Influence of SQM Zinc on broiler performance when fed at different levels in the diet, comparing with Zinc sulfate.

Summary

The mineral requirement of livestock is determined by the amount of mineral that is required for growth and for maintenance. This is the metabolizable or net requirement that an animal has for a given mineral. The dietary requirement is determined by the amount of a mineral that the animal needs as well as the digestibility of that mineral from feedstuffs and supplemental sources within the diet, as well as any compounds within the diet or environment that can influence the digestion and absorption. Previous research we have conducted showed that factors or compounds within cottonseed hulls will reduce the absorption of zinc from the diet and an inorganic supplemental source. This decrease in absorption was not evident when zinc was protected by the "polytransport" technology of SQM. The objective of the research reported here is to evaluate the dietary supplemental level required for optimum growth and feed efficiency when either zinc sulfate or SQM zinc was used as the sole supplemental source in the diet.

Materials and methods

Performance study

A 42-d performance study was conducted utilizing 2640 Straight Run Broiler chicks in 88 pens containing 30 chick/pen. Each pen contained 1 water fountain and a 50 lb capacity feed tube. Pen density provided 0.67 ft^2 per bird initially. Prior to trial start all pens were carefully inspected to ensure that there were no openings to allow for pen to pen migration by chicks. Each pen had approximately 3 inches of new wood shavings at Day 0. The temperature was checked and recorded daily. Continuous lighting was provided.

Bird weight was measured at the initiation of the study, midpoint of the study (21 days) and completion (42 days). Feed efficiency was calculated based on total pen bird weight and total feed intake throughout the 42 day study. Birds were monitored daily for morbidity and mortality.

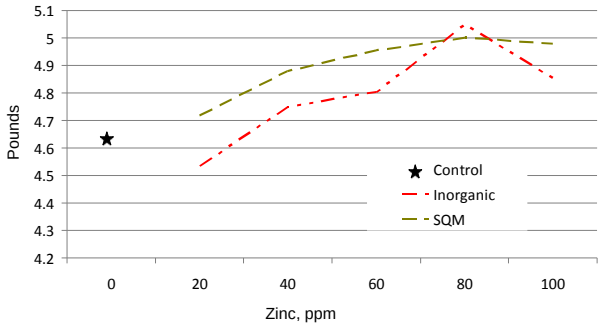
Diets were formulated to contain 20% crude protein, 1425.0 Kcal ME/lb, 3.7% fat, 0.95% calcium, 0.43% phosphorus, 1.07% digestible lysine, and 0.51% digestible methionine. The normal diet (Corn/Soy) in these trials was formulated using ground corn and soybean meal (47.5% CP) as the base with the remainder of the diet containing soybean oil, limestone, dical, salt, choline chloride, vitamins, Na bicarb, lysine, DL-methionine and selenium nitrate. The trace mineral of interest in the study was zinc provided by either an inorganic sulfate source or SQM polysaccharide protected source. The levels of zinc evaluated were 0 ppm, 20 ppm, 40 ppm, 60 ppm, 80 ppm or 100 ppm. Copper and manganese level were set at 10 and 25 ppm.

Table 1. Final weight and performance of broilers fed varying levels of zinc from different sources.

	Level					
Source	0	20	40	60	80	100
Bird weight, lbs						
Control	4.641^{ab}					
Inorganic		4.535^{a}	4.748^{abcd}	4.803^{bcde}	5.050^{f}	4.853^{bcdef}
SQM		4.716^{abcd}	4.877^{bcdef}	4.953^{cdef}	4.999^{ef}	4.979^{def}
Feed efficiency, feed/gain						
Control	1.942^{d}					
Inorganic		1.908^{cd}	1.887^{bcd}	1.870^{abcd}	1.805^{ab}	1.809^{ab}
SQM		1.935^{d}	1.864^{abcd}	1.795^{a}	1.843^{abc}	1.805^{ab}

^{abcdef} **Means with unlike superscripts differ P<0.05**

Figure 1. Influence of dietary zinc level and source on broiler final weight, lbs

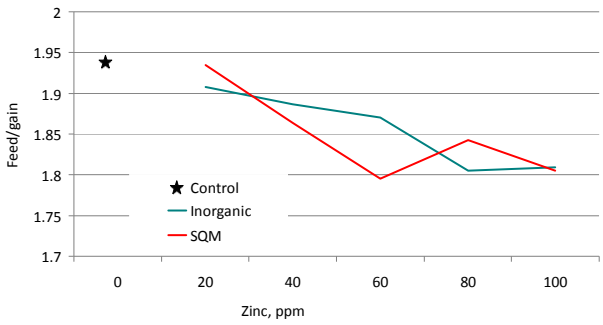


Statistical analysis was conducted using NCSS ANOVA with treatment and two-way interactions evaluated for statistical significance.

Results and discussion

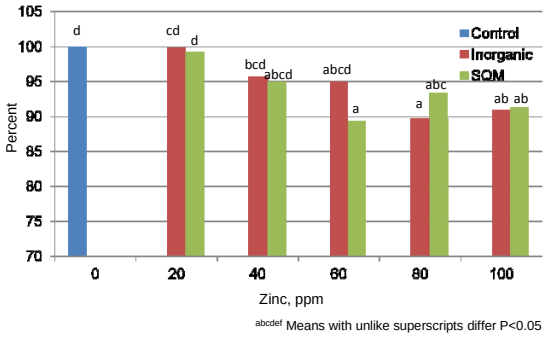
Table 1 shows the final bird weight and feed efficiency from this study. The data in the table shows the degree of significance and is color coded. The data breaks out into 3 general groupings where the poorest performance is shown in blue, intermediate performance in green and best performance in red. Statistically, the significance between treatments only occurs between the red and blue means. The highest bird weights were obtained by the zinc sulfate at 80 ppm and the SQM zinc at all the levels greater or equal to 60 ppm. If one looks at Figure 1, which graphically shows the birds 42 days weights by source and level of zinc in the diet, one

Figure 2. Influence of dietary zinc level and source on broiler feed efficiency.



observes that the 80 ppm zinc from zinc sulfate looks to have caused an abnormal performance in the birds. Looking at both lines for SQM zinc and zinc sulfate one would have expected a smooth progression producing a quadratic response. That was

Figure 3. Influence of dietary zinc level and source on cost/unit of gain, relative to Control.



abcdef Means with unlike superscripts differ P<0.05

observed for the SQM zinc but it appeared to spike for the zinc sulfate at 60 ppm.

The means for feed efficiency are presented in the same format. Optimum feed efficiency was obtained with levels of zinc sulfate equal to or greater than 80 ppm, whereas when SQM zinc was used the most efficient feed efficiency began at 60 ppm zinc.

Figure 3 shows the economics for this study based on final weight and feed efficiency. Birds receiving the diet with SQM zinc at levels greater than or equal to 60 ppm along with the zinc sulfate diets with zinc higher than 80 ppm had the best economic performance in this study. On a strict numerical basis, those birds receiving the SQM zinc at 60 ppm had the best overall economic performance.

Conclusion

The results from this study indicate that the use of zinc from an organic source, such as SQM zinc, will provide the highest level of live animal performance. The additional cost of using an organic source such as SQM has been shown to be offset by the ability to reduce the level of incorporation. Indicating overall greater bioavailability and delivery to the animal along with providing zinc to optimize the bird's performance and efficiency.

Study location

This study was conducted at the Virginia Diversified Research Center, Harrisonburg, VA

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