

# A diet lacking in zinc is detrimental to human and animal health

June 9 2016

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Credit: AI-generated image ([disclaimer](#))

The trace element zinc has an impact on the essential metabolic functions of most living organisms. New research carried out by the Chair of Animal Nutrition at the Technical University of Munich (TUM) has found that even minimal zinc deficiency impairs digestion, albeit without any typical symptoms such as skin problems or fatigue. Hence,

short-term zinc deficiency in the diet should be avoided.

The test series established that even slight [zinc deficiency](#) in an animal's diet impedes pancreatic digestive activity and results in significant digestive impairment, even at an early stage. The study undertaken by Daniel Brugger of the Chair of Animal Nutrition at TUM was recently published in the *British Journal of Nutrition*.

Scientist Brugger charted a new path since all previous studies had compared the functions of animals with clinical zinc deficiency to those of animals that had adequate amounts of this trace element in their bodies. "It is important to note that, in nature, clinical zinc deficiency does not really occur, neither in animals nor in humans", explains lead author Brugger. Hence, Brugger carried out his study on animals with short-term or subclinical zinc deficiency. As the trace element only exists in small amounts in an organism, it has to be consumed by way of nutrition. In piglets, for instance, a clinical or manifest zinc deficiency can - under feeding conditions applied in practice - only be achieved after about ten days, explains the TUM scientist. This is why he ended his test series early, after just eight days.

## **How does the metabolism react to a dwindling zinc deposit?**

The unnoticed start of zinc depletion occurs without any visible symptoms, but minute changes can be identified in the liver and in the blood. For the purpose of this study, piglets which had just been weaned were fed a diet containing different amounts of zinc to develop early-stage zinc deficiency. This was the only way for the scientists to trace and analyze what effects dwindling zinc deposits would have on the animals' metabolisms. On one hand, it was observed that the body tried to absorb zinc more efficiently, while on the other, it reduced pancreatic

zinc excretion. Since clinical zinc deficiency reduces the test animals' appetite, "various hypotheses were derived, for example, that zinc deficiency had a direct impact on the vagus nerve. The real reason, however, may be much simpler: the accumulation of undigested food inside the gastrointestinal tract due to zinc deficiency results in feeling less hungry", says Brugger.

## **The pancreas requires zinc for digestion**

The pancreas is the control center for food digestion and energy homeostasis in the body. It pumps zinc into the gastrointestinal tract in order to maintain a consistent zinc level. Conversely, if an organism is depleted of zinc, it reduces its pancreatic zinc excretion to a minimum. The starting point for Daniel Brugger's study was the hypothesis that this mechanism may be related to digestion.

Feed digestion is of enormous importance for growing livestock and especially the first few weeks after young animals are weaned from their mothers are of crucial importance. This is a factor that must not be underestimated by farmers.

"We proved that there is a direct correlation between the amount of digestive enzymes inside the pancreas and zinc levels in the organism as a whole", explains Brugger. "Even short intervals of zinc deficiency in the diet should therefore be avoided. Given the similarities between a pig's organism and the human organism, we may draw the following conclusion when applying our results to the human body: an egg or two more once in a while can do no harm." Brugger advises vegans, vegetarians and older people to monitor their zinc intake. Among other things, a subclinical zinc deficiency in humans has been attributed to increased levels of inflammation markers and reduced immunocompetence.

**More information:** Daniel Brugger et al, Subclinical zinc deficiency impairs pancreatic digestive enzyme activity and digestive capacity of weaned piglets, *British Journal of Nutrition* (2016). [DOI: 10.1017/S0007114516002105](https://doi.org/10.1017/S0007114516002105)

Provided by Technical University Munich

Citation: A diet lacking in zinc is detrimental to human and animal health (2016, June 9) retrieved 19 April 2024 from <https://medicalxpress.com/news/2016-06-diet-lacking-zinc-detrimental-human.html>

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