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Influence of SQM Zinc in a nursery program compared to therapeutic levels of zinc oxide/zinc sulfate

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A therapeutic level of zinc, provided in the form of zinc oxide, is now the standard to reduce the incidence of diarrhea, while increasing performance in baby pigs. As the swine industry evolves, greater concerns are being raised about excessive mineral feeding to swine, both therapeutic and normal fortification, and its overall impact on the environment. Previous research with zinc comparing oxides to organic sources has had mixed results on overall efficacy. In those studies, the level of zinc from organic sources was only a small fraction of the zinc provided in the oxide form. The objective of this study was to compare the performance benefits of SQM Zinc with that of zinc oxide in nursery diets for baby pigs at SQM zinc levels higher than previously examined.

Forty-eight pens were sorted into 24 blocks, with approximately 25 pigs randomly sorted within sex per pen in a weaning-to-finish barn. Pigs were fed diets for 42 days in a 3-phase system where phase 1 was 0-7 days, phase 2 was 8-21 days and phase 3 was 22-42 days. Dietary treatments were Control or SQM Zinc (fed in phases 1 and 2). The Control was formulated using zinc sulfate and zinc oxide to provide 2200 ppm zinc in both phase 1 and 2 diets. SQM Zinc treatments were formulated to provide 60% of the Control zinc in phase 1 and 2 diets. Phase 3 diet was formulated to have 150 ppm zinc from zinc sulfate. All diets were corn and soybean meal based diets, formulated to meet or exceed NRC requirements for all other nutrients and in meal form (Table 1).

All pigs were vaccinated for PCV2, M. hyopneumoniae, Lawsonia and Salmonella. Pigs were given standard treatments for illness throughout the duration of the trial. Mortality and pen removals were weighed and information was recorded pertaining to the time of removal and the reason for removal/death. Pig weights and feed intake was measured at 7, 21 and 42 days.

Average daily gain (ADG) and feed over gain (F/G) were recorded up until the time when each pen was completely emptied. Fecal scores by pen were collected at days 1, 3, 5, 7, 14, and 21 of the trial. A scoring system of 0-4 was used As follows; 0 – no scours in the pen, 1 – 25% of the pen has a scour, 2 – 50% of the pen has a scour, 3 – 75% of the pen has a scour, and 4 – 100% of the pen has a scour.

Data were analyzed as a randomized complete block design with pen as the experimental unit. Proc Mix of SAS with block as a random effect and treatment as a fixed effect was used. Removals were analyzed using GLMMix procedure. Results were considered significant at $P \leq 0.05$ and considered a trend at $P > 0.05$ and $P \leq 0.10$.

Table 1. Composition of nursery diets

	Phase 1		Phase 2		Phase 3
Item	Control	SQM	Control	SQM	
Dry matter, %	97.89	92.11	92.41	91.32	91.39
Crude protein, %	21.9	21.8	23.1	22.9	24.8
ADF, %	2.3	2.5	3.6	3.4	5.9
TDN, %	83.6	83.6	82.7	81.9	79.4
Ca, %	0.94	0.91	0.93	0.91	0.74
P, %	0.68	0.67	0.68	0.64	0.6
K, %	1.25	1.23	1.31	1.29	1.12
Mg, %	0.16	0.16	0.19	0.18	0.2
Zn, ppm	2273.4	1347.7	2222.9	1333.9	156.5
Fe, ppm	210	294	316	231	211
Mn, ppm	83	87	79	64	63
Cu, ppm	201.4	199.5	222.2	221.5	22.3

Results of the nursery pig performance are presented in Table 2. Nursery pig performance in the phase one period showed a significant improvement in ADG and average daily feed intake (ADF) for Control pigs, while feed efficiency (F/G) showed a significant improvement for pigs fed SQM. This difference in performance appears to be driven by the reduction in feed intake which only 63% of the Control for the pigs receiving the

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SQM diets. This response was reversed during the phase 2 feeding period. During phase 2, those pigs receiving the SQM diet has significantly greater ADG, with a tendency for an increase in ADF which resulted in a non-significant improvement in feed efficiency. During phase 3 feeding there were no significant responses or trends between treatments although there was numeric advantages to the pigs that had been on the SQM treatment. When evaluating overall performance, pigs receiving the SQM treatment had gains and feed intakes similar to the Control pigs, but there was a significant overall improvement in feed efficiency that carried on through the entire study for the SQM zinc treatment.

Table 3 shows the results of the fecal scoring. There were no significant effects of either treatment on the fecal scores of the baby pigs. Although it can be observed that fecal scoring of the SQM treatment pigs was basically lower in all time periods compared to the Control pigs.

The results of this study indicate that the use of SQM zinc at 60% of the inclusion rate of therapeutic zinc oxide and fortification with zinc sulfate resulted in baby pig performance that was superior at times in the nursery phase and overall resulted in more efficient growth for these pigs through 42 days of feeding with similar growth rates. This study indicates that providing SQM zinc in the nursery phase of pigs has the potential to be an environmentally beneficial program along with optimizing the overall performance of the pigs.

Table 2. Performance of nursery pigs

Item	Control	SQM	SE	p-value
Initial weight, lbs	11.65	11.68	0.26	0.22
Day 0-7				
Final weight, lbs	16.77	16.30	0.37	0.02
Daily gain, lbs	0.70	0.62	0.02	0.02
Feed intake, lbs	0.52	0.33	0.04	<0.01
Feed/Gain	0.75	0.53	0.07	0.04
Day 8-21				
Final weight, lbs	32.92	33.26	0.59	0.36
Daily gain, lbs	0.97	1.01	0.01	0.01
Feed intake, lbs	1.41	1.44	0.02	0.07
Feed/Gain	1.46	1.44	0.02	0.46
Day 22-42				
Final weight, lbs	66.99	67.47	0.94	0.38
Daily gain, lbs	1.61	1.62	0.02	0.27
Feed intake, lbs	2.45	2.45	0.03	0.97
Feed/Gain	1.52	1.51	0.01	0.30
Overall 1-42 days				
Daily gain, lbs	1.22	1.23	0.02	0.37
Feed intake, lbs	1.76	1.74	0.02	0.34
Feed/Gain	1.44	1.41	0.01	0.01
Removals, %	1.82	2.00	0.51	0.79

Table 3. Scour score by treatment

Item	Day 1	Day 3	Day 5	Day 7	Day 14	Day 24
Control	0.92	0.96	1.17	0.00	0.00	0.29
SQM	0.71	0.75	0.71	0.04	0.00	0.21

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