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Evaluation of a Wheat Protein Concentrate for Finishing Swine¹

Gary L. Allee, C. W. Deyoe and R. H. Hines

Summary

Two experiments involving 66 finishing pigs were conducted to determine the feeding value of a wheat protein concentrate. Pigs fed diets containing as much as 60% wheat protein concentrate consumed the same quantity of feed, gained at the same rate, and were just as efficient in feed utilization as pigs fed the control diet. Pigs fed the diet containing 96.1% wheat protein concentrate consumed less feed and gained significantly slower ($P < .05$) than pigs fed the control diet. Extrusion processing of the wheat protein concentrate gave no beneficial effect on feed intake, daily gain or feed required per unit of gain. It appears that up to 60% wheat protein concentrate may be used in finishing pig diets with no adverse effects.

Procedure

The feeding value of a wheat protein concentrate for finishing pigs was tested in two experiments involving 66 finishing pigs. Pigs were housed on a totally slatted floor with 5 or 6 pigs per pen. Weight gain and feed consumption were determined biweekly. The experiments were terminated when each pen of pigs averaged 200 pounds. Composition of the wheat protein concentrate is shown in Table 26.

Experiment I. To determine the influence of level of wheat protein concentrate on the performance of finishing pigs, 36 pigs averaging 118 pounds, were randomly assigned to treatments based on breed, sex, and initial weight. Composition of the experimental diets are shown in Table 27. All diets contained approximately 15.0% crude protein, 0.80% calcium, and 0.60% phosphorus. All diets were fed in pellet form.

¹Wheat-protein concentrate (WHEPRO) and financial support supplied by Dixie-Portland Flour Mills, Inc., Arkansas City, Kansas.

Experiment II. This experiment studied effects of different levels of wheat protein concentrate and of extrusion processing the wheat protein concentrate on performance of finishing pigs. Thirty-six Durocs averaging 94 pounds were randomly assigned based on sex and initial weight to one of these treatments.

1. Control diet (0% wheat protein concentrate)
2. 15% wheat protein concentrate
3. 30% wheat protein concentrate
4. 60% wheat protein concentrate
5. 15% extruded wheat protein concentrate
6. 30% extruded wheat protein concentrate
7. 60% extruded wheat protein concentrate

Composition of the experimental diets are shown in Table 27a. All diets contained approximately 15.0% crude protein and were fed as pellets.

Results and Discussion

Data from experiment I are shown in Table 28. Pigs fed 50% wheat protein concentrate consumed the same amount of feed and gained at the same rate as those consuming the control diet (0% wheat protein concentrate). Pigs fed the diet containing 96.1% wheat protein concentrate consumed less feed and gained significantly slower ($P .05$) than pigs receiving diets containing 0 or 50% wheat protein concentrate. There were no significant differences in feed required per pound of gain due to level of wheat protein concentrate in the diet.

The reduced feed intake and consequently the slower rate of gain by pigs consuming the diet containing 96.1% wheat protein concentrate may result from the high fiber content of the diet (7-8% crude fiber), the poor acceptability of this diet or a combination of these factors.

Table 26. Composition of Wheat Protein Concentrate

Approximate Analysis (as is)		%
Moisture		8.4
Ash		3.75
Protein		14.6
Fat		3.5
Fiber		8.0
Amino Acid Analysis (as is)		%
Lysine		.556
Histidine		.313
Ammonia		.305
Arginine		.928
Aspartic acid		.996
Threonine		.481
Serine		.640
Glutamic acid		3.053
Proline		.992
Glycine		.750
Alanine		.702
Half Cystine		.217
Valine		.678
Methionine		.152
Isoleucine		.461
Leucine		.922
Tyrosine		.416
Phenylalanine		.543

¹WHEPRO Coarse #A856C, analysis supplied by Dixie-Portland Flour Mills, Inc.

Table 27. Composition of Diets (Experiment I)

Ingredient	A	<u>Diets</u> B	C
Ground milo	80.0	38.3	----
Soybean meal (44%)	16.0	8.0	----
Wheat protein concentrate	----	50.0	96.1
Dicalcium phosphate	1.5	1.0	1.0
Limestone	1.0	1.2	1.4
Salt	0.5	0.5	0.5
Vitamin, trace mineral and antibiotic premix	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>
	100.0	100.0	100.0

Table 27A. Composition of Diets (Experiment II)

Wheat Protein Concentrate, %	0	15	30	60
Ingredient				
Ground milo	78.3	65.5	53.2	28.2
Soybean meal (44%)	17.9	15.8	13.1	8.3
Wheat protein concentrate	----	15.0	30.0	60.0
Dicalcium phosphate	1.8	1.6	1.6	1.2
Limestone	0.5	0.6	0.6	0.8
Salt	0.5	0.5	0.5	0.5
Vitamin, Antibiotic and trace mineral premix	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>
	100.0	100.0	100.0	100.0

Table 28. Influence of Level of Wheat Protein Concentrate on Performance of Finishing Pigs

Item	% Wheat Protein Concentrate		
	0	50	96.1
Number of pigs	10	10	10
Initial wt., lb.	118	119	117
Final wt., lb.	213	213	199
Daily feed intake, lb.	5.34 ^a	5.34 ^a	4.86 ^a
Daily gain, lb.	1.51 ^a	1.51 ^a	1.31 ^b
Feed/gain	3.51 ^a	3.52 ^a	3.69 ^a

a,b Means on the same line with different superscripts differ significantly ($P < .05$).

Data from feeding finishing pigs various percentages of wheat protein concentrate and from extrusion processing the wheat protein concentrate are shown in Table 29. There was no significant difference in average daily gain due to level of nonextruded wheat protein concentrate in the diet. Neither feed intake nor feed required per unit of gain was influenced by the level of nonextruded wheat protein concentrate in the diet. Extrusion processing had no beneficial effect on feed intake, daily gain, or feed required per unit of gain.

These studies demonstrate that concentrated protein from wheat can be successfully utilized by finishing pigs, and suggests that concentrated protein from wheat may become an additional source of protein for use in swine diets.

Table 29. Influence of Level of Wheat Protein Concentrate and of Extrusion Processing on the Performance of Finishing Pigs.

Indicated item:	Wheat Protein Concentrate Nonextruded, % of the diet				Wheat Protein Concentrate Extruded, % of the diet		
	0	15	30	60	15	30	60
Number of pigs	6	6	6	6	6	6	6
Initial weight, lb.	95.4	92.2	88.3	95.0	96.0	91.2	98.2
Final weight, lb.	207.8	204.5	194.0	198.7	207.0	185.0	197.8
Daily feed intake, lb.	6.05	6.03	6.16	5.83	6.13	5.58	5.98
Daily gain, lb.	2.16 ^a	2.16 ^a	2.02 ^{a,b}	1.99 ^{a,b}	2.13 ^a	1.94 ^b	1.90 ^{a,b}
Feed gain	2.80	2.79	3.05	2.92	2.87	2.88	3.15

^{a,b}Differ significantly ($P < .05$).