



Wheat in Swine Finishing Rations

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In recent years in many areas of the United States, wheat has been competitively priced with other cereal grains. Thus, interest has increased tremendously in its use as a feedstuff for growing-finishing swine. Unfortunately since World War II, published research on the use of wheat for growing-finishing swine has been rather limited until recently.

Evaluating Wheat in Feeding Trials

In the last two or three years several research reports have been published on the value of wheat for growing-finishing swine. Luce *et al.* (1969) reported on a trial involving 320 crossbred pigs in which hard red winter (Triumph variety) was compared to milo. Experimental rations used in this study are shown in Table 1. Results are shown in Table 2.

The results published indicate that wheat tended to support similar gains as milo especially when equal amounts of supplemental protein were used (rations 1 and 5). The slight reduction of average daily gains for the pigs on the 15% crude protein diet (ration 3) may have been the result of a lysine deficiency during the earlier growth stages. Based on the analyzed content of the wheat and calculated content of the soybean meal, the lysine content of ration 3 was 0.51%. This is considerably lower than the 0.70% requirement listed by NRC (1968) for growing pigs weighing 20 to 35 kg.

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Table 1. Comparison of Experimental Rations.

Ingredients, %	Ration Number				
	1	2	3	4	5
Ground milo	75.00	40.05	---	37.60	---
Ground wheat	---	40.05	85.90	37.60	75.40
Soybean meal (44%)	20.10	15.15	9.50	20.10	20.10
Molasses	1.50	1.50	1.50	1.50	1.50
Dicalcium phosphate	1.40	1.10	0.70	1.05	0.65
Ground limestone	0.90	1.05	1.30	1.05	1.25
Trace mineralized salt	0.50	0.50	0.50	0.50	0.50
Vitamin-Antibiotic mix ¹	0.60	0.60	0.60	0.60	0.60
Total	100.00	100.00	100.00	100.00	100.00
% Composition					
Protein, calculated	15.00	15.00	15.00	16.67	18.35
Protein, chemical	15.42	15.42	14.95	16.87	18.00
Calcium, calculated	0.70	0.70	0.70	0.70	0.70
Calcium, chemical	0.67	0.68	0.72	0.67	0.73
Phosphorus, calculated	0.60	0.60	0.60	0.60	0.60
Phosphorus, chemical	0.60	0.56	0.55	0.60	0.57

¹ Vitamin-antibiotic mix furnished 1500 IU, Vitamin A; 500 IU, Vitamin D; 1.1 mg., riboflavin; 6.8 mg., niacin; 2.1 mg., pantothenic acid; 114 mg., choline; 8.2 mcg., Vitamin B₁₂ and 20 mg., tylosin per pound of complete feed.

Table 2. Comparative Values of Wheat Vs. Milo for Growing-Finishing Swine¹

Treatment	Ration Designation				
	1	2	3	4	5
	100% milo (basal)	50% milo 50% wheat equal crude protein	100% wheat equal crude protein	50% milo 50% wheat equal supp. protein	100% wheat equal supp. protein
Pens per treatment, no.	4	4	4	4	4
Pigs per pen, no.	16	16	16	16	16
Av. initial wt., lbs.	49.30	49.00	49.20	49.70	49.80
Av. final wt., lbs.	203.30	204.90	201.80	205.30	205.40
Av. daily gain, lbs.	1.68	1.68	1.61	1.76 ¹	1.69
Av. daily feed intake, lbs.	5.28	5.28	5.22	5.51 ²	5.48 ²
Feed per lb. gain, lbs.	3.15 ³	3.17 ³	3.28	3.16 ³	3.28
Av. adjusted backfat, in.	1.36	1.39	1.43	1.37	1.40

¹ Treatment 4 is significantly higher ($P < .05$) than treatment 3.

² Treatments 4 and 5 are significantly higher ($P < .05$) than treatment 3.

³ Treatments 1, 2 and 4 are significantly lower ($P < .05$) than treatments 3 and 5.

Significantly more feed per pound of gain was required using the 100% wheat rations (rations 3 and 5) as compared to the 100% milo ration (ration 1). However, when wheat replaced only 50% of the milo, feed utilization was not appreciably affected. The type grain used had little apparent effect on average daily feed intake or backfat thickness.

Gill *et al.* (1966) reported that pigs fed Gaines wheat tended to gain slower and require more feed per unit of gain than pigs fed corn

with equal amounts of protein supplement. Cromwell *et al.* (1969) also reported that growing-finishing swine fed a 16% crude protein corn-soybean diet gained faster and required less feed per unit of gain than pigs fed diets substituted with either 1/2 or all the corn with wheat. These research workers reported wheat to have only 95% the value of corn.

Danielson and Grobouski (1970) reported that growing-finishing pigs fed diets composed of wheat tended to gain slower than pigs fed corn or milo diets. However, feed conversion was not appreciably affected. They also reported that a substitution of 1/3 or 2/3 of the milo portion of the diet with wheat did not apparently affect rate of gain.

Jensen *et al.* (1967) and (1969) reported that wheat rations when appropriately supplemented with protein and/or lysine will produce gain and feed conversion ratios similar to that of a 12% protein corn-soybean meal diet. Jensen *et al.* (1967) demonstrated that a 13.7% crude protein, 15.3% crude protein or 12.4% crude protein + 0.15% lysine wheat rations tended to produce similar rate of gain and feed-gain ratios as a 12% corn-soybean diet for growing-finishing swine. However, a 12.4% wheat-soybean diet did not produce gains or feed-gain ratios comparable to a 12% corn-soybean meal diet.

Processing of Wheat

Since wheat occasionally fails to produce equal gains or feed-gain ratios as corn or milo, a few research workers have explored methods of processing as an avenue to improve utilization of wheat.

Luce *et al.* (1970) reported on a trial in which growing-finishing pigs were fed either a fine, medium or coarse grind or a close dry rolled wheat ration. Methods of preparation had little apparent effect on rate of gain, feed conversion or probed backfat thickness.

England *et al.* (1965), Jensen *et al.* (1967), Jensen *et al.* (1969) and Clawson and Alsmeyer (1970) have shown pelleting of wheat diets to be an effective method to improve feed utilization and rate of gain in growing-finishing swine. Results of the research conducted by Clawson and Alsmeyer (1970) using the soft red winter wheat (Blue Boy variety) are shown in Table 3. A standard corn-soybean meal or wheat-soybean meal ration fortified with vitamins and minerals was used. The crude protein level was 15.5% from the start of the experiment until the pigs weighed approximately 45 kg. At this point the protein level was reduced to approximately 13.6% crude protein.

Summary

Available literature indicates that wheat can be used successfully in swine rations. While there is some disagreement between reports from

Table 3. Comparison of Wheat and Corn Base Diets When Fed Ground or Pelleted¹

	Ground Corn	Pelleted Corn	Ground Wheat	Pelleted Wheat
No. pigs	47	46	47	47
Av. initial wt., kg.	24	24	24.5	24
Av. final wt., kg.	90.4	92.3	91.8	91.8
Av. pig days	90	86	91	91
Av. daily gain, kg.	0.73	0.79	0.74	0.75
Av. daily feed, kg.	2.21	2.26	2.27	2.20
Feed/gain	3.02	2.86	3.06	2.93

¹Clawson and Alsmeyer (1970)

different experiment stations, a perusal of the literature would suggest that it is probably largely due to the different varieties of wheat being fed and differences in nutrient composition. The nutrient composition, especially amino acid content, must be taken into consideration when formulating optimum wheat rations for growing-finishing swine.

Methods of processing that may improve utilization of wheat for growing-finishing swine need to be explored further. At the present time, it would appear that pelleting will give about the same beneficial results as would be expected for corn or grain sorghum.

With the present knowledge concerning the use of wheat in growing-finishing swine rations, it would appear that price will largely determine its use. When wheat is as cheap or cheaper than other cereal grains such as corn or grain sorghum, nutritionists should seriously consider the use of wheat in swine rations.

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Utilization of Wheat In Turkey Feeding Programs

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Introduction

Wheat and wheat by-products have been used for centuries as a food for both animals and humans. Although generally considered as an energy source, wheat must also be recognized and evaluated as a major source of protein and amino acids. The price of wheat relative to other cereal grains restricted its use in animal feeds from the early 1940's until recently.

During the past few years, a steady decline in price has allowed an increasing use of wheat in turkey feeds. In some instances there has probably been too much reluctance or caution in replacing traditional feed grains with wheat. Some caution in this usage of wheat may have been justified, however, because turkeys, turkey feeding programs and varieties of wheat have all changed greatly during the past 25 years.

Data concerning the nutrient composition of wheat has been obtained and reported at a much faster pace in recent years. Also, a number of feeding trials have been conducted with turkeys. McGinnis (1964), Sanford (1966), Harper (1966) and Biely (1969) have reviewed the value of wheat in poultry rations.

This paper will review the pertinent and significant literature relative to the utilization of wheat in turkey feeding programs.

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