

# Liver Trace Mineral Status of Cow-Calf Ranches in the Western High Plains

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## Abstract

Trace mineral requirements for cattle and assessing herd mineral status are strong, strong areas of interest for producers and veterinary practitioners. Trace minerals are required for a variety of metabolic functions including immune response to pathogenic challenges and maintenance of reproduction. Diagnosing and treating a subclinical trace mineral deficiency may have a positive economic impact on beef cattle production. Subclinical mineral deficiencies in cattle may be a larger problem than acute deficiencies because specific clinical symptoms are often not evident to allow the producer to recognize the deficiency. Animals with a subclinical status continue to reproduce or grow but at a reduced rate, have decreased feed efficiency, and a depressed immune system. The difficulty in diagnosing trace mineral deficiencies is due to a number of factors. Identifying trace mineral deficiencies from blood serum concentrations may be misleading. Serum Cu levels have not had a high correlation to liver Cu, and are not considered a reliable indicator of Cu status in cattle. All Cu circulating in the blood is not available to the animal, and serum copper values can be affected by dietary molybdenum and sulphate, infection, trauma, and stage of gestation. The objective of this study was to evaluate Cu and Zn mineral concentrations in bovine hepatic samples collected from different ranches and determine the minimum sampling number within each herd for diagnosing beef cattle mineral status.

Liver biopsy samples (n=283) were collected from

beef cattle following weaning at six different locations representing operations on typical northern mixed grass prairie. Breeds of cattle included Black Angus, Red Angus, Hereford and Angus X Hereford. At four of the locations, cows and heifers were pregnant. Samples obtained at the other two locations were from open heifers and cows. Liver biopsy samples were collected under aseptic conditions using a Tru-cut® biopsy needle. Mineral analysis was completed at the Animal Health Diagnostic Laboratory. Hepatic mineral concentrations are reported on dry matter basis.

Herd means for hepatic Cu levels ranged from a low of 6.7 to a high of 115.3 ppm, with only one of six herds being adequate as indicated by a mean greater than the recommended level of 80 ppm Cu. Four of the herds appear to be Cu deficient with means of 18.3 ppm or less. Hepatic Zn means ranged from 114.4 to 163.1 ppm, with all herds similar to or greater than 120 ppm Zn. Standard deviations were utilized to determine the minimum number of samples needed within a herd to detect a deficiency within 5 units of recommended normal (95% confidence level). Based upon standard deviations from herds with marginal to deficient Cu levels, the calculated minimum number of animals required for sampling within a herd was 23. Liver biopsy samples from live animals may provide a more reliable indicator for diagnosing subclinical trace mineral deficiencies if adequate sample numbers are collected. Too few samples may be misleading and not a true representation of herd trace mineral status.