

DIAGNOSIS, EPIDEMIOLOGY AND IMMUNOLOGIC CONSEQUENCES OF COPPER DEFICIENCY IN CALVES

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ABSTRACT

Copper is an essential micronutrient. Copper deficiency has been associated with disease states that decrease commercial beef production. Clinical manifestations of copper disease include anemia, diarrhea, long bone fractures, generalized ill-thrift, and decreased fertility. Recent studies have demonstrated that copper deficiency is common in North American beef cattle. This body of work addresses diagnosis, epidemiology and the immunologic consequences of copper deficiency in calves. For serum copper concentration of 0.45 $\mu\text{g/g}$ as a test endpoint, serum copper concentration had sensitivity of 0.53 and specificity of 0.89 for detection of low liver copper concentration. A number of management factors were significantly associated with either serum copper concentration or copper status. The relationship between geographic areas of copper deficiency occurrence and the state's two major rivers, the Missouri and Mississippi, was the most intriguing factor identified. The true influence of these rivers could not be determined with this study, but it warrants further investigation. The binomial distribution was used to calculate the probability of k positive test results in n trials at varying prevalences. This process provided a de facto hypothesis test for the lower 95% confidence limit of prevalence. The binomial model provided a more satisfactory method to interpret imperfect test results than the z -distribution for population proportions. In relation to copper supplementation there were no statistically significant differences in the immunologic parameters studied. This however, may not represent the true benefit copper supplementation may have on copper deficient calves.