

# Evaluating Bovine Neutrophil Function with Mineral Supplementation

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Mastitis is the inflammation of the mammary gland, and is the most economically significant disease of cattle accounting for an estimated \$1.8 billion loss from the dairy industry annually. Neutrophils are a crucial component of the host defenses against mastitis, originating from the bloodstream and arriving at the site of infection by extravasation and chemotaxis. Neutrophils destroy bacteria by phagocytosis and intracellular killing. The efficacy of neutrophils is influenced heavily by nutrition, particularly vitamins and minerals. Copper influences neutrophils by diminishing their phagocytic capabilities, while zinc affects the neutrophil's ability to migrate from the bloodstream to site of infection. Copper is frequently unavailable in commercial herds due to the presence of dietary antagonists, such as sulfur. Twelve lactating Holsteins were tested to determine the effects of copper, manganese and zinc supplementation on neutrophil functions. Cows were assigned to one of two groups, one receiving a diet void of copper, manganese and zinc, and the remaining group receiving a diet supplemented with minerals. Whole blood was collected from each cow from the jugular vein to minimize hemolysis. Neutrophils were isolated from peripheral blood as described by Carlson and Kaneko, preparation of the cells resulted in a mean 95.4% neutrophils with a 97.8% viability. *Escherichia coli* (McDonald 487) was added to heat inactivated serum to be opsonized. Neutrophil suspensions were added to opsonized bacteria in an intended ration of 2 bacteria:1 neutrophil, though the mean ratio for the study was 1.5:1. After incubation, slides were prepared and viewed under ultra violet oil immersion. Cows received supplemented diet had a greater phagocytic index. There was no dietary effect on intracellular kill or percent of neutrophils phagocytizing.