

THERMAL TREATMENTS FOR INACTIVATION

SURVIVAL, GROWTH, AND THERMAL RESISTANCE OF *LISTERIA MONOCYTOGENES* IN PRODUCTS CONTAINING PEANUT AND CHOCOLATE (S. J. Kenney and L. R. Beuchat)

Outbreaks of listeriosis linked to the consumption of ready-to-eat (RTE) foods have raised interest in better understanding the survival and growth characteristics of *Listeria monocytogenes* in these products. Among RTE products of interest are those containing chocolate. Outbreaks of listeriosis have been epidemiologically linked to the consumption of butter, chocolate milk and whole-fat and reduced-fat (2%) milk. To date, there have been no outbreaks of listeriosis associated with the consumption of peanut products. However, peanut butter has been epidemiologically linked to an outbreak of salmonellosis in Australia caused by *Salmonella* Mbandaka. *Salmonella* can survive in peanut butter for at least 24 weeks at 5 or 21°C. The wide-spread presence of *L. monocytogenes* in nature, its ability to grow at refrigeration temperatures, and the severity of infections it is capable of causing raises interest in defining its survival and growth characteristics in conventional and newly developed RTE foods. The objective of this study was to evaluate the behavioral characteristics of *L. monocytogenes* in two newly developed food products, a peanut beverage, and a chocolate-peanut spread, as affected by temperature and a_w . Survival and growth of *L. monocytogenes* in these products subjected to various environmental conditions was determined. Behavior of the pathogen in newly developed products was compared to its behavior in similar products available in retail markets.

Tolerance of *L. monocytogenes* was evaluated in a peanut-based beverage (3.1% fat), whole-fat (3.5%) milk, whole-fat (4.0%) and reduced-fat (1.0%) chocolate milk, a chocolate-peanut spread (39% fat), and peanut butter (53% fat). The $D_{60^\circ\text{C}}$ value in peanut beverage (3.2 min) was not significantly different ($P > 0.05$) than the $D_{60^\circ\text{C}}$ value in whole-fat milk (3.3 min) or whole-fat chocolate milk (4.5 min) but significantly lower ($P \leq 0.05$) than the $D_{60^\circ\text{C}}$ value in reduced-fat chocolate milk (5.9 min). The pathogen was significantly more resistant to heat when enmeshed in chocolate-peanut spread (a_w 0.46) ($D_{60^\circ\text{C}} = 37.5$ min) and peanut butter (a_w 0.32) ($D_{60^\circ\text{C}} = 26.0$ min) than in liquid products. At 10°C, the pathogen grew most rapidly in whole-fat chocolate milk and slowest in peanut beverage. At 22°C, populations increased significantly within 12 and 16 h in whole-fat milk and reduced-fat chocolate milk, respectively, and within 8 h in whole-fat chocolate milk and peanut beverage. Initial populations (3.37 – 4.42 log cfu/g) of *L. monocytogenes* in chocolate-peanut spread and peanut butter adjusted to a_w 0.33 and 0.65 declined but the pathogen was not eliminated over a 24-week period at 20°C. Survival was enhanced at reduced a_w . Results indicate that a pasteurization process similar to that used for full-fat milk would be adequate to ensure the destruction of *L. monocytogenes* in peanut beverage. The pathogen survives for at least 24 weeks in chocolate-peanut spread and peanut butter at an a_w range encompassing that found in these products.