

Title Survival of *Salmonella enteritidis* PT 30 on Almonds after Exposure to Hot Water  
Author Aaron R. Uesugi and Linda J. Harris  
Citation Program and Abstract Book, IAFP 2005 (International Association for Food Protection) - 92<sup>nd</sup> Annual Meeting, 14-17 August 2005, Baltimore, Maryland, USA. 256 pages.  
Keyword almond; *Salmonella*; hot water treatment

### Abstract

Almond skins are removed by treatment with steam and/or hot water (blanching). The objective of this study was to evaluate survival of *Salmonella* on almonds exposed to hot water. Whole Nonpareil almonds (40 g) inoculated ( $10^8$  CFU/g) with *S. enteritidis* PT 30 were submerged in 241 ml of water maintained at 70, 80, or 88°C ( $\pm 0.2^\circ\text{C}$ ). Almonds were heated for 0.5 to 4.0 min, drained for 4 sec, transferred to 80 ml of cold (4°C) tryptic soy broth, and stomached for 2 min. Appropriate dilutions were plated onto tryptic soy and bismuth sulfite agars, and incubated at 37°C for 24 and 48 h, respectively. Skins remained fully or partially attached to kernels and were included in the analysis. Reductions of 1.7, 3.0, and 4.6 log CFU/g were observed within 30 s at 70, 80, and 88°C, respectively. Thereafter, *S. enteritidis* declined at a slower rate. Standard deviations were large particularly at the longer treatment times. This may have been due to partial detachment of skins from kernels. D values were calculated assuming that the outer surface of the almond uniformly and immediately reached the water temperature and that reduction of *Salmonella* followed first order thermal death kinetics. D values of 1.0, 0.6, and 0.3 min were determined for exposure to 70, 80, and 88°C, respectively. The z-value was calculated to be 29°C. Current industry practice of blanching at 88 to 96°C for 2 to 3 min for removal of almond skins should be adequate to achieve a 5-log reduction of *Salmonella*.