

Evaluation of the Heat Resistance of Pathogenic *Listeria monocytogenes* in Milk and Milk Products in Sri Lanka

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Abstract

Listeria monocytogenes, which is a food-borne pathogen often isolated from milk and milk products, causes listeriosis in pregnant women, newborns, older adults and immuno-suppressed people. *Listeria* is said to be more resistant to heat treatments and the present study investigated the effects of current heat treatments on inactivation of *Listeria* in milk. Two isolates of *L. monocytogenes*, namely FSTLC2 and FSTLC55, were introduced to sterilized milk at population levels of 10^2 and 10^7 cfu/ml and were subjected to various temperature-time combinations. *Listeria* was enumerated using the FDA Listeria Enrichment Broth (LEB; Oxoid Ltd) and Modified Oxford Agar (MOX; Oxoid Ltd) medium. The Thermal Death Time (TDT) and Thermal Death Rate (TDR) curves were also constructed using thermal resistance data. The slope of the TDT curve (z) and the slope of the TDR curve (D ; Decimal Reduction Time) were also determined using the statistical software package Minitab (release 8.21). It was observed that the normal pasteurization treatments of 62.8°C for 30 min (LTLT; Low Temperature Long Time) and 71.7°C for 15 sec (HTST; High Temperature Short Time) appear to be adequate to destroy a *Listeria* population of 10^2 CFU/ml in milk, but not a population of 10^7 cfu/ml. A z value of 7.6°C and a $D_{71.7^\circ\text{C}}$ value of 2.9 sec were observed for *L. monocytogenes* in milk. The current heat treatment techniques used in the dairy industry need to be reviewed and necessary modifications introduced to ensure a complete elimination of this pathogen. Moreover, the z and $D_{71.7^\circ\text{C}}$ values observed in the present study may be used in devising sound heat treatment techniques as well as suitable Hazard Analysis Critical Control Points (HACCP) systems in the dairy industry.

Keywords: *Listeria monocytogenes*, heat resistance, pasteurization, thermal inactivation, thermal death time, thermal death rate