

Can dietary zinc help pigs cope?

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Modern pork production systems are continually improving their efficiency of producing pork. Efficiency of production has improved mainly because each sow produces a larger litter than 10 or 15 years ago and pigs are raised to much heavier body weights (30 to 50 pounds) than previously. These improvements in biological efficiency have occurred in barns that have not increased in size to keep pace with the improvements in productivity. Consequently, pigs may become crowded in pens as they near market weight. Often, but not always, crowded pigs can display signs of chronic stress which can depress growth rate and immunity of pigs.

There are several possible solutions that could decrease the negative consequences of crowding. Producers could simply stop implementing technologies that improve production efficiency. Yet, this hardly seems reasonable given the economic and environmental demands for efficient use of resources. Pork producers could just build more barns to accommodate the increased production. This is a viable solution but requires a thorough economic analysis to ensure that the increased fixed cost associated with an additional barn will be covered by the revenue generated when pigs grow faster in the un-crowded conditions. Thirdly, farmers might be able to use a nutritional approach to help pigs cope with the stresses imposed by crowding.

Zinc is a trace mineral that is required in all pig diets. Zinc plays an important role in maintaining a functioning immune system, supporting muscle growth and wound healing, and ensuring proper reproductive functions. Zinc has been shown to help animals adapt to stressful conditions. So, we wondered if additional supplements of zinc in the diet over what is normally included would help pigs withstand the stresses imposed by crowded pens and ultimately improve pig performance under crowded conditions.

In our experiment conducted at the West Central Research and Outreach Center, we used 636 pigs assigned to 5 different treatments beginning at about 50 pounds body weight until pigs were marketed at about 290 pounds. The Control treatment included pigs housed in un-crowded conditions (7.9 square feet of floor space per pig) and fed corn-soybean meal based diets that contained the recommended amount of zinc (60 parts per million). The Crowded treatment included pigs housed in crowded conditions (6.5 square feet of floor space per pig) and fed exactly the same diet as Control pigs. Growth rate of the crowded pigs was significantly less (2.01 vs. 2.13 pounds per day) than that of the un-crowded pigs, as we expected. The remaining three treatments all housed pigs in crowded conditions but offered pigs additional dietary zinc at 40 or 80 parts per million from a highly digestible organic zinc source (amino acid chelated zinc) or a commonly-used inorganic zinc source (zinc sulfate). The Crowded control treatment demonstrated that pigs were stressed to the point that growth performance suffered. So, we could properly test if additional dietary zinc would help alleviate the crowding-induced stress and improve pig performance.

Only in the last two weeks of the finishing period when pigs were the most crowded were daily weight gain of pigs and efficiency of weight gain improved with addition of the organic

zinc source. However, over the entire experiment, neither zinc source nor level of additional zinc improved growth performance of pigs compared with pigs that received no extra dietary zinc. We also measured carcass characteristics (backfat depth, loin eye area, fat-free percent lean) and quality of loin chops (drip loss, marbling score, color measures) and found that neither crowding nor additional zinc affected these traits.

In summary, we learned that supplemental dietary zinc does not seem to help pigs cope with crowded conditions often experienced in the finishing period. Pork producers' best strategy to alleviate the negative effects of crowding are to continue marketing 2 to 5 of the heaviest pigs in each pen a couple weeks before marketing the rest of the pigs. This practice, known as "topping pens", frees up space for the remaining pigs and reduces the effects of crowding. Topping pens makes good sense from economic, pig performance, and pig welfare perspectives.

For more information about swine nutrition studies at the West Central Research and Outreach Center, visit <https://wcroc.cfans.umn.edu/research-programs/swine/nutrition>.