Zinc Bioavailability in Tetrabasic Zinc Chloride and the Dietary Zinc Requirement of Young Chicks Fed a Soy Concentrate Diet

A. B. Batal, T. M. Parr, and D. H. Baker

Department of Animal Sciences and Division of Nutritional Sciences, University of Illinois, Urbana-Champaign, Illinois 61801

ABSTRACT Three chick assays were conducted to determine a bioavailable Zn requirement and to establish a Zn relative bioavailability (RBV) value for tetrabasic Zn chloride [TBZC, i.e., Zn₅Cl₂(0H)₈]. In Assay 1, 8-d-old chicks were fed a Zn-deficient soy concentrate diet (8.8 mg/kg bioavailable Zn) supplemented with 0, 5.81, 10.81, 15.10, and 20.25 mg Zn/kg from ZnSO₄·7H₂O for 14 d to establish a linear response range and estimate a bioavailable Zn requirement. Weight gain of chicks increased linearly (P < 0.01; r² = 0.99) when the first three levels of Zn were fed. Broken-line analysis of the weight gain data indicated a bioavailable Zn requirement of 22.4 mg/kg. In Assay 2, RBV of Zn in TBZC was determined by multiple-linear regression slope-ratio methodology. The Zn-deficient basal diet was supplemented with 0, 5.81, and 10.81 mg Zn/kg from ZnSO₄·7H₂O to produce a linear growth response as determined in Assay 1. The same basal diet was supplemented with 5.38 and 10.81 mg Zn/kg from TBZC. The RBV of Zn in TBZC was found to be 102%, which was not different (P > 0.10) from 100%. A third assay was conducted as described for Assay 2, and the RBV of Zn in TBZC was 111%, which was not different from 100%. In summary, the RBV of Zn in TBZC was not different from that of ZnSO₄·7H₂O, and the minimal bioavailable Zn requirement for chicks 1 to 3 wk of age fed a soy concentrate diet was estimated at 22.4 mg/kg.

(Key words: zinc sulfate, tetrabasic zinc chloride, bioavailability, chick, zinc requirement)

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