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TRACE MINERAL SUPPLEMENTATION OF DIETS
FOR GROWING-FINISHING SWINE

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Until the past few years, most diets for growing-finishing swine contained .5% salt. However, recent research has confirmed that a level of .2 to .25% added salt will meet the dietary sodium and chlorine requirements of the growing-finishing pig fed a grain-soybean meal diet. Some producers rely on trace mineral salt to supply the needed trace minerals to the diet. A reduction in the amount of trace mineral salt added to the diet from .5 to .25% results in only half as much of each of the trace minerals supplemented to the diet.

The study reported herein was designed to evaluate the performance of growing-finishing pigs fed salt containing different amounts of trace minerals at a level of .25% of the diet.

Experimental Procedure

Sixty-four crossbred pigs averaging about 54 pounds were allotted to four treatments replicated four times. Each pen contained one barrow and three gilts. The pigs were housed in a slotted floor, totally enclosed confinement building. The pigs were fed ad libitum a 16% protein corn-soybean meal fortified diet to average pen weights of approximately 120 to 130 pounds and a 14% protein diet from that weight to termination of the experiment at average weights of about 210 pounds. All pigs received .25% salt in their diets. The salt-trace mineral treatments were as follows:

- Treatment 1 - white salt, no trace minerals
- Treatment 2 - low zinc trace mineral salt
- Treatment 3 - white salt plus trace mineral premix
- Treatment 4 - high zinc trace mineral salt

The levels of supplemental trace minerals in the diets are shown in table 1.

Results

Average daily gain, average daily feed and feed/gain data for the growing, finishing and combined periods are summarized in table 2. Average daily gain and weight at the end of the growing period were both significantly greater for pigs fed the trace mineral premix or high zinc trace mineralized salt (treatments 3 and 4) than for treatments 1 and 2 during the 45-day growing period. Average daily feed and feed/gain were not different among treatments during this period.

Table 1. Levels of Supplemental Trace Minerals in Diets (Parts Per Million)

Ingredient	Treatment number			
	1 ^a	2 ^b	3 ^c	4 ^d
Zinc	1	.125	100	25
Manganese	0	6.25	25	25
Iron	0	5.0	75	20
Sulfur	0	2.5	0	5.5
Copper	0	.825	7.5	2.0
Iodine	0	.175	.175	.5
Cobalt	0	.0625	0	.0625
Selenium	0	0	.1	0

^a Five lb white salt per ton.

^b Five lb low zinc salt per ton.

^c Five lb white salt and 1 lb trace mineral premix per ton.

^d Five lb high zinc salt per ton.

Table 2. Effect of Trace Mineral Supplementation on Swine Performance^a

Items	Trace mineral			
	White salt	Low zinc trace salt	premix white salt	High zinc trace salt
Initial wt, lb	53.7	53.8	53.8	53.8
Mid-wt, lb	123.0 ^b	120.2 ^b	131.4 ^c	128.2 ^c
Final wt, lb	207.8	206.5	212.4	211.9
<u>Growing Period</u>				
Avg daily gain, lb	1.54 ^b	1.47 ^b	1.72 ^c	1.65 ^c
Avg daily feed, lb	4.32	4.12	4.47	4.51
Feed/gain	2.83	2.81	2.60	2.75
<u>Finishing Period</u>				
Avg daily gain, lb	1.60	1.44	1.61	1.52
Avg daily feed, lb	6.27	5.62	5.30	5.46
Feed/gain	3.95 ^b	3.90 ^b	3.30 ^c	3.60 ^{bc}
<u>Growing-Finishing Period</u>				
Avg daily gain, lb	1.57	1.45	1.66	1.58
Avg daily feed, lb	5.37	4.97	4.89	5.03
Feed/gain	3.44 ^b	3.42 ^b	2.95 ^c	3.19 ^{bc}

^a Four lots of four pigs each per treatment.

^{b,c} Means with unlike superscripts are different (P<.05).

There were no significant differences in average daily gains during the finishing or combined growing-finishing periods, although pigs fed the low zinc trace mineralized salt had the slowest gains throughout the experiment. Feed/gain was less ($P < .05$) for pigs fed the trace mineral premix (treatment 3) than for pigs in treatments 1 and 2 during both the finishing and combined growing-finishing periods.

The levels of trace minerals in the low zinc trace mineralized salt provided relatively low levels of supplemental trace minerals to the diet and were of no benefit to the pigs as indicated by the similar performance of pigs in treatment 1 fed white salt without trace minerals and treatment 2 fed the low zinc salt. The trace minerals zinc, manganese, iron and copper were considerably higher in diets of treatments 3 and 4. It is not possible to identify if one trace mineral was more responsible than another for the improved performance of pigs fed these two diets. However, according to the National Research Council recommendations for trace minerals, zinc is the mineral element that is most deficient in diets 1 and 2. Our recommendation is that a minimum of 50 parts per million (ppm) of supplemental zinc be included in diets of growing-finishing pigs.

Summary

Sixty-four weanling pigs averaging 54 lb were used to study the effect of trace mineral supplementation of a corn-soybean meal fortified diet. Diets contained 16% protein to 120-130 lb and 14% protein from 120-130 to 210 pounds. All diets contained .25% salt.

Pigs fed 1 lb of a trace mineral premix per ton that supplied 100 ppm of zinc, 25 ppm manganese, 75 ppm iron, 7.5 ppm copper, .175 ppm iodine and .1 ppm selenium gained faster during the growing period and required less feed/gain in the finishing and combined periods than pigs fed no supplemental trace minerals or a low zinc trace mineralized salt. There was no significant difference in performance of pigs fed a high zinc trace salt that supplied 25 ppm of zinc to the diet and those pigs fed the trace mineral premix.