

ABSTRACT

THESIS PROJECT: Lactoferrin as an Antimicrobial against *Salmonella enterica* and *Escherichia coli* O157:H7

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Improper storage conditions or processing of milk leads to potential spoilage and illness, due in part to shifts in temperature. These shifts allow any bacteria present in milk to reproduce at an increased rate and cause spoilage. However, certain proteins naturally found in raw milk have reported antibacterial properties, such as lactoferrin, but the natural levels have not yet been investigated. Thus, this study aimed to examine various concentrations of lactoferrin as a potential biopreservative and as an antimicrobial against common dairy pathogens, *Salmonella enterica* and *Escherichia coli* O157:H7. Minimum inhibitory concentration (MIC) assays were conducted in two systems: tryptic soy broth (TSB) and bovine milk. The bacteria were exposed to varying concentrations of lactoferrin, beginning with 225 mg/mL and then diluted in a 1:2 fashion. The cultures were incubated at 37°C for 48h and the absorbance was measured on a microtiter plate reader at the end of the incubation period. Lactoferrin at levels at or above 3.516 mg/mL significantly ($p = 0.00682$) reduced the rate of growth of *E. coli* O157:H7 in TSB. However, the lactoferrin MIC increased for *S. enterica* to at or above 7.031 mg/mL ($p = 0.0352$). Lactoferrin in the milk system significantly decreased the absorbance of *E. coli* O157:H7 at levels greater than 14.05 mg/mL ($p = 0.027$) based on the reduction of tetrazolium salts. For *S.*

enterica, only concentrations at or above 112.5 mg/mL in the milk resulted in reduced growth ($p = 0.0585$). Taken together these results indicate lactoferrin may have biopreservative potential. In order to fully conclude the practicality and effectiveness of lactoferrin as an antimicrobial additive, a similar study should be conducted using additional (Gram-positive) pathogens, such as *Bacillus cereus* and *Listeria monocytogenes*. If effective, lactoferrin could prolong the shelf-life of dairy products and help reduce the incidence of foodborne illnesses in developing countries.