

in an unfavorable direction, but fortunately these correlations were of a quite low magnitude. The data indicates that superior meat-type hogs with acceptable quality can be produced, but attention must be given to quality as well as meatiness in order to accomplish the goal. The relationships between backfat thickness and quality factors are similar to those believed to exist between backfat thickness and growth rate, but unfortunately quality can not be appraised in the live animal.

Although it would be desirable to analyze additional data involving breeding groups with greater variation in the expression of quality aspects, the current results provide justification for placing some emphasis on these traits in swine breeding programs at the present time.

Wheat vs. Milo for Growing-Finishing Swine

W. G. Luce, I. T. Omtvedt, D. R. Rule, D. F. Stephens and S. D. Welty

Story in Brief

Three hundred twenty crossbred pigs were fed at the Fort Reno Livestock Research Station to compare the value of wheat vs. milo for growing-finishing swine. The pigs were fed in confinement from eight weeks of age to an average weight of 204.1 pounds.

Wheat tended to support similar gains as milo especially when equal amounts of supplemental protein were used. However, significantly more feed was required per pound of gain when wheat replaced all the milo. When only 50 percent of the milo was replaced with wheat, feed utilization was not appreciably affected. The type of grain used had little apparent effect on average daily feed intake or backfat thickness.

Introduction

Wheat is an important economic crop in Oklahoma. In 1968, 5,374,000 acres were harvested with a yield of 123,602,000 bushels. This is a yield of approximately three times the rest of the cereal grains combined.

Appreciation is expressed to T. E. Nelson for assistance in conducting laboratory analysis. This project was conducted by the Department of Animal Sciences and Industry in cooperation with the Regional Swine Breeding Laboratory, U. S. D. A., ARS, AH.

In cooperation with USDA Agri. Research Service, Animal Husbandry Research Division.

Recently wheat has been competitively priced with other cereal grains to suggest its use as a feed for swine. However, current information concerning the feeding value of wheat for swine is limited.

Since milo is the standard cereal grain used for swine production in Oklahoma, a study was conducted with the objective of comparing the feeding value of wheat vs. milo for growing-finishing swine.

Procedure

Three hundred twenty Duroc-Beltville crossbred pigs were self-fed in confinement at the Fort Reno Livestock Experiment Station. The pigs were fed from eight weeks of age to an average weight of 204.1 pounds. Pigs were randomly allotted within sex and litters to five experimental treatments. Each experimental treatment consisted of four pens containing sixteen pigs (eight barrows and eight gilts). Upon completion of the experiment, all pigs were probed for backfat thickness adjusted to 200 pounds.

Results of the chemical analysis of the two cereal grains are shown in Table 1. Composition of the experimental rations fed are shown in Table 2. Soybean meal was added at levels in rations 1, 2 and 3 to bring the total crude protein of each of these rations to 15.0 percent. Rations 4 and 5 contained the same amount of soybean meal as ration 1. Thus, rations 2 and 3 were identical in total crude protein to ration 1 while rations 4 and 5 contained the same amount of supplemental protein as ration 1.

Table 1. Chemical Composition of Experimental Wheat and Milo.

Chemical Analysis, Percent	Wheat	Milo
Dry Matter	89.73	87.90
Calcium	0.06	0.02
Phosphorus	0.48	0.29
Crude Protein	12.50	8.07
Essential Amino Acids ¹		
Lysine	0.28	0.15
Tryptophan	0.21	0.13
Methionine	0.16	0.09
Histidine	0.23	0.12
Arginine	0.56	0.26
Threonine	0.30	0.22
Valine	0.47	0.28
Isoleucine	0.34	0.24
Leucine	0.71	0.75
Phenylalanine	0.50	0.31

¹ Amino acid analysis were conducted using a Beckman Model 120 amino acid analyzer.

TABLE 3.—COMPOSITION OF EXPERIMENTAL RATIONS.

Ingredients, Percent	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
Percent 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.

Results and Discussion

The results of this experiment are shown in Table 3. Pigs on ration 3 (100 percent wheat - 15.0 percent crude protein) had the lowest average daily gains of 1.61 pounds per day. However, this study does show that it is possible to obtain similar gains with an all wheat as compared to a milo ration if equal amounts of supplemental protein are used. Pigs on ration 5 gained 1.69 pounds per day vs. 1.68 pounds for the pigs on ration 1.

Pigs on ration 4, a 50 percent wheat-50 percent milo ration containing the same amount of soybean meal as ration 1, had the highest average daily gain of all treatments (1.76 pounds per day). These gains were significantly higher than the gains obtained by the pigs on ration 3.

Significant differences were noted in average daily feed intake with the pigs on rations 4 and 5 having significantly higher daily feed intakes than pigs on ration 3. Significantly more feed was required per pound of gain for the pigs on either of the wheat rations (3 and 5) than for the pigs on the milo or wheat-milo combination rations (1, 2 and 4).

Adjusted backfat probes to 200 pounds were similar for pigs on all treatments as shown in Table 3.

The results of this investigation indicate that wheat will support similar gains to milo for growing-finishing swine when equal amounts of supplemental protein are used. Although wheat is normally higher in

Table 3. 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 ²	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.

crude protein and essential amino acids than milo, a certain amount of supplemental protein is needed to meet the pig's requirement of essential amino acids. Based on analyzed lysine content of the wheat and calculated content of the soybean meal, the lysine content of ration 3 was 0.51 percent. The requirement for a 44 to 77 pound pig as reported in "Nutrient Requirements of Swine", Sixth Revised Edition, 1968, published by the National Academy of Sciences is 0.70 percent. A deficiency of lysine in the earlier growth stages of the pigs on ration 3 may be the reason for the decreased average daily gains.

Although significant differences were noted in average daily feed intake, it should be pointed out that no appreciable problem was observed in this trial in getting pigs to consume the two all wheat rations (3 and 5). Pigs on ration 3 did not eat an appreciably smaller amount of feed daily than did pigs on rations 1 and 2. Pigs on ration 5 ate more feed per day than the pigs on the other rations with the exception of ration 4.

Results from this study does not show wheat to be equal to milo for growing-finishing swine when feed utilization was considered. It took 0.13 more pounds of feed per pound of gain using the 100 percent wheat rations (3 and 5) as compared to the 100 percent milo ration (ration 1). However, when wheat replaced only 50 percent of the milo, feed utilization was not appreciably affected. More research is being planned to further explore methods of feeding wheat that may improve feed utilization.