

**Title** Application of high hydrostatic pressure to decontaminate green onions from *Salmonella* and *Escherichia coli* O157:H7

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**Citation** Food Microbiology, Volume 28, Issue 7, October 2011, Pages 1275-1283

**Keywords** Green onions; High pressure; *Escherichia coli* O157:H7; *Salmonella*

### Abstract

Consumption of fecally contaminated green onions has been implicated in several major outbreaks of foodborne illness. The objectives of this study were to investigate the survival and growth of *Salmonella* and *Escherichia coli* O157:H7 in green onions during storage and to assess the application of high hydrostatic pressure (HHP) to decontaminate green onions from both pathogens. Bacterial strains resistant to nalidixic acid and streptomycin were used to inoculate green onions at low (~1 log cfu/g) and high (~2 log cfu/g) inoculum levels which were then kept at 4 or 22 °C for up to 14 days. Both pathogens grew to an average of 5–6 log cfu/g during storage at 22 °C and the bacterial populations were fairly stable during storage at 4 °C. High-pressure processing of inoculated green onions in the un-wetted, wetted (briefly dipped in water) or soaked (immersed in water for 30 min) conditions at 250–500 MPa for 2 min at 20 °C reduced the population of *Salmonella* and *E. coli* O157:H7 by 0.6 to >5 log cfu/g, depending on the pressure level and sample wetness state. The extent of pressure inactivation increased in the order of soaked > wetted > un-wetted state. The pressure sensitivity of the pathogens was also higher at elevated treatment temperatures. Overall, after pressure treatment at 400–450 MPa (soaked) or 450–500 MPa (wetted) for a retention time of 2 min at 20–40 °C, wild-type and antibiotic-resistant mutant strains of *Salmonella* and *E. coli* O157:H7 inoculated on green onions were undetectable immediately after treatment and throughout the 15-day storage at 4 °C. The pressure treatments also had minimal adverse impact on most sensorial characteristics as well as on the instrumental color of chopped green onions. This study highlights the promising applications of HHP to minimally process green onions in order to alleviate the risks of *Salmonella* and *E. coli* O157:H7 infections associated with the consumption of this commodity.