# Feeding pigs with low trace mineral levels

In animal production, zinc and copper are supplemented above the requirements due to their low retention rate. This can result in environmental risks and moreover these resources are non-renewable. Which leads to the question as to whether it is possible to reduce supplementation without impacting animal performance.

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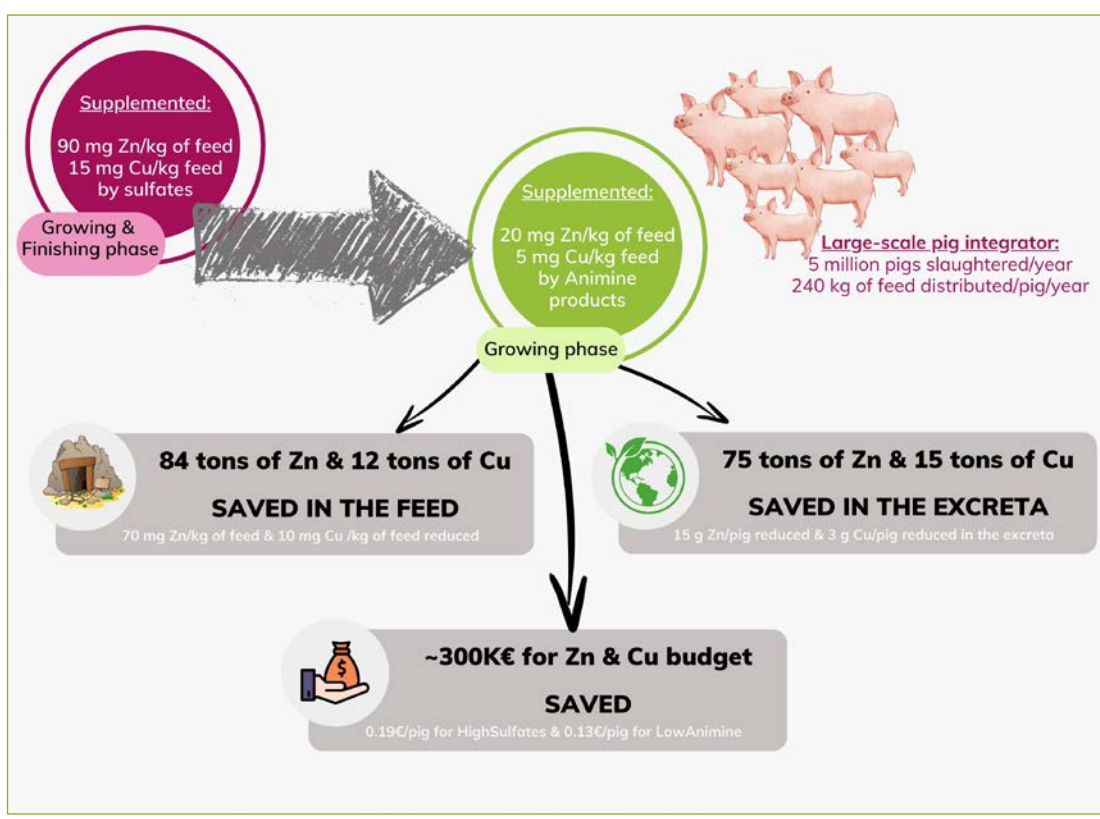
Trace minerals are critical for supporting normal physiological functions in pigs, but their requirements decrease as pigs get older. The advancement in phytase enzymes plays a significant role in this context. Newer generations of phytase not only enhance the release of native phosphorus from phytate in feed but also facilitate the release of other essential minerals, which are otherwise bound in mineral-phytate complexes. Furthermore, in fattening pigs, different experiments have confirmed that the reduction or complete removal of trace mineral premixes may not negatively affect performance (see *Table 1*)

Among the studies listed, none observed a reduction in performance. This may be attributed to two main points: the low mineral requirement of older animals, as no study started the depletion in the nursery phase; the low sanitary pressure in some research facilities, with for example a small number of pigs per pen. Although older studies haven't included information on phytase inclusion, it is known that by using advanced phytase and highly bioavailable sources of trace minerals, it becomes possible to reduce supplemental trace minerals without compromising the growth of the animals.




**The benefits of reducing copper and zinc in pig feed**

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## Trace minerals: environment and performance

It is well documented that excessive excretion of minerals such as Cu and Zn can lead to accumulation in soil and water, which negatively impacts ecosystems. For more than 25 years, the European Food Safety Authority (EFSA) and the European Commission have been reviewing the maximum authorised levels for Cu and Zn in animal feeds. Nowadays, the levels are set at 25 mg Cu and 120 mg Zn/kg in feeds for fattening pigs, which is higher than some of the values reported in *Table 1*. There are still some safety margins as we need to consider the heterogeneity of field conditions and the role of these minerals in digestive health and the immune system.

For this reason, it is crucial to find a balance between minimising environmental impact and maintaining mineral status. To illustrate that, a recent trial conducted at INRAe demonstrated that reducing Cu and Zn levels from the EU-regulated amounts (around 120 mg/kg Zn and 25 mg/kg Cu supplemented by sulfates) to lower levels (around 20 mg/kg Zn and 5 mg/kg Cu supplemented by HiZox and CoRouge, respectively) resulted in a more than 50% reduction in mineral excretion (*Figure 1*). This significant decrease highlights the potential for environmental benefits through careful management of trace mineral supplementation levels. This experiment also showed that using highly bioavailable sources of trace minerals (monovalent Cu, CoRouge and potentiated Zn, HiZox; Animine, France) did not impair growth performance or the mineral status of the animals

## Simulation of the benefits in the field

To simulate the benefits of the described feed strategy for one large-scale pig integrator, the following details were considered:

- 5 million pigs slaughtered/year.
- FCR around 2.5.
- 240 kg of feed/pig/year.
- Growing phase:
  - o High sulfates: Supplementation of 90 mg Zn and 15 mg Cu/kg from sulfates.
  - o Low animine: Supplementation of 20 mg Zn/kg and 5 mg Cu/kg using HiZox and CoRouge, respectively.
- Finishing phase:
  - o High sulfates: same as growing.
  - o Low animine: withdrawal of supplementation, as the use of highly bioavailable Zn and Cu sources in the growing phase would allow the pigs to keep their mineral status in the finishing phase.

Using the software siMMin these inputs were used to estimate excretion for both strategies. The simulations showed that it is possible to reduce Zn excretion from 29 g to 14 g/pig. For Cu, the expected reduction is from 10 g Cu to 7 g Cu excreted/pig.

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In the large-scale context, the benefits of this reduction can be even more significant (*Figure 1*): from an environmental point of view, it would reduce the use of non-renewable resources and the mineral excretion; from an economic point of view, the costs associated with the use of high-quality sources would be reduced by the end of the production cycle.

**To reduce the levels of zinc and copper in pig feed it is essential to use highly bioavailable sources.**

## Conclusion

Reducing copper and zinc in pig feed, particularly during the growing-finishing phases, appears to be a viable strategy. To successfully implement it, it is essential to utilise highly bioavailable sources of copper and zinc, which can help to preserve mineral status and farm productivity while minimising overall usage.

*References available upon request*

**Table 1 – Effect of zinc and copper reduction or withdrawal from pig's diets.***

| Initial BW, kg | N° pigs/pen | Phytase | Zinc supplementation,mg/kg | Copper supplementation,mg/kg | Impact on growth performance |
|---|---|---|---|---|---|
| 86 | 8 | ? | ~100 → 0 | NA | NS |
| 94 | 10 | ? | 150 → 0 | 17 → 0 | NS |
| 21 | 4 | ? | 60 → 30 | 150 → 75 | NS |
| 65 | 1 | ? | ~120 → 0 | ~7 → 0 | NS |
| 83 | 6 | ? | ~40 → 0 | ~5 → 0 | NS |
| 25 | 1 | Y | 120 → 30 | 25 → 5 | NS |

**References available upon request*