bioavailability

small intestinal metallothionein mRNA expression as an indicator of zinc bioavailability (Richards et al., 2007; Richards et al., 2008b). In this experiment, broilers were fed control diets or diets supplemented with 70 ppm zinc from the indicated sources. Because zinc absorption varies greatly in the small intestine, differences in metallothionein expression here would help explain why different methods can yield only relative bioavailability instead of tissue zinc levels would.

The correlation between the data in Figures 1 and 2 in that they demonstrate that some, but not all, chelated zinc sources are more bioavailable than inorganic zinc. Consistent with the other experiments, ZoTREX® was the most available source.

Measuring tissue minerals or mineral-depleted biomarkers can be the easiest and most straightforward measures to generate a quantitative estimate of mineral bioavailability.

**Fundamental roles**

With that said, it is important not to stop there. Zinc, copper and manganese play fundamental roles in a wide variety of biological processes. They are essential components of hundreds of cellular enzymes and transcription factors (Underwood and Suttle, 1999). If trace minerals are limiting in the diet, all biological processes can suffer. So, by supplementing diets with more highly available forms of trace minerals, a producer will more effectively "feed" these enzyme systems, which should translate into a variety of positive outcomes.

Indeed, recent results with trace minerals chelated with HMTBa have demonstrated benefits such as enhanced immune function (Dibner et al., 2005), reduced incidence of tibial dyschondroplasia (Dibner et al., 2007; Dibner et al., 2008a) and improved performance (Richards et al., 2006) and footpad necrosis (Dibner et al., 2005; Dibner et al., 2007; Richards et al., 2008b). In this experiment, broilers were fed control diets or diets supplemented with 70 ppm zinc from the indicated sources. Because zinc absorption varies greatly in the small intestine, differences in metallothionein expression here would help explain why different methods can yield only relative bioavailability instead of tissue zinc levels would.

**Conclusions**

While measures such as these are not traditionally considered to be mineral bioavailability, they can and should be used to confirm the information gained from assessing more customary measures, such as tissue minerals and genomic biomarkers.

**References**


Cheryan, M. 1980. Manganese deficiency and metallic lesions (Richards et al., 2006), reduced leg abnormalities (vars, varus, valgus), reduced egg size, increased broken strength (Ferket et al., 2009), reduced oxidative stress (Richards et al., 2006), reduced inflammation (Ferket et al., 2009) even at lower levels of trace mineral inclusion (mutation, polymorphism).

While measures such as these are not traditionally considered to be mineral bioavailability, they can and should be used to confirm the information gained from assessing more customary measures, such as tissue minerals and genomic biomarkers.

Feeding high-quality, high-

bioavailability trace minerals is an important key to maximizing the growth potential and performance of production animals. Chelated minerals have the potential to deliver trace minerals more effectively to the tissues of the animal, thus, to better support the biochemical functions of the animal’s cells and tissues.

By MARCUS A. HOELSCHER*

**Feedsweek, January 18, 2010 15**

**Mineral bioavailability has been estimated in a wide variety of ways that vary greatly in their effectiveness. In general, techniques that rely on radioactivity or other techniques whose methodology are of limited utility and can be misleading. In contrast, in vivo methods can be very effective on a wide variety of ways.**

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