Inactivation of a diverse set of shiga toxin-producing *Escherichia coli* in ground beef by high pressure processing

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Abstract

Shiga toxin-producing *Escherichia coli* (STEC) are regularly implicated in foodborne illness outbreaks and recalls of ground beef. In this study we determined the High Pressure Processing (HPP) $D_{10}$ value (the processing conditions needed to reduce the microbial population by 1 log) of 39 STEC isolates, including the “big six” serovars, O104 and O157:H7. STEC isolates included those isolated from animals and environmental sources in addition to those associated with illness in humans. Individual STEC were inoculated into 80% lean ground beef and treated with HPP (350 MPa, 4 °C, up to 40 min). The mean $D_{10}$ was 9.74 min, with a range of 0.89–25.70 min. The $D_{10}$ of the STEC involved in human illness was 9.25 vs. 10.40 min for those not involved in human illness ($p > 0.05$). The presence or absence of genes encoding virulence factors (e.g. Shiga toxin 1 or 2, intimin, or enterohemolysin) had no effect on the HPP $D_{10}$ ($p > 0.05$). The high $D_{10}$ of some STEC involved in human illness should be considered in selecting HPP processing parameters for ground beef. This study demonstrates the heterogeneity of STEC resistance to HPP. Risk assessors and the food industry can use this information to provide safer meat products to consumers.

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