

Wheat vs Corn for Growing-Finishing Swine

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Story in Brief

A feeding trial utilizing 473 growing-finishing pigs was conducted to compare corn vs wheat as a feedstuff for swine and to determine the effect of replacing a portion of the soybean meal in wheat rations with lysine or lysine and methionine on performance. During the growing period, pigs fed corn or wheat-soybean meal diets had similar gain and pigs fed a reduced protein wheat diet with added lysine tended to gain faster than pigs fed either the corn or wheat-soybean meal diets. The addition of methionine to the reduced protein wheat diet with added lysine tended to reduce gain, feed intake and feed efficiency. During the finishing period, pigs fed the corn-soybean meal diet grew faster than pigs fed either wheat diet. Pigs fed the reduced protein wheat diet with added lysine tended to grow faster than pigs fed the wheat-soybean meal control diet during both the growing and finishing periods. During the finishing period, gain and feed efficiency were similar for swine fed all wheat diets. This study suggests that wheat is comparable with corn as a feedstuff for the growing, but not the finishing pig.

Introduction

In recent years, wheat has often been competitively priced with other cereal grains as a feedstuff for swine. When wheat becomes competitively priced with other cereal grains, it becomes especially attractive to Oklahoma swine producers since Oklahoma is a major wheat producing state. Although most research would indicate that wheat will compare favorably with other feed grains, some studies have reported reduced and less efficient gains when wheat was substituted for grain sorghum or corn. The factors responsible for this variability in performance in swine fed wheat diets have not been determined. This study was conducted to compare the performance of growing-finishing swine fed wheat or corn based diets formulated on an equal lysine basis and to determine the effect of replacing a portion of the soybean meal in wheat rations with the first limiting amino acid, lysine or the first and second limiting amino acids, lysine and methionine on performance.

Materials and Methods

This trial was conducted at the Southwestern Livestock and Forage Research Station near El Reno, Oklahoma, and consisted of 473 pigs in 34 pens. All pigs were housed in indoor concrete pens equipped with self-feeders

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and waterers. Pigs from various breed groups in the animal breeding herd were randomly allotted within breed group to the four experimental treatments (Table 1). All diets were formulated to contain 0.75 percent lysine during the growing phase (37.6 to 121.3 lb) and 0.62 percent lysine during the finishing phase (121.3 to 220.9 lb). The four treatments consisted of: (1) control corn-soybean meal diet; (2) control wheat-soybean meal diet; (3) wheat-soybean meal diet formulated to meet the minimum requirement of the third limiting amino acid, and supplemented with lysine hydrochloride to provide lysine levels equivalent to the wheat control diet; (4) Treatment 3 supplemented with methionine to provide methionine levels equivalent to the wheat control diet.

Results and Discussion

During the growing period (37.6-121.3 lb; Table 1), pigs fed corn or wheat-soybean meal diets had similar gains. Pigs fed wheat with reduced protein supplemented with lysine (Treatment 3) grew 4.2 percent faster than pigs fed either the corn ($P < .11$) or wheat-soybean meal ($P < .15$) diets. Pigs fed wheat with reduced protein supplemented with both lysine and methionine (Treatment 4) had reduced gains ($P < .01$) when compared to any other treatment. Average daily feed intake and feed efficiency was similar in pigs fed either the corn or wheat-soybean meal diets (Treatment 1 or 2) or the wheat diet with reduced protein supplemented with lysine (Treatment 3). The further addition of methionine to the low protein wheat plus lysine diet (Treatment 4) reduced average daily feed intake ($P < .05$) when compared to the wheat control diet (Treatment 2) and resulted in reduced feed efficiency ($P < .01$) when compared to any other treatments. The reason for this reduced performance with added methionine is unknown since methionine supplementation at higher levels than those used in this experiment with corn based diets has not resulted in reduced performance (Katz et al., 1973 and Grimson and Bowland, 1971). Wheat appears to be comparable with corn as a feedstuff for the growing pig when diets are formulated on an equivalent lysine basis.

During the finishing phase (121.3 to 220.9 lb; Table 3), pigs fed the corn-soybean meal diet (Treatment 1) grew an average of 6.4 percent faster ($P < .05$) than pigs fed the wheat diets. Average daily feed intake was higher ($P < .05$) in pigs fed the corn diet (Treatment 1) than those fed either the wheat control diet (Treatment 2) or the wheat diet with reduced protein supplemented with both lysine and methionine (Treatment 4). Reducing soybean meal and supplementing with lysine alone (Treatment 3) resulted in an average daily feed intake similar to that observed in pigs fed the corn-soybean meal diet (Treatment 1). Feed efficiency was similar among the four dietary treatments.

Means for average daily gain, average daily feed intake, feed efficiency and backfat during the entire growing-finishing period (37.6 to 220.9 lb) are presented in Table 4. Overall average daily gains were not significantly affected by dietary treatment although pigs fed the reduced protein wheat diet with added lysine (Treatment 3) tended to gain faster ($P < .1$) than pigs fed the wheat-soybean meal diet (Treatment 2). Similarly, pigs fed the corn-soybean meal diet (Treatment 1) tended to gain faster ($P < .11$) than pigs fed the wheat-soybean meal diet (Treatment 2) but not the reduced protein wheat diet with added lysine (Treatment 3). Luce et al (1972) observed improved gains in growing-finishing swine when either 0.1 or 0.2 percent lysine was added to a wheat-soybean meal diet containing 0.51 percent lysine. As was observed

Table 1. Composition of experimental rations.

Ingredient	% Composition (as-fed)							
	Starter				Finisher			
	1 corn	2 wheat	3 wheat + Lys	4 wheat + Lys + Met	1 corn	2 wheat	3 wheat + Lys	4 wheat + Lys + Met
Corn, yellow	77.12				82.65			
Wheat, hard red winter		81.00	89.00	88.92		86.80	94.20	94.12
Soybean meal (44%)	19.03	15.37	7.00	7.00	14.06	10.15	2.00	2.00
Dicalcium phosphate	1.84	1.46	1.60	1.60	1.68	1.25	1.38	1.38
Calcium carbonate	0.76	0.92	0.90	0.90	0.76	0.95	0.92	0.92
Salt	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Vitamin trace mineral mix ^a	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine hydrochloride			0.25	0.25			0.25	0.25
DL methionine				0.08				0.08
Tylan 10	0.50	0.50	0.50	0.50	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated analysis								
% Protein	15.16	16.64	13.94	13.93	13.46	15.06	12.37	12.36
% Lysine	0.75	0.75	0.75	0.75	0.62	0.62	0.62	0.62
% Met + cys	0.53	0.48	0.41	0.48	0.49	0.44	0.36	0.44
% Threonine	0.60	0.59	0.46	0.46	0.52	0.51	0.39	0.39
% Calcium	0.75	0.75	0.76	0.76	0.70	0.70	0.71	0.71
% Phosphorus	0.65	0.65	0.65	0.65	0.60	0.60	0.60	0.60

^aSupplied 4,000,000 IU vitamin A, 300,000 IU vitamin D, 4 g riboflavin, 20 g pantothenic acid, 30 g niacin, 800 g choline chloride, 15 mg vitamin B₁₂, 10,000 IU vitamin E, 2 g menadione, 200 mg iodine, 90 g iron, 20 g manganese, 10 g copper, 90 g zinc and 100 mg selenium per ton of feed.

in the growing period, pigs fed the reduced protein diet supplemented with lysine and methionine (Treatment 4) had reduced gains ($P < .01$) when compared to the other treatments. As was observed with average daily gain, the overall average daily feed intake was similar for swine fed the corn or wheat-soybean meal diets or the wheat diet with reduced protein supplemented with lysine (Treatments 1, 2 and 3) but was reduced when lysine and methionine was added to the reduced protein wheat diet (Treatment 4; $P < .01$). The overall feed efficiency was not significantly affected by dietary treatment. Scan backfat measurements at 220 lbs were lower ($P < .05$) in pigs on treatment 4 than those on treatments 1 or 3 and lower ($P < .05$) in pigs on treatment 2 than those on treatment 3. These reduced backfat measurements may be due to the decreased rate of gain observed in pigs on treatments 2 and 4.

Table 2. The effect of choice of grain and level of soybean meal and amino acids on performance of growing swine.

Item	Treatments			
	1 corn	2 wheat	3 wheat + Lys	4 wheat + Lys + Met
Pigs per treatment, no.	121	118	106	132
Pens per treatment, no.	9	9	7	9
Avg. initial wt., lb	35.5	38.3	40.5	36.3
Avg. final wt., lb	123.0	119.7	123.6	119.3
Avg. daily gain, lb	1.41 ^a	1.41 ^a	1.47 ^a	1.19 ^b
Avg. daily feed intake, lb	3.72 ^{cd}	3.80 ^c	3.70 ^{cd}	3.48 ^d
Feed per lb gain, lb	2.69 ^a	2.67 ^a	2.61 ^a	2.94 ^b

^{ab}Values in the same row with different superscripts differ ($P < .01$).

^{cd}Values in the same row with different superscripts differ ($P < .05$).

Table 3. The effect of choice of grain and level of soybean meal and amino acids on performance of finishing swine.

Item	Treatments			
	1 corn	2 wheat	3 wheat + Lys	4 wheat + Lys + Met
Pigs per treatment, no.	125	110	106	131
Pens per treatment, no.	9	9	7	9
Avg. initial wt, lb	123.0	119.7	123.6	119.3
Avg. final wt, lb	223.5	221.0	223.5	216.2
Avg. daily gain, lb	1.82 ^a	1.69 ^b	1.73 ^b	1.70 ^b
Avg. daily feed intake, lb	6.21 ^a	5.86 ^b	6.02 ^{ab}	5.45 ^c
Feed per lb gain, lb	3.36	3.48	3.44	3.35

^{abc}Values in the same row with different superscripts differ ($P < .05$).

Table 4. The effect of choice of grain and level of soybean meal and amino acids on performance of growing-finishing swine.

Item	Treatments			
	1 corn	2 wheat	3 wheat + Lys	4 wheat + Lys + Met
Pigs per treatment, no.	125	110	106	131
Pens per treatment, no.	9	9	7	9
Avg. initial wt., lb	35.5	38.3	40.4	36.3
Avg. final wt., lb	223.5	221.0	223.5	216.2
Avg. daily gain, lb	1.60 ^b	1.55 ^b	1.60 ^b	1.42 ^c
Avg. daily feed intake, lb	4.88 ^b	4.83 ^b	4.86 ^b	4.37 ^c
Feed per lb gain, lb	3.05	3.11	3.07	3.17
Backfat, in. ^a	0.95 ^{de}	0.92 ^{ef}	0.96 ^d	0.90 ^f

^aBackfat measurements were taken on 124, 104, 105 and 123 pigs for the corn, wheat, wheat + Lys and wheat + Lys + Met treatments respectively.

^{bc}Values in the same row with different superscripts differ ($P < .01$).

^{def}Values in the same row with different superscripts differ ($P < .05$).

Literature Cited

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