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Lysine and Methionine Supplementation of Growing-
Finishing Swine Diets

Richard C. Wahlstrom and George W. Libal

Lysine and methionine have long been considered to be the two most limiting amino acids in corn-soybean meal diets for swine. Research conducted at the South Dakota Experiment Station and elsewhere has shown lysine to be the most limiting amino acid in these diets. However, the need for methionine is more questionable. The increase in price of soybean meal and other supplements has caused renewed interest in the possibility of supplementing low protein corn-soybean meal diets with amino acids for more economical swine production.

The objectives of this experiment were to determine the effects of lysine and methionine supplementation of 14% protein swine growing diets and 11% swine finishing diets on rate of gain, feed efficiency and carcass development.

Experimental Procedure

This experiment consisted of two trials using 120 crossbred pigs in each trial. The pigs averaged 30.0 and 38.5 lb. initially and in each trial were allotted to three replications of seven treatments on the basis of litter, sex and weight. Each lot consisted of five pigs, two barrows and three gilts in trial 1 and three barrows and two gilts in trial 2. They were housed in uninsulated, wood frame houses with concrete floors and connecting concrete lots where self-feeders and waterers were located.

The experimental treatments were as follows:

1. 17% protein diet to 110 lb., 14% protein diet 110 to 205 lb.
2. 14% protein diet to 110 lb., 11% protein diet 110 to 205 lb.
3. 14 and 11% diets plus 0.1% L-lysine
4. 14 and 11% diets plus 0.2% L-lysine
5. 14 and 11% diets plus 0.2% DL-methionine
6. 14 and 11% diets plus 0.2% lysine and 0.2% methionine
7. 14 and 11% diets plus 0.2% lysine and 0.4% methionine.

The composition of the corn-soybean meal diets is shown in table 1. The pigs were removed from their respective treatments at individual weights of about 205 lb. and slaughtered at the University Meats Laboratory. Carcass data obtained were backfat thickness, carcass length, loin eye area, percent ham and loin and percent moisture, fat and protein in the loin muscle.

Results

Summaries of the daily gain, feed per gain and carcass data are presented in tables 2, 3, and 4, respectively. Average daily gains did not differ significantly between treatments during the growing or finishing periods. However, during the early growth period pigs gained 1.47 lb. per day when fed the 17% protein diet and 1.38 lb. daily when fed the 14% protein diet or the 14% diet with only methionine. The addition of 0.1% L-lysine to this diet resulted in pig gains of 1.47 lb. daily. This was equal to gains of pigs fed the higher (17%) protein feed. During the finishing period pigs fed the low protein diet with 0.2% methionine grew at the slowest rate.

Feed efficiency data also indicated a slight but insignificant advantage for the 17% protein diet or the 14% diet with 0.1% lysine compared to the unsupplemented 14% protein diet during the growing period. However, there were significant ($P < .01$) treatment differences in feed efficiency during the finishing period and for the total period. Pigs fed the 11% protein diet or this diet with methionine required 4.32 lb. of feed per lb. of gain during the period from 110 to 205 lb., while pigs receiving the other dietary treatments required from 3.72 to 4.08 lb. of feed per lb. of gain. About 12% more feed was required when pigs were fed the low protein dietary sequence (14-11%) without lysine supplementation than when pigs were fed the 17-14% protein diets. The addition of 0.1% lysine to the 14-11% protein diets reduced feed requirement by about 9% compared to the unsupplemented 14-11% protein diets.

There were no large differences in carcass measurements, although loin eye area and percent ham and loin were lowest for pigs fed the 14-11% protein diets alone or with methionine only. This would indicate that these diets did not support maximum lean muscle development. There was also significantly more fat and less protein in the muscle tissue of pigs fed these two diets.

Summary

Two hundred forty crossbred pigs were used to study protein, lysine and methionine needs of growing and finishing pigs. Pigs fed a 14% protein, corn-soybean meal diet from 30 to 110 lb. gained slightly slower and required more feed per lb. of gain than pigs fed 17% protein diets or the 14% protein diet supplemented with 0.1% lysine. Rate of gain from 110 to 205 lb. did not differ when pigs were fed 14 or 11% protein diets. However, pigs fed the 11% protein diet required significantly more feed per gain than those fed diets of 14% protein or 11% protein supplemented with lysine. Methionine supplementation did not improve the low protein diets during either the growing or finishing periods. Fat content of the loin muscle was increased significantly, and protein content, loin eye area and percent ham and loin were decreased when pigs were fed the low protein (14-11%) dietary sequence without supplemental lysine. These data suggest that lysine was deficient in the 14% diet for best performance of pigs from 30 to 110 lb. and in 11% diets fed to pigs from 110 to 205 pounds.

Table 1. Composition of Diets (Percent)

Ingredient	Percent Protein		
	17	14	11
Ground yellow corn	74.0	82.0	90.7
Soybean meal (44%)	23.0	15.0	6.3
Dicalcium phosphate	1.7	1.7	1.7
Ground limestone	0.5	0.5	0.5
Trace mineral salt (0.8% zinc)	0.5	0.5	0.5
Vitamin-antibiotic ^a	0.3	0.3	0.3
Amino acids, % ^b			
Lysine	0.84	0.66	0.43
Methionine	0.26	0.23	0.19

^aProvided per lb. of diet: vitamin A, 1050 IU; vitamin D, 200 IU; riboflavin, 1.45 mg; pantothenic acid, 5.0 mg; niacin, 10 mg; choline, 50 mg; vitamin B₁₂, 7.5 mcg and tylosin, 10 mg.
^bPercent of air-dry diet.

Table 2. Effect of Lysine and Methionine on Average Daily Gain, Lb.^a

Treatments ^b	34-110 lb.	110-205 lb.	34-205 lb.
1. 17-14% protein	1.47	1.88	1.66
2. 14-11% protein	1.38	1.84	1.59
3. 0.1% lysine (Ly)	1.47	1.88	1.66
4. 0.2% Ly	1.39	1.93	1.64
5. 0.2% methionine (M)	1.38	1.69	1.50
6. 0.2% Ly + 0.2% M	1.44	1.90	1.65
7. 0.2% Ly + 0.4% M	1.47	1.78	1.62

^aSix replicates of 5 pigs each per treatment. Avg. initial wt., 34.2 lb.
^bDietary protein changed at 110 lb.

Table 3. Effect of Lysine and Methionine on Feed Per Gain

Treatment	34-110 lb.	110-205 lb.	34-205 lb.
1. 17-14% protein	2.81	3.72	3.30
2. 14-11% protein	2.99	4.32**	3.73**
3. 0.1% Ly	2.83	3.88	3.41
4. 0.2% Ly	2.94	3.88	3.47
5. 0.2% M	2.94	4.32**	3.70**
6. 0.2% Ly + 0.2% M	2.94	3.79	3.40
7. 0.2% Ly + 0.4% M	2.85	4.08	3.51

**Significant (P<.01).

Table 4. Effect of Lysine and Methionine on Carcass Characteristics

Treatments	Backfat in.	Length in.	Loin eye area sq. in.	Ham-loin %	Fat % ^a	Protein % ^a
1. 17-14% protein	1.27	29.8	4.66	40.3	3.78	22.71
2. 14-11% protein	1.35	29.9	4.42	39.3	6.66	21.68
3. 0.1% Ly	1.38	30.1	4.76	39.8	4.64	22.56
4. 0.2% Ly	1.31	30.0	4.70	39.8	3.79	22.78
5. 0.2% M	1.37	30.1	4.37	38.8	6.02	21.89
6. 0.2% Ly + 0.2% M	1.33	29.9	4.84	40.6	3.75	22.60
7. 0.2% Ly + 0.4% M	1.30	29.9	4.66	39.9	3.78	22.52

^aSignificant treatment difference (P<.01).