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Amino Acid Supplementation of Opaque-2 Corn
for Finishing Swine

Richard C. Wahlstrom, George W. Libal and John Volz

Several experiments have shown that opaque-2 corn is superior to normal yellow corn for pigs because of its higher content of the amino acids lysine and tryptophan. Previous research at this station has shown that finishing pigs fed opaque-2 corn supplemented with lysine or lysine and tryptophan do not grow as rapidly or efficiently as pigs fed corn and soybean meal. Since we have shown that opaque-2 corn is also deficient in threonine for the young pig, this experiment was conducted to study the effect of adding supplemental lysine and threonine to a diet of opaque-2 corn, minerals and vitamins.

Experimental Procedure

Forty-eight crossbred pigs of an average weight of approximately 124 lb. were allotted to 12 pens of four pigs each on the basis of sex, weight and ancestry. Three pens were assigned to each of the four treatment groups which were as follows:

1. Opaque-2 corn
2. Opaque-2 corn plus 0.15% L-lysine
3. Opaque-2 corn plus 0.15% L-lysine and 0.10% DL-threonine
4. Normal corn-soybean meal, 13% protein

The amino acid analysis of the opaque-2 corn is shown in table 1 and the composition of the rations fed is shown in table 2. All diets were supplemented with minerals and vitamins in amounts necessary to meet National Research Council specifications. Feed and water were both provided ad libitum. Pigs were housed in uninsulated, wooden frame houses with concrete floors and had access to outside concrete lots where feeders and waterers were located. The experiment was conducted during the winter months from mid-December to mid-February. Blood samples were obtained at the end of the experiment for analysis of blood urea nitrogen (BUN).

Results

The results of this experiment are presented in table 3. Rate of gain of pigs fed opaque-2 corn supplemented with lysine or lysine and threonine was approximately 8 and 16% faster, respectively, than the gain of pigs fed the opaque-2 corn diet without amino acid supplementation. Pigs receiving opaque-2 corn with added lysine and threonine had gains identical to those for pigs fed the corn-soybean meal diet. Average daily gains for the four treatment groups were 1.31, 1.42, 1.51 and 1.51 lb. for pigs fed the opaque-2 corn alone, with lysine, with lysine and threonine or the corn-soybean meal diet, respectively.

Feed efficiency was improved approximately 4% when opaque-2 corn was supplemented with lysine or lysine and threonine. However, the best feed:gain ratio was obtained when pigs were fed the corn soybean diet. These pigs required 4.32 lb. of feed per gain compared to 5.01, 4.84 and 4.74 lb. for pigs fed the opaque-2 corn diets. Feed efficiency in this experiment was not as good as that obtained in previous trials on similar diets. One reason for the high feed:gain ratios in this trial could be the adverse weather conditions which occurred during early 1975. These pigs were fed in outside lots and the January blizzard caused considerable stress that very likely affected both rate and efficiency of gain.

Average feed consumption varied among treatments from 6.48 lb. of feed consumed daily by pigs fed the corn-soybean meal diet to 7.16 lb. per day for those fed opaque-2 corn supplemented with lysine and threonine. These differences were not significantly different.

Blood urea nitrogen levels did not differ significantly among treatments. The highest value was obtained in the blood of pigs fed the corn-soybean meal diet, indicating that this diet may have had excess protein.

Summary

Forty-eight crossbred pigs weighing 124 lb. initially were fed opaque-2 corn diets supplemented with minerals and vitamins and different amounts of supplemental amino acids. The opaque-2 corn was improved when supplemented with lysine or a combination of lysine and threonine. Pigs fed the opaque-2 corn diet supplemented with these two amino acids gained at the same rate as pigs fed a 13% protein, corn-soybean meal diet, but feed efficiency was improved when pigs were fed the corn-soybean meal diet.

Table 1. Amino Acid Analysis
of Opaque-2 Corn

Amino acid	Percent
Arginine	0.703
Histidine	0.338
Isoleucine	0.366
Leucine	0.925
Lysine	0.373
Methionine	0.198
Phenylalanine	0.463
Threonine	0.421
Valine	0.486
Alanine	0.692
Aspartic acid	0.918
Half cystine	0.152
Glutamic acid	1.778
Glycine	0.649
Proline	0.776
Serine	0.493
Tyrosine	0.333
Ammonia	0.309

Table 2. Composition of Diets (Percent)

Ingredient	Opaque-2	Opaque-2		Normal corn-SBM
		+ lysine	+ lysine + threonine	
Opaque-2 corn	97.75	97.56	97.46	---
Normal corn	---	---	---	85.85
Soybean meal, 44%	---	---	---	12.05
Dicalcium phosphate	0.66	0.66	0.66	0.45
Limestone	0.89	0.89	0.89	0.95
Trace mineralized salt ^a	0.50	0.50	0.50	0.50
Vitamin-antibiotic premix ^b	0.20	0.20	0.20	0.20
L-lysine ^c	---	0.19	0.19	---
DL-threonine	---	---	0.10	---

^aContained 0.8% zinc.

^bProvided per lb. of diet: vitamin A, 1500 IU; vitamin D, 150 IU; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 10 mg; choline, 50 mg; vitamin B₁₂, 7.5 mcg and tylosin, 10 milligrams.

^cL-lysine monohydrochloride (78% lysine).

Table 3. Effect of Lysine and Threonine Supplementation of Opaque-2 Corn for Finishing Pigs

Item	Opaque-2	Opaque-2		Normal corn-SBM
		+ lysine	+ lysine + threonine	
Number of pigs ^a	12	12	12	12
Avg. initial wt., lb.	124.5	124.5	124.7	124.8
Avg. final wt., lb.	197.8	204.3	209.0	209.5
Avg. daily gain, lb. ^b	1.31	1.42	1.51	1.51
Avg. daily feed, lb.	6.54	6.85	7.16	6.48
Feed/gain, lb.	5.01	4.84	4.79	4.32
Blood urea nitrogen, mg %	10.2	9.8	10.5	11.9

^aThree replicates of four pigs each.

^bSignificant sex differences, P<.05 (barrows, 1.53 vs. gilts, 1.35).