Trace Elements in Animal Nutrition

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I. ESSENTIAL TRACE ELEMENTS

Trace elements that are essential for the nutrition of animals are usually required in amounts ≤ 100 mg/kg in dietary dry matter. These elements include Fe, Zn, Cu, Mn, Se, I, Co, and Mo. All but Mo have been shown to be deficient in some natural feed ingredients, necessitating the use of supplements to make the diet nutritionally complete.

Molybdenum has essential metabolic functions, but an excess in the diets of ruminants, rather than a deficiency, is of greater practical consequence. A specific metabolic function for F has not been identified, but certain minimum levels in the diet or drinking water aid in the prevention of tooth decay and inhibit demineralization of the skeleton of elderly humans. Excesses of F, particularly from certain P supplements, can cause undesirable changes in bones and teeth.

All of the above elements are discussed in this chapter, using the information assembled by Scott (1972) in the previous edition of this book as a base. Research published since 1971 has been emphasized in updating Dr. Scott’s review. Magnesium is not included as a trace element in our review, since its requirement in the diet is generally >400 mg/kg.

Other trace elements for which nutritional requirements have been proposed include Cr, Si, Ni, V, Sn, As, B, and Pb (Mertz, 1987). Studies demonstrating these requirements generally have been conducted with rats (Rattus norvegicus), mice (Mus musculus), or chicks (Gallus domesticus) fed purified diets in plastic isolators supplied with filtered air. Whereas animals of importance to agriculture probably have physiological requirements for these elements, it is unlikely that livestock diets would be deficient. Thus, these elements have not been reviewed. Likewise, Cd and Hg, which may be present...