

Effects of Copper Supplementation on Host Defense Responses to Lipopolysaccharide from *Escherichia coli* O111:B4 in Holstein Cows

Author: Kim T Tran

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Project Advisor: Joseph Hogan

Mastitis, or inflammation of the mammary gland, is the leading source of economic cost in the dairy industry at over \$2 billion per year. Most cases are caused by contagious or environmental bacteria that invade the teat and mammary tissue and release toxins which damage the integrity of the epithelial lining. Lipopolysaccharide (LPS), or purified endotoxin, serves as the major virulence factor of gram-negative bacteria and triggers inflammatory processes such as leukocytic chemotaxis and extravasation. Copper plays a role in the production and functioning of macrophages and neutrophils, both key immune cell responders to mastitis. Due to the low cost of mineral feed additives and common knowledge of nutritional deficiency syndromes, many farmers over-supplement herds. A better understanding of copper supplementation in the context of mastitis may culminate in industry practices that reduce environmental excretion. The purpose of this study was to determine the effects of copper supplementation on host defense responses to a LPS challenge. Twelve mid-lactation Holstein cows were fed a diet either deficient or supplemented with copper for 30 d and infused with lipopolysaccharide (LPS) of *Escherichia coli* O111:B4 to compare host defense responses. Our results indicated that somatic cell counts and clinical scores did not differ significantly between groups, but rectal temperatures were greater in control than supplemented cows ($P < 0.05$). These data suggest that copper-deficient and -supplemented cows exhibit similar local host defense responses but different systemic host defense responses.