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Animal Science Reports

1971

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Recommended Citation

Wahlstrom, R. C.; Libal, G. W.; and Fredrikson, J. F., "Effect of Lysine and Methionine Supplementation on Performance and Carcass Characteristics of Growing-Finishing Swine" (1971). *South Dakota Swine Field Day Proceedings and Research Reports, 1971*. Paper 7.
http://openprairie.sdstate.edu/sd_swine_1971/7

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A.S. Series 71-35

Effect of Lysine and Methionine Supplementation on Performance
and Carcass Characteristics of Growing-Finishing Swine

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Lysine and methionine are two of the essential amino acids for swine that are thought to be most limiting in corn-soybean meal diets. Previous research at the Southeast South Dakota Experiment Farm indicated that lysine improved diets that were low in protein, but pigs fed low protein diets plus lysine did not gain as rapidly as did those receiving high protein diets.

The objective of the experiment reported herein was to study the effect of lysine and methionine supplementation when added to diets at levels equal to that present in a similar diet containing 2 or 4% more protein.

Procedure

Seventy-two weanling pigs averaging approximately 47 lb. were divided into 12 lots of six pigs each. Each lot contained three barrows and three gilts. Four replicate lots received each of the following dietary treatments:

1. 16% protein diet reduced to 14% protein at 110 lb.
2. 14% protein diet reduced to 12% at 110 lb. plus 0.16% L-lysine and 0.03% methionine.
3. 12% protein diet reduced to 10% at 110 lb. plus 0.31% L-lysine and 0.05% methionine.

All diets contained the same amount of lysine and methionine. Composition of the diets is shown in table 1.

Pigs were weighed weekly and individual pigs were removed from the experiment when they weighed over 205 lb. on the weekly weigh day. These pigs were marketed at John Morrell and Co., Sioux Falls, South Dakota, where carcass data were obtained. Several pigs in treatment 3 did not reach this final weight figure by the time the experiment was terminated. Therefore, only 14 pigs are included in the carcass data for treatment 3.

Carcass data were obtained after the carcasses had been cooled for approximately 24 hours. Data collected were carcass length, backfat, percent ham and loin and area of the longissimus dorsi muscle (loin eye).

Results

Growth performance data are summarized in table 2 and carcass data in table 3. During the growing phase pigs fed the 16% protein diet gained 8% faster than those pigs fed the 14% diet and 31% faster than those fed the 12% protein diet, even though all diets contained equal amounts of lysine and methionine. These results would indicate that either other amino acids are deficient in these low protein

diets or that the balance of amino acids is not correct for maximum growth when lysine and methionine are supplemented to low protein diets. During the finishing phase pigs gained at similar rates, 1.66 lb. per day, when fed 14 or 12% protein diets, but those fed the 10% protein diet gained considerably slower, 1.25 lb. per day. For the entire experimental period gains were 1.64, 1.59 and 1.25 lb. per day for pigs fed the 16, 14 and 12% protein diets, respectively.

Feed per gain increased as the protein level of the diet decreased. During the growing phase pigs required 2.84, 2.90 and 2.99 lb. of feed per pound of gain when fed the 16, 14 or 12% protein diets, respectively. Feed per gain for the finishing period was 3.51, 3.69 and 4.06 lb. of feed per pound of gain. For the entire trial, approximately 4 and 10% more feed was required by the pigs fed the 14 and 12% protein diets, respectively, compared to those pigs fed the 16% protein diet.

Carcasses from pigs fed the low protein diet had slightly more backfat, less percent ham and loin and smaller loin eye areas. The data were similar to that obtained in previous experiments. However, the magnitude of the differences was not as great. There are two possible explanations as to why low protein diets did not cause as severe an effect on carcass characteristics in this trial. Only 14 of 23 pigs were represented in the data. These were the fastest gaining pigs in this treatment and thus may not be a true representative average of all pigs fed the low protein diets. Another reason that may account for somewhat less effect on carcass quality is that the low protein diet was supplemented with lysine and methionine. Other work at the South Dakota experiment station has indicated an improvement on carcass quality due to supplemental lysine.

Summary

Pigs fed low protein diets, 12% to 110 lb. and 10% from 110 lb. to market weight, supplemented with lysine and methionine to a level equal to that in 16 to 14% protein diets gained slower, required more feed per unit of gain and produced carcasses with more backfat, less percent ham and loin and smaller loin eye areas than pigs fed 16 to 14% protein diets or 14 to 12% protein diets plus supplemental lysine and methionine.

Table 1. Composition of Diets (Percent)

Treatment no.	Weaning to 110 lb.			110 lb. to market wt.		
	1	2	3	1	2	3
Ground yellow corn	763	817	871	823	877	932
Soybean meal (44%)	208	143	87	150	86	29
Dicalcium phosphate	16.5	17.5	18.5	14.5	14.5	15.5
Limestone	5	5	5	5	5	5
Trace mineral salt	5	5	5	5	5	5
Vitamin-antibiotic premix ^a	2.5	2.5	2.5	2.5	2.5	2.5
Lysine-methionine premix	--	10	11	--	10	11
Calculated analysis						
Crude protein, %	16.0	14.0	12.0	14.0	12.0	10.0
Lysine, %	0.81	0.81	0.81	0.66	0.66	0.66
Methionine, %	0.29	0.29	0.29	0.27	0.27	0.27
Calcium, %	0.65	0.66	0.67	0.59	0.58	0.59
Phosphorus, %	0.65	0.65	0.65	0.60	0.58	0.57

^a Provided 1,500 I.U. vitamin A, 150 I.U. vitamin D, 1 mg. riboflavin, 2.5 mg. calcium pantothenate, 7.5 mg. niacin, 50 mg. choline, 5 mcg. vitamin B₁₂ and 5 mg. oxytetracycline per lb. of diet.

Table 2. Growth Performance of Pigs Fed High, Medium and Low Protein Diets of Equal Lysine and Methionine Content

	High protein (16-14%)	Medium protein + lysine and methionine (14-12%)	Low protein + lysine and methionine (12-10%)
No. of pigs ^a	24	24	23
Avg. initial wt., lb. ^b	46.7	47.0	46.9
Avg. final wt., lb.	210.3	210.5	184.3
Avg. daily gain, lb.	1.64	1.59	1.25
Avg. feed cons./day, lb.	5.30	5.35	4.45
Feed/gain, lb.	3.23	3.36	3.55

^a Four replicates of 6 pigs each per treatment. One pig died on low protein diet.

^b Avg. initial weights were 53.3, 41.8, 46.2 and 46.2 lb. for replicates 1, 2, 3 and 4, respectively.

Table 3. Effect of Dietary Protein on Carcass Characteristics

	High protein (16-14%)	Medium protein + lysine and methionine (14-12%)	Low protein + lysine and methionine (12-10%)
No. of carcasses	24	24	14
Cold carcass wt., lb.	153.5	155.0	153.4
Avg. length, in.	30.3	30.4	30.6
Avg. percent ham and loin	37.25	37.95	37.01
Avg. loin eye area, sq. in.	3.70	3.82	3.39