

Status of Trace Minerals in Swine Nutrition

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Abstract

Major changes in the swine industry during the last 25 years in Mexico and the USA have influenced trace mineral nutrition of swine. Improvements in the efficiency of lean tissue synthesis of pigs through selection has necessitated a reappraisal of dietary requirements of not only amino acids, energy and major mineral elements, but of the micronutrients as well, especially the trace minerals. The importance of trace elements in biology and in the swine diet became well recognized during the last 25 years. The development of effective, safe and inexpensive parenterally administered forms of iron (Fe) as iron dextran type chelates has essentially eliminated baby pig anemia in modern swine production. The addition of zinc (Zn) to grain - plant protein type swine diets has prevented the occurrence of parakeratosis and has improved the immunocompetence of swine. In addition to its nutritional role, copper (Cu) is added at high levels (up to 250 ppm in the diet) as an effective and inexpensive growth-promoting antibacterial in pig starter and grower diets. The safety of this Cu level is enhanced by the simultaneous addition of 100 ppm of Zn and 100 ppm of Fe to the diet. The emergence in recent years of the use of supplemental vitamin E and selenium in swine diets and their roles in protection of cellular and subcellular membranes from peroxidative damage have been of utmost importance in swine production. This became increasingly apparent as the general movement of the swine industry to confinement rearing developed. The general use of grain-plant protein type diets created the need for micronutrient premixes and our modern feed industry has met this need.

Professor Miller received his Ph.D. at MSU in 1956 and joined the Animal Science Department at that time as an Assistant Professor. He became professor in 1966 and teaches and conducts research in swine nutrition. His research has been in the nutrient requirements of the baby pig, baby pig anemia, mineral and trace mineral requirements for growth, reproduction and lactation and the composition of sow's milk. He is a member of a number of scientific societies and has served on the editorial board of the Journal of Animal Science. He has received numerous awards for his research including the MSU Junior (1964) and Senior (1975) Sigma Xi Awards, the AFMA (1965) Nutrition Award, the Calcium Carbonate (1967) Mineral Award and the Gustav Bohstedt (1969) Trace Mineral Award. He has served on the National Research Council committee on nutrient requirements of swine and recently served as president of the Midwestern section of the American Society of Animal Science.