

Zinc's negative effects on mineral digestibility can be mitigated, study shows

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Researchers at the University of Illinois have shown that a common strategy for reducing postweaning diarrhea in pigs may have negative effects on calcium and phosphorus digestibility, and are suggesting management practices to counteract the effects.

The biological requirement for [zinc](#) in growing [pigs](#) is approximately 50 mg/kg body weight. However, pharmacological levels of zinc—2,000 to 3,000 mg/kg—are sometimes included in diets fed to pigs after weaning. The high levels of zinc help to prevent postweaning diarrhea, but are not without drawbacks.

"Zinc competes with [calcium](#) for absorption in the small intestine of the pig," says Hans H. Stein, professor in the Department of Animal Sciences at U of I. "In addition, zinc can form complexes with phytate molecules, which prevents them from being hydrolyzed by phytase to release phosphorus. Therefore, if zinc is included at pharmacological levels in the diets, it can reduce calcium and phosphorus digestibility."

Stein led a team of researchers to determine if pharmacological levels of [zinc oxide](#) in pig diets affect the ability of microbial phytase to improve calcium and phosphorus digestibility. They fed growing barrows diets containing either 0 or 2,400 mg/kg zinc in the form of zinc [oxide](#), along with either 0, 1,000 or 3,000 units of phytase (FTU) per kilogram.

Standardized total tract digestibility (STTD) of calcium was 70.0 percent for pigs fed diets containing no zinc oxide and no phytase. Apparent

total tract digestibility (ATTD) of phosphorus in the same diets was 61.5 percent. However, when zinc oxide was included in the diets, those values dropped to 67.2 percent for STTD of calcium and 55.6 percent for ATTD of phosphorus.

Adding microbial phytase improved calcium and phosphorus digestibility in all diets. However, the improvement in digestibility was reduced in diets containing zinc oxide. In the diets without zinc oxide, adding 3,000 FTU of phytase increased the STTD of calcium by 16 percent, but the increase was only 9.7 percent in the high zinc diets. Adding 3,000 FTU of phytase increased the ATTD of phosphorus by 31 percent and 21 percent, respectively, in diets without and with zinc oxide.

Stein offered guidelines for producers based on the new research.

"If pigs need pharmacological levels of zinc, the calcium and phosphorus in the diets may need to be increased by 4 and 9.5 percent, respectively, for 15 kg pigs. Alternatively, diets can be supplemented with microbial phytase to prevent reduced absorption of calcium and phosphorus, but the efficacy of phytase will be reduced."

The paper, "Effects of zinc oxide and microbial phytase on digestibility of calcium and [phosphorus](#) in maize-based diets fed to growing pigs," is published in the *Journal of Animal Science*.

More information: L. Blavi et al, Effects of zinc oxide and microbial phytase on digestibility of calcium and phosphorus in maize-based diets fed to growing pigs, *Journal of Animal Science* (2017). [DOI: 10.2527/jas.2016.1149](https://doi.org/10.2527/jas.2016.1149)

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