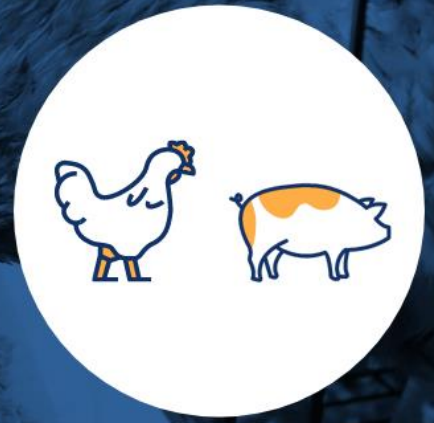


Use of chelates of copper and zinc (emissions of metals)



Last update: 2 June 2023

- **Type of challenge:** Environment.
- **Challenges:** Soil contamination (metals); resources management (nutrient losses).
- **Action:** Decreasing zinc and copper emissions.
- **Animal category:** All species, especially monogastrics.
- **Technique:** Addition of chelates of zinc and copper (copper or zinc proteinates, copper or zinc amino acid complex) authorized as feed additives in the compound feed (complete or complementary) combined with a reduction of the amount of trace-elements added.
- **Mode of action:** In comparison to inorganic minerals, proteinates can facilitate passage of the mineral ion through the stomach and aid in its absorption in the gut (a process of hydrolysis and direct absorption into the blood at the intestinal brush border; inorganic mineral forms have a tendency to produce reactive ions during passage through the stomach, binding indiscriminately to other dietary components (non-digestible fibres for example), passing through the intestine and subsequently excreted into the environment.
- **Potential efficacy:** There are a number of parameters impacting on the potential bioavailability of trace-elements whether organic or inorganic; chelated forms are on average more bioavailable than inorganic forms but not always; copper amino acid complex is between 0.96 and 1.28 times more bioavailable than cupric sulphate; zinc proteinates are between 0.7 and 2 times more bioavailable than zinc sulphate.
- **Nature of evidence of efficacy:** Peer-reviewed scientific publications (meta-analysis).
- **Factors impacting on efficacy:** Breed; feed composition; level of phytates; levels of calcium and phosphorous; types of organic form; this makes the predictability of bioavailability more complicated and consequently the determination of the safe margin of reduction of the total amount of trace-elements.
- **Mode of use:** Incorporated into a compound feed or a complementary feed, including boluses for grazing animals.
- **Requirements / limitations:** The substance must be added in a mixture by a registered feed business operator applying HACCP (Regulation (EC) No 183/2005); trace-element chelates of protein hydrolysates are expected to be authorized in organic farming soon upon condition that the protein is not of GM origin.
- **Economic consequences:** The use of organic trace-elements is an extra-costs, not always compensated by the effect on broilers' performance.
- **Other considerations:** Improved resistance to necrotic enteritis; lower antagonism between copper and zinc when in organic forms.

▪ **References:**

- Byrne *et al.* (2022). *Relative Bioavailability of Trace Minerals in Production Animal Nutrition: A Review*. *Animals* 2022, 12, 1981. <https://doi.org/10.3390/ani12151981>
- EFSA [opinions](#) on several organic forms of trace-element compounds
- Schlegel *et al.* (2012). *Bioavailability of zinc sources and their interaction with phytates in broilers and piglets*. *Animal* Volume 7, Issue 1, 2013, p. 47-59. <https://doi.org/10.1017/S1751731112001000>

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