

## HIGH PROTEIN WHEAT FOR SWINE

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### Story In Brief

Swine producers are interested in high protein wheat as a means of reducing further the need for supplemental protein in wheat based diets. This study was conducted to compare the performance of growing-finishing swine fed diets containing a high protein wheat (Brawney) with those fed a common hard red winter wheat diet (TAM-105) or a corn based diet. During the growing and finishing periods, pigs fed the Brawney wheat diet had reduced average daily gain when compared to pigs fed the corn diet. Average daily gain between pigs fed the corn based diet and the TAM-105 wheat diet was not significant. Average daily feed intake was lowest in both the growing and finishing phase in pigs fed the Brawney wheat diet. Feed efficiency was not affected by grain source during the growing period. During the finishing period, feed required per unit of gain was higher in pigs fed the TAM-105 wheat based diet than those fed the corn based diet. This study suggest that Brawney wheat is inferior to either TAM-105 wheat or corn as the primary grain source in swine growing-finishing diets.

(Key words: Swine, Brawney Wheat, TAM-105 Wheat, Corn)

### Introduction

Wheat in Oklahoma has periodically been competitively priced with other grains more commonly used in swine rations. The value of wheat as a feed grain is based primarily upon energy value of the grain, but the higher protein and lysine levels in wheat results in reduced protein supplement in the ration which also increases the value of wheat relative to other grains. Some producers have been interested in high-protein wheats which should reduce further the need for supplemental protein in swine rations. This study was conducted to compare performance of growing-finishing swine fed diets containing a high protein wheat (Brawney) with those fed a standard hard red winter wheat diet (TAM-105) or a corn based diet.

### Materials and Methods

This trial was conducted at the Livestock and Forage Research Station at El Reno, Ok and consisted of 394 pigs in 25 pens equipped with self-feeders and nipple waterers. Pigs from a line selected for rapid growth for 6 generations and improved growth efficiency for one generation were randomly allotted within growth line to three dietary treatments (Table 1). The treatments consisted of: (1) a corn-soybean meal diet (2) a hard red winter wheat-soybean meal diet or (3) protein wheat-soybean meal diet. Both the hard red winter wheat (TAM-105) and the high protein wheat (Brawney) were produced at the Livestock

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Table 1. Composition of experimental rations.

Item	Grower Diets			Finisher Diets		
	1 Corn	2 TAM-105 Wheat	3 Brawney Wheat	1 Corn	2 TAM-105 Wheat	3 Brawney Wheat
-----% Composition (as-fed)-----						
Corn, Yellow	77.12	--	--	82.65	--	--
Wheat	--	80.62	81.36	--	86.70	87.20
Soybean meal (44%)	19.03	15.75	15.00	14.06	10.25	9.75
Dicalcium phosphate	1.84	1.46	1.87	1.68	1.25	1.26
Calcium carbonate	.76	.92	.92	.76	.95	.95
Salt	.50	.50	.50	.50	.50	.50
Vit TM mix <sup>a</sup>	.25	.25	.25	.25	.25	.25
Aureomycin 10 <sup>b</sup>	.50	.50	.50	.10	.10	.10
Calculated analysis						
% Protein	15.16	17.08	18.67	13.46	15.46	17.03
% Lysine	.75	.75	.75	.62	.62	.62
% Met + Cys	.53	.48	.48	.49	.44	.43
% Threonine	.60	.59	.58	.53	.51	.50
% Calcium	.75	.75	.75	.70	.70	.70
% Phosphorus	.65	.65	.65	.60	.60	.60

<sup>a</sup>Supplied 4,000,000 IU vitamin A, 3,000,000 IU vitamin D, 4 g riboflavin, 20 g pantothenic acid, 30 g niacin, 800 g choline chloride, 15 mg vitamin B<sub>12</sub>, 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.

<sup>b</sup>Supplied 10g Aureomycin/lb.

and Forage Research Station in El Reno, OK. Analyzed protein and amino acid content of both wheat varieties are presented in Table 2. Diets were formulated, using the analyzed lysine value for the wheat varieties, to contain 0.75 percent lysine during the growing phase and 0.62 percent lysine during the finishing phase.

### Results and Discussions

During the growing period, average daily gain was similar in pigs fed the corn-soybean meal (treatment 1) or the TAM-105 wheat soybean meal diet (treatment 4, Table 3). Pigs fed the Brawney wheat-soybean meal diet (treatment 3) grew 8.0 and 5.8 percent slower ( $P < .01$ ) than those fed the corn or TAM-105, diets, respectively. Average daily feed intake was also lower ( $P < .08$ ) in pigs fed Brawney wheat (treatment 3) than in pigs fed the corn based diet (treatment 1). Although actual feed required per unit of gain was higher for pigs fed the Brawney wheat-soybean meal diet, differences in efficiency of gain were not significant.

Table 2. Analyzed Composition of Wheat<sup>a</sup>.

Item	Wheat Variety	
	Brawney	TAM-105
Crude Protein	14.84	12.63
Lysine	.39	.37
Threonine	.43	.36
Isoleucine	.49	.40
Valine	.63	.56

<sup>a</sup>Average of two samples of each variety.

Table 3. Comparison of two varieties of wheat with corn on performance of growing swine.

	Treatment		
	Corn 1	TAM-105 Wheat 2	Brawney Wheat 3
Pigs per treatment, no.	126	126	142
Pens per treatment, no.	8	8	9
Average daily gain, lb.	1.74 <sup>a</sup>	1.70 <sup>a</sup>	1.60 <sup>b</sup>
Average daily feed intake, lb.	4.68 <sup>c</sup>	4.58 <sup>cd</sup>	4.41 <sup>d</sup>
Feed per lb. gain, lb.	2.68	2.69	2.75

<sup>a,b</sup>Means in the same row with different superscripts differ ( $P < .01$ ).

<sup>c,d</sup>Means in the same row with different superscripts differ ( $P < .08$ ).

Average daily gain during the finishing phase (Table 4) followed the same pattern observed during the growing phase, although gain in pigs fed the TAM-105 wheat based diet (treatment 2) was more similar to gain observed in pigs fed the Brawney wheat based diet (treatment 3) than those fed the corn based diet (treatment 1). Pigs fed the corn diet grew more rapidly than those fed the Brawney wheat based diet ( $P < .07$ ) whereas gain in pigs fed the TAM-105 wheat based diet was intermediary. Average daily feed intake was not significantly affected by source of grain in the diet although pigs fed the Brawney wheat based diet during the finishing phase again consumed the least feed. Feed

Table 4. Comparison of two varieties of wheat with corn on performance of finishing swine.

	Treatment		
	Corn 1	TAM-105 Wheat 2	Brawney Wheat 3
Pigs per treatment, no.	124	123	140
Pens per treatment, no.	8	8	9
Average daily gain, lb.	2.13 <sup>a</sup>	2.08 <sup>ab</sup>	2.07 <sup>b</sup>
Average daily feed intake, lb.	7.20	7.39	7.12
Feed per lb. gain, lb.	3.45 <sup>c</sup>	3.66 <sup>d</sup>	3.56 <sup>cd</sup>
Backfat, in.	1.42 <sup>e</sup>	1.38 <sup>f</sup>	1.39 <sup>ef</sup>

<sup>a,b</sup>Means in the same row with different superscripts differ ( $P < .07$ ).

<sup>c,d</sup>Means in the same row with different superscripts differ ( $P < .05$ ).

<sup>e,f</sup>Means in the same row with different superscripts differ ( $P < .09$ ).

required per pound of gain was increased by 6 percent ( $P < .05$ ) in pigs fed the Tam-105 diet (treatment 2) when compared to those fed the corn diet (treatment 1). Feed efficiency in pigs fed the Brawney wheat diet was intermediary. Backfat thickness tended to be slightly higher in pigs fed the corn diet (treatment 1) although this difference approached significance ( $P < .09$ ) only when compared to pigs fed the TAM-105 diet (treatment 2).

This study suggest that Brawney wheat is inferior to either TAM-105 wheat or corn as the primary grain in swine growing-finishing diets. In addition, the reduction in soybean meal needed with the higher protein Brawney wheat is minimal since Brawney wheat was only slightly higher in lysine. Although Brawney wheat was 17.5 percent higher in protein than TAM-105 wheat, lysine was only 5.4 percent higher.