

## Case Study - Trace Minerals and Immunity

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Cattle that are deficient in copper have been shown to have decreased tissue concentrations of the mineral in liver, spleen, thymus and lung. Both humoral and cell mediated immunity has been shown to be compromised in these animals. During 2003, a beef herd in north-western Kentucky along the Ohio River reported increased percent cows open at pregnancy check despite good body condition, and also some late term abortions. In addition, some early calf mortality at 1 to 3 days of age was occurring. Cattle were very slow to shed their winter hair coat and a high level of Pinkeye occurred in both cows and calves in this herd. Work with this herd is on-going but some early findings and results will be detailed in this paper.

The herd is composed of Angus and Angus cross females. Cows are rotated between two separate locations in close proximity to each other. There does not seem to be an effect of location as problems were occurring at both locations. Cattle graze mixed cool season grass - legume pastures with hay harvested from these same pastures. Commodity feeds are provided during winter to younger cows and developing heifers as needed for weight gain and maintenance of body condition. Older cows receive primarily hay unless supplemental feed is needed to maintain body condition. Coccidiosis has been a problem in the herd. To combat this, a

free choice mineral containing Monensin is provided to all cattle. The mineral contains 1100 ppm of copper from copper sulfate. All cattle are vaccinated twice yearly with a killed viral product containing 5 strains of *Leptospira*.

Laboratory analysis of an aborted late term fetus and its placenta was not able to determine a definitive cause. Necropsy on a three day old calf also failed to reveal a specific cause of death. Blood was drawn on a cross section of the herd by age of cow and sent to the Breathitt Veterinary Center in Hopkinsville. Elevated titers to *Leptospira hardjo* indicated recent exposure.

Visual observation of the cattle revealed rough hair coats with discoloration. Serum analysis revealed copper in the normal range. Mineral analysis from hays harvested on both farms revealed an interesting finding, Table 1. Sulfur levels were double the values normally found on Kentucky farms. The iron content of forage from Farm 2 was also much higher than normal. As the sample was dry hay, it is unlikely for the iron to result from soil contamination on the surface of the plants. Molybdenum, while not found at high levels, was greater normally expected levels for Kentucky forages. Each of these trace minerals can interfere with the absorption and utilization of copper by the animal.

A management plan was developed in consultation with the producer's local veterinarian. All cattle were injected with long acting oxytetracycline, LA-200® at the dosage of 9 mg per pound of body weight. A drench, Pull-Thru®, supplying 200 mg of copper per fluid ounce was given at the rate of one fluid ounce per 400 to 600 pounds of body weight. All cattle were also

560 pounds, also up from previous years. Initial results indicate an improved appearance and performance of the herd due to the above listed changes.

Table 1. Forage Mineral Analysis		
Mineral	Farm 1	Farm 2
Calcium, %	.52	.43
Phosphorus, %	.20	.20
Copper, ppm	11	12
Sulfur, %	.36	.31
Iron, ppm	215	912
Molybdenum, ppm	1.2	1.1

injected twice, approximately 3 weeks apart with Spirovac®. The mineral was reformulated to provide 25% of the added copper in a chelated form to overcome the likely antagonism of sulfur, iron and molybdenum.

At the time of this writing, a complete pregnancy check has not been completed on the herd. However, 37 out of 39 first calf heifers are pregnant. Visual observation shows the cattle to have a slicked off hair coat and to be much blacker in appearance than in previous years. Spring born steer calves have been weaned and sold at a pay weight of