

1982

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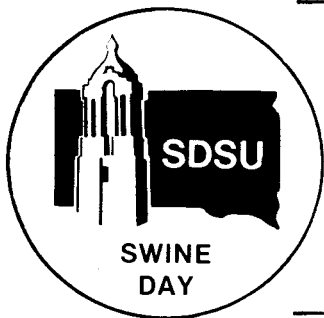
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Wahlstrom, R. C. and Libal, G. W., "Supplemental Potassium in Swine Diets Varying in Lysine Content" (1982). *South Dakota Swine Field Day Proceedings and Research Reports, 1982*. Paper 7.
http://openprairie.sdstate.edu/sd_swine_1982/7

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SUPPLEMENTAL POTASSIUM IN SWINE DIETS VARYING IN LYSINE CONTENT

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SWINE 82-6

Practical type swine diets contain levels of potassium in excess of National Research Council recommendations for this nutrient. However, it has been shown that potassium salts of metabolizable organic acids improved gain and efficiency of pigs fed low lysine diets. Previous work at this station indicated that .4 or .8% of supplementary potassium, from potassium chloride, did not affect performance of young pigs fed a diet containing .85% lysine. These pigs did respond to lysine supplementation, indicating that the .85% lysine level was not sufficient for maximum performance. The supplemental potassium appeared to decrease lysine concentration in the blood plasma and additions of lysine decreased ($P < .05$) plasma potassium.

The objectives of this study were to determine if supplemental potassium, from potassium acetate, would improve performance of pigs fed a diet slightly deficient in lysine and also to compare the performance of pigs receiving potassium from potassium acetate or potassium chloride.

Experimental Procedure

Crossbred weanling pigs, averaging 19.6 lb in trial 1 and 17.7 lb in trial 2, were used in this experiment. In trial 1, 64 pigs were allotted to four replicates of four treatments and the trial was conducted for 26 days. Seventy-two pigs were allotted to six treatments replicated three times in trial 2. This trial was conducted for 35 days. The four treatments in trial 1 were in a 2 x 2 factorial arrangement, with two levels of lysine (.85 and 1.15%) and two levels of added potassium (0 and .4%) derived from potassium acetate. The six treatments in trial 2 included the same four treatments of trial 1 plus two treatments that received .4% potassium, derived from potassium chloride, in diets containing .85 or 1.15% lysine. The composition of the diets is shown in table 1.

Results

The performance of pigs in trial 1 is summarized in table 2. The addition of potassium acetate to the low lysine diet had no effect on average daily gain or feed efficiency. However, pigs fed the high lysine diet gained faster when potassium was supplemented to the diet. This resulted in a significant lysine x potassium interaction. The gains of pigs fed the high lysine diet without potassium were lower than expected and were no better than that of pigs fed the low lysine diets. This appeared to be due to the poor performance of three pigs fed this diet. Therefore, we would suggest the improvement in gains of pigs fed the high lysine, potassium supplemented diet was probably due to lysine and not to potassium supplementation. Feed efficiency was improved ($P < .05$) when diets contained 1.15% lysine. Potassium supplementation did not affect feed/gain at either lysine level.

Table 1. Composition of Diets (%)

Dietary lysine, %	.85	.85	.85	1.15	1.15	1.15
Added potassium, %	0	.4 ^a	.4 ^b	0	.4 ^a	.4 ^b
Ground corn	43.0	42.0	42.2	42.6	41.6	41.8
Oat groats	43.0	43.0	43.0	43.0	43.0	43.0
Meat meal	7.0	7.0	7.0	7.0	7.0	7.0
Fish meal	3.4	3.4	3.4	3.4	3.4	3.4
Soybean meal	3.0	3.0	3.0	3.0	3.0	3.0
White salt	.25	.25	.25	.25	.25	.25
Trace mineral premix ^c	.05	.05	.05	.05	.05	.05
Vitamin-antibiotic mix ^d	.3	.3	.3	.3	.3	.3
L-lysine hydrochloride	--	--	--	.4	.4	.4
Potassium acetate	--	1.0	--	--	1.0	--
Potassium chloride	--	--	.8	--	--	.8

^a From potassium acetate.

^b From potassium chloride.

^c Provided the following ppm of elemental levels to the complete diet: zinc, 100; iron, 75; copper, 7.5; manganese, 25; iodine, .175; and selenium, .1.

^d Provided per pound of diet: vitamin A, 2000 IU; vitamin D, 200 IU; vitamin E, 6.7 IU; vitamin K, 1.3 mg; riboflavin, 2 mg; pantothenic acid, 8 mg; niacin, 10.7 mg; choline, 96 mg; vitamin B₁₂, 8 mcg; penicillin, 25 mg; aureomycin, 50 mg; and sulfamethazine, 50 milligrams.

Table 2. Effect of Lysine and Potassium Acetate on Pig Performance (Trial 1)

Lysine, %	.85	.85	1.15	1.15
Added potassium, %	0	.4	0	.4
Initial wt, lb.	19.6	19.6	19.6	19.6
Final wt, lb ^a	38.3	38.3	37.3	39.5
Avg daily gain, lb ^a	.72	.72	.70	.77
Avg daily feed, lb ^b	1.45	1.48	1.30	1.40
Feed/gain ^b	2.02	2.06	1.88	1.83

^a Lysine x potassium interaction, P<.05.

^b Lysine effect, P<.01.

The results of the second trial are presented by treatment groups in table 3 and summarized by lysine and potassium level and source in table 4. Increasing the lysine content of the diets from .85 to 1.15% resulted in a significant improvement in rate of gain and feed/gain. Pigs fed low lysine diets supplemented with potassium acetate gained 13% faster (.84 vs .74 lb/day) than pigs fed this diet without supplemental potassium. This difference approached significance. Potassium supplementation was without effect when pigs were fed the high lysine diet. When the data for potassium supplementation were combined across lysine levels, there was a small but significant increase in feed/gain due to potassium supplementation.

Table 3. Effect of Lysine and Potassium on Pig Performance (Trial 2)

Lysine, %	.85	.85 ^a	.85 ^b	1.15	1.15 ^a	1.15 ^b
Added potassium, %	0	.4	.4	0	.4	.4
Initial wt, lb	17.7	17.7	17.7	17.7	17.7	17.8
Final wt, lb ^c	43.7	47.1	45.0	52.3	49.5	49.3
Avg daily gain, lb ^d	.74	.84	.78	.96	.91	.90
Avg daily feed, lb	1.48	1.75	1.75	1.76	1.70	1.62
Feed/gain ^e	2.00	2.09	2.26	1.78	1.88	1.79

- ^a From potassium acetate.
- ^b From potassium chloride.
- ^c Lysine effect, P<.01.
- ^d Lysine effect, P<.05.
- ^e Potassium effect, P<.05.

Table 4. Summary of the Effects of Lysine and Potassium on Pig Performance (Trial 2)

	Lysine level, %		Potassium source		
	.85	1.15	None	Acetate	Chloride
Initial wt, lb	17.7	17.7	17.7	17.7	17.7
Final wt, lb ^a	45.3	50.4	48.0	48.3	47.2
Avg daily gain, lb ^b	.79	.93	.85	.88	.84
Avg daily feed, lb	1.66	1.69	1.62	1.73	1.69
Feed/gain ^c	2.12	1.82	1.89	1.99	2.03

- ^a Lysine effect, P<.01.
- ^b Lysine effect, P<.05.
- ^c Potassium effect, P<.05.

Summary

One hundred thirty-six crossbred weanling pigs were used in two trials to study the effect of .4% supplemental potassium on performance of pigs fed diets containing .85 or 1.15% lysine. Potassium acetate (trials 1 and 2) and potassium chloride (trial 2) were the potassium sources used in these 26- and 35-day trials.

Pigs fed diets containing 1.15% lysine gained significantly faster and required less feed/gain ($P < .01$) than pigs fed diets containing .85% lysine. In trial 2, potassium supplementation from potassium acetate or potassium chloride decreased feed efficiency. However, pigs fed potassium acetate as the potassium source in low lysine diets gained somewhat faster than unsupplemented pigs in trial 2 but not in trial 1. Thus, the results of this experiment were inconclusive as to the value of potassium acetate in improving diets low in lysine.