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One of several objectives in a swine feeding program is to make optimum use of the protein in the diet. The balance of amino acids in the ration will be used more for maximum gains and efficiency of feed utilization. The percent crude protein in the ration can be less than present standards, provided the amino acid supply is adequate and present in the proper ratio.

On the other hand, meat type animals require adequate protein for muscle development, which increases the need for more protein in the ration. Because the competition for protein feed will become greater in the future and because the amino acid requirement of the meat type pig is not well defined, more information is needed on feeding amino acids to modern pigs.

Lysine is one of the more limiting amino acids in swine rations, although it is considered adequate in most corn-soy type rations by most nutritionists. When lysine has been added to the ration, the results have not shown a consistent benefit with lysine. In the earlier research at this station there have been good responses with some treatments of lysine in the water, but other times the response has been negligible. One of our objectives is the understanding of the difference in the effects we have observed and to develop a consistent response with lysine. The objective of this trial was to determine the effect of adding different levels of L-lysine hydrochloride in the drinking water when the pigs were fed a corn-soy ration which was lower in protein content than normally recommended at the respective weight of the pigs.

Experimental Procedure

Ninety-eight Yorkshire pigs were randomly allotted into two lots of eight pigs each, except sex was equal in each pen. The six experimental treatments were:

Lots 1 and 7 - Plain water
Lots 2 and 8 - 1 gm. per gallon of L-lysine hydrochloride
Lots 3 and 9 - 2 gm. per gallon of L-lysine hydrochloride
Lots 4 and 10 - 4 gm. per gallon of L-lysine hydrochloride
Lots 5 and 11 - 6 gm. per gallon of L-lysine hydrochloride
Lots 6 and 12 - 4 gm. per gallon of L-lysine hydrochloride plus 2 gm. of DL-tryptophan per 50 gallons of water

All pigs were fed rations in accordance with the schedule shown in table 1. They were self-fed and water was provided ad libitum in 80 gallon tank-type waterers. Feed and water consumption data were recorded. The pigs were confined in houses with adjoining concrete-floored pens.

Table 1. Composition of Rations

Ingredient	Feeding period		
	Start to 75 lb.	75 to 150 lb.	150 to 200 lb.
Shelled corn, lb.	843	890	930
50% soybean meal, lb.	128	80	40
Dicalcium phosphate, lb.	16	18	18
Limestone, lb.	5	3	3
Trace mineral salt, lb.	5	5	5
Vitamin-antibiotic premix[a]	3	3	3
Total	1000	999	999
Crude protein, %	14	12	10

[a] The premix provided 1135 I.U. vitamin A, 340 I.U. vitamin D, 2 mg. riboflavin, 4 mg. calcium pantothenate, 9 mg. niacin, 10 mg. choline chloride, 7 mcg. vitamin B_{12} per pound of ration. The 14% crude protein ration had 10 mg. of chlortetracycline per pound of ration and the 12 and 10% crude protein rations had 5 mg. of chlortetracycline per pound of ration.

Results

A summary of the results is shown in table 2. The control pigs had the slowest daily gain. The pigs receiving 4 gm. of lysine per gallon of water had the fastest gains, which was 8.6% faster than the control pigs. Daily gain did not increase consistently with an increase in the amount of lysine in the water. Gains of pigs receiving 2 gm. per gallon were below that of the group fed 1 gm. per gallon and only slightly above the control group. This difference may be explained in part by greater feed consumption of the group fed the lower level of lysine.

In general, pigs fed more lysine gained faster and required less feed per pound of gain than pigs fed no or little lysine. There did not appear to be any advantage of feeding more than 4 gm. of lysine per gallon of water. Pigs fed 4 gm. or more of lysine per gallon of water required about 19 fewer pounds of feed per one hundred pounds of gain. There was no advantage of adding tryptophan at the level used in the water. Daily water consumption was not affected by the various levels of lysine in the water.

Each pig receiving the water with 4 gm. of lysine per gallon consumed nearly a pound of lysine during the trial or nearly 3.2 gm. per pound of gain. The improved feed efficiency did not quite offset this additional expense at the current price of lysine.

Table 2. Effect of Various Levels of L-lysine in Low Protein Rations

	Trial	Plain water	1 gm. L-lysine gal. water	2 gm. L-lysine H per gal. water	4 gm. L-lysine H per gal. water	6 gm. L-lysine H per gal. water	4 gm. L-lysine + 2 gm. per 50 gal. DL-tryptophan
Lot number		1,7	2,8	3,9	4,10	5,11	6,12
No. pigs	1	8	8	8	8	8	8
	2	8	8	8	8	8	8
Av. init. wt., lb.	1	57.5	58.3	59.5	58.1	58.6	59.5
	2	50.0	50.1	50.3	49.4	48.5	49.1
Av. final wt., lb.	1	200.0	204.4	202.8	202.3	204.2	205.3
	2	200.2	202.6	202.6	202.9	201.5	200.5
Av. daily gain, lb.	1	1.50	1.55	1.51	1.66	1.53	1.59
	2	1.49	1.61	1.51	1.60	1.68	1.58
	Av.	1.49	1.59	1.51	1.63	1.61	1.58
Av. daily feed, lb.	1	4.72	5.09	4.79	5.04	4.79	4.75
	2	4.86	4.94	4.93	4.81	4.94	4.82
	Av.	4.79	5.02	4.86	4.92	4.87	4.78
Feed per lb. gain, lb.	1	3.14	3.28	3.18	3.04	3.13	2.98
	2	3.27	3.08	3.27	3.01	2.94	3.05
	Av.	3.21	3.16	3.22	3.02	3.03	3.02
Av. daily water, gal.	1	1.30	1.29	1.30	1.26	1.33	1.32
	2	1.31	1.30	1.22	1.28	1.21	1.32
	Av.	1.30	1.29	1.26	1.27	1.27	1.32
Av. daily lysine consumed, gm.	1	0	1.2	2.6	5.1	8.0	5.3
	2	0	1.3	2.4	5.1	7.2	5.3
	Av.	0	1.3	2.5	5.1	7.6	5.3