Effect of a chelated source of copper on growth performance and tissue copper concentration in weaned piglets

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Copper (Cu) can be added to animal feed in an inorganic form, for example CuSO4, or in the form of a chelate. MINTREX® Cu is a chelate of Cu in which the hydroxy analogue of methionine (2-hydroxy-4-(methylthio)butanoic acid) is the ligand. In addition to Cu, the chelate is also a source of methionine activity in the diet. The objective of the study was to investigate the effect of the chelate on growth performance and Cu bioavailability in weaned piglets. 240 weaned piglets (26 days of age) were allocated to one of three dietary treatments with 8 replicates per treatment and 10 piglets per pen. The treatments were 6 mg/kg Cu from CuSO4 (Trt 1, Control), 170 mg/kg Cu from CuSO4 (Trt 2) and 170 mg/kg from MINTREX® Cu (Trt 3). Methionine levels were balanced across treatments to account for the methionine activity in the chelate. Piglets fed the chelated source grew 9% faster over the 42 day period than those fed the diets containing the inorganic Cu source with ADG values (g/d) of 346, 346 and 378 for Treatments 1-3 respectively (P=0.032). In the same period feed intake was higher for piglets fed the chelated Cu source when compared to piglets fed 170 mg/kg from CuSO4 (544 g/d and 510 g/d respectively (P=0.034). Piglets fed the chelated Cu source had higher liver Cu than pigs fed 170 mg/kg as CuSO4 (30.46 mg/kg vs. 18.37 mg/kg; P=0.06), and significantly higher liver Cu than pigs fed 6 mg/kg as CuSO4 (6.83 mg/kg; P<0.01). In conclusion piglets fed 170 mg/kg Cu from MINTREX® had a significantly higher ADG (+9%) and feed intake (+7%) when compared to piglets fed 170 mg/kg Cu from CuSO4. Cu levels in liver tissue indicate that chelated Cu was more bioavailable than the inorganic source of the trace mineral.

Bioavailability of zinc sources in piglets and broilers: a meta-analysis

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Zinc (Zn) is essential for swine and poultry and native Zn contents in feedstuffs are too low to meet their requirement. Added Zn in organic form (OZn) is considered as more bioavailable than inorganic Zn (IZn). One broiler (28 exp., 175 obs.) and one piglet database (34 exp., 159 obs.) were used for a meta-analysis. Within dose-response effect from dietary Zn on dependent variables, the GLM procedure with native Zn, IZn and OZn as independent variables presented: In broilers, G:F, plasma Zn and bone Zn responded linearly (P<0.001) and bone Zn quadratically (P<0.001) to the three Zn sources. All variables presented a negative interaction between native Zn and added Zn as IZn or OZn (P<0.01). Coefficients of determinations for variables were above 0.90. The relative bioavailability (RBV) of OZn versus IZn were 98, 97 and 103 for G:F, plasma Zn and bone Zn, respectively. In piglets, absorbed Zn, liver Zn and bone Zn responded negatively to increasing native Zn (P<0.10). Absorbed Zn, plasma Zn, plasma ALP, liver Zn and bone Zn increased linearly (P<0.001) and plasma Zn, plasma ALP and liver Zn reduced quadratically (P<0.10) with added Zn. No interaction was calculated between DZNN and added Zn (P>0.10). Coefficients of determinations were above 0.89. The RBV of OZn versus IZn were 111, 99, 95, 88 and 100 for absorbed Zn, plasma Zn, plasma ALP, liver Zn and bone Zn, respectively. This meta-analysis concludes that native Zn was highly bioavailable to broilers, similar to added Zn and independent from source. In piglets however, native Zn bioavailability was reduced with increasing contents, most probably due to antagonism from diet components, such as phytate. Added Zn was not affected such a way. The amount of absorbed Zn from OZn was numerically higher than IZn, but its capacity to improve Zn status of piglets was equal to IZn.