

Table 3. Effects of Auger-Blending and Phase-Feeding on Growth Performance, Fat Thickness, and Cost of Gain in Growing-Finishing Pigs[a]

	Mixer phase regimens				Auger phase regimens				
Trait	2	3	4	5	2	3	4	5	CV
ADG,lb[b]	1.88	1.89	1.92	1.84	1.85	1.90	1.93	1.90	5.5
ADFI, lb[c]	6.29	5.97	6.18	6.09	6.40	6.26	6.56	6.51	5.7
F/G[d]	3.35	3.16	3.22	3.31	3.46	3.30	3.40	3.43	4.8
LRFD, in[e]	1.33	1.29	1.35	1.29	1.30	1.30	1.31	1.30	5.7
Cost of gain, $/lb[f]	.214	.208	.216	.217	.221	.210	.223	.224	--
Cost/ pig, $	42.58	41.44	43.08	43.24	43.91	41.73	44.45	44.66	--

[a]A total of 80 pigs (with an avg initial wt of 77 lb and an avg final wt of 276 lb were used in a 105-d growth assay.
[b]No effect of treatment ($P > .21$).
[c]Mixer vs auger ($P < .02$).
[d]Mixer vs auger ($P < .01$) and quadratic effect of phases ($P < .04$).
[e]No effect of treatment ($P > .32$).
[f]Feed cost was based on grain sorghum at $5.02/cwt and soybean meal at $205/ton.