EFFECT OF DOSE OF CHLORATE ON GROWTH PERFORMANCE OF NURSERY PIGS

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Summary

A 14-day growth study was conducted to evaluate the effects of feeding varied levels of chlorate on weanling pig growth performance. A previous experiment with weanling pigs fed diets containing added chlorate (800 ppm) resulted in numerical decreases in ADG, ADFI and F/G as compared to diets with no added antimicrobial, a commonly used antimicrobial (carbadox), or another feed additive, mannanoliogsaccharide. The negative effects of feeding 800 ppm chlorate were confirmed in this study. Additionally, the current trial demonstrated that pigs fed diets containing 200 ppm sodium chlorate had greater ADG, ADFI, and d 14 average weights than pigs fed diets containing 800 ppm sodium chlorate and numerically greater ADG and ADFI than those fed diets without chlorate.

(Key Words: Sodium Chlorate, Antimicrobials, Weanling Pigs.)

Introduction

Oral treatment with sodium chlorate significantly reduced cecal populations of *Salmonella* 16 h after the final dosing with sodium chlorate. In a more recent preliminary report, feeding weaned pigs up to 0.04 g sodium chlorate/kg body weight reduced the number of pathogenic organisms in the intestines by 150-fold. Thus, feeding of sodium chlorate short term appears to offer potential as a preharvest food safety tool to reduce *Salmonella* in the gastrointestinal tract of pigs prior to transport. Based on this data, we hypothesized that feeding chlorate may be used as an alternative to commonly fed antimicrobials. However, feeding sodium chlorate to pigs to enhance growth performance or other physiological parameters has not been extensively evaluated. Additionally, in a study reported elsewhere in this publication, feeding 800 ppm sodium chlorate to weaned pigs reduced feed intake and had a negative impact on growth. Therefore, our objective was to determine if lower rates of dietary sodium chlorate inclusion would affect nursery pig growth performance.

Procedures

A total of 84 pigs (averaging 31.7 lb) were blocked by weight and randomly allotted to one of four dietary treatments (Table 1) in a randomized complete block design at approximately 17 d after weaning. Each pen contained 3 pigs, with 7 replicates (pens) per treatment. Experimental diets were fed in meal form for a total of 14 d. Dietary energy, mineral, and vitamin levels were held constant across all treatments. The dietary treatments included a control (0 ppm sodium chlorate) and three levels of sodium chlorate (200, 400, and 800 ppm). Pigs were weighed and feed disappearance was measured on d 0, 7, and 14 to determine ADG, ADFI, F/G. Data were analyzed using the Mixed procedure of SAS.

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Results and Discussion

Overall (d 0 to 14), pigs fed diets containing 200 ppm sodium chlorate had greater ADG ($P<0.01$) and ADFI ($P<0.01$) than pigs fed diets containing 800 ppm sodium chlorate (Table 2). Generally, ADG, ADFI, and F/G improved linearly as chlorate content of the diets decreased from 800 to 200 ppm ($P<0.01$, $P<0.02$, and $P<0.08$, respectively). Additionally, there were numerical improvements in ADG and ADFI of pigs fed the 200 ppm chlorate compared to those fed the diets without chlorate. At d 14, pigs fed 200 ppm sodium chlorate had increased body weight ($P<0.01$) compared to pigs fed the diet containing 800 ppm sodium chlorate. Also, there was a strong linear trend for d 14 average weights to be increased as sodium chlorate content decreased from 800 to 200 ppm.

The linear decreases in ADG and ADFI confirm the negative effects observed in a separate experiment when feeding 800 ppm chlorate. Interestingly, results from this experiment indicate that feeding chlorate at levels less than 800 ppm may be beneficial in improving ADG and ADFI in nursery pigs. The initial premise for adding sodium chlorate to weanling pig diets was for the chlorate to function as an antimicrobial agent against enteric pathogens. Thus, further work is warranted to determine if feeding lower levels of chlorate (<800 ppm) result in similar production responses as feeding a commonly used antimicrobial such as carbadox.

Table 1. Composition of Diets

	Chlorate, ppm			
	0	200	400	800
Corn	50.735	50.735	50.735	50.735
Soybean meal	27.94	27.94	27.94	27.94
Soy oil	3.00	3.00	3.00	3.00
Monocalcium phosphate, 21% P	1.20	1.20	1.20	1.20
Limestone	0.675	0.675	0.675	0.675
Salt	0.35	0.35	0.35	0.35
Vitamin premix	0.25	0.25	0.25	0.25
Trace mineral premix	0.15	0.15	0.15	0.15
Corn starch	1.00	0.98	0.96	0.92
Sodium chlorate	--	0.02	0.04	0.08
Lysine HCl	0.15	0.15	0.15	0.15
DL-methionine	0.05	0.05	0.05	0.05
Select menhaden fish meal	4.50	4.50	4.50	4.50
Spray dried whey	10.00	10.00	10.00	10.00
Total	100.00	100.00	100.00	100.00

[a]All diets were formulated to contain 1.4% total dietary lysine.

Table 2. Effect of Dietary Sodium Chlorate on Growth Performance of Nursery Pigs[a]

	Chlorate					*P*<	
Item	0	200	400	800	SEM	Chlorate	Linear
D 0 to 14							
ADG, lb	1.28	1.35	1.29	1.19	.05	.07	.01
ADFI, lb	1.86	1.93	1.85	1.76	.07	.10	.02
Feed/gain	1.42	1.43	1.44	1.47	.02	.23	.08
Avg. Weight, lb							
d 0	31.7	31.7	31.7	31.6	1.9	.99	.79
d 7	38.1	38.2	38.3	38.1	2.1	.99	.86
d 14	49.6	50.6	49.7	48.4	2.4	.08	.01

[a]Values are means of seven replicate pens (3 pigs/pen).