ABSTRACT

Pressure Resistance of *Escherichia coli* O157:H7 Upon Exposure to Low Temperatures

Nicole Henry

Microorganisms have the ability to develop adaptive responses to stress factors, thus becoming tolerant to further stresses. Two adaptive responses of *Escherichia coli* O157:H7 upon exposure to low temperatures and high pressures are, the cold shock response and alterations in the cell membrane. In this study, the pressure resistance of stationary phase and exponential phase *E. coli* O157:H7 in 0.1% peptone water, beef gravy and ground beef, upon exposure to low temperatures was examined. Sublethal injury of the microorganisms and the baroprotective role of the three food systems were also examined. Quantitative estimates of sublethal injury and inactivation were made using the differential plating method. The results showed that cold shock increased the pressure resistance of stationary phase *E. coli* O157:H7 pressurised at 400MPa, 20 min, 30°C in 0.1% peptone water, but not in ground beef and beef gravy. However, cold-shock did not increase pressure resistance of exponential phase *E. coli* 0157:H7 pressurised in the three systems at 200MPa, 8min, 20°C. Of the three systems, ground beef had the greatest baroprotective effect on non cold-shocked and cold-shocked stationary and exponential phase cells, while 0.1% peptone water had the least baroprotective effect on non cold-shocked and cold-shocked stationary and exponential phase cells. There were 4.0 and 3.9 cfu/ml log reductions in cold-shocked stationary phase and exponential phase cells,

respectively, pressurised in 0.1% peptone water, log reductions of 2.0 and 3.7 cfu/ml, occurred in stationary phase and exponential phase cells, respectively, pressurised in beef gravy. There were 0.9 and 1.3 cfu/g log reductions, in stationary phase and exponential phase cells, respectively, pressurised in ground beef.

Keywords: *Escherichia coli* O157:H7; cold shock; high pressure treatments; stress response; sublethal injury.