



## Thermal Inactivation of *Salmonella* spp. in Tandoori Chicken

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### Abstract

*Salmonella* spp. is a major foodborne pathogen commonly associated with meat products and the processing environment. Although thermal processing effectively eliminates this pathogen, the efficacy of microbial inactivation depends strongly on the applied time–temperature combination. This study aimed to evaluate the microbial reduction of *Salmonella* spp. in tandoori chicken under defined cooking conditions at temperatures of 55°C and 60°C using defined heating time intervals. The objectives were to determine the thermal inactivation parameters (D-value and z-value) and to calculate the F-value required to achieve a 7-log reduction of *Salmonella* spp. in tandoori chicken. Tandoori chicken samples (25 g) were inoculated with a three-strain *Salmonella* cocktail to achieve an initial population of approximately  $7 \log_{10}$  CFU/g and subjected to thermal treatment at 55°C and 60°C under controlled conditions. Survivor curves were generated to determine decimal reduction times (D-values) and the z-value using linear regression analysis, and  $F_7$  values were calculated to estimate the process time required to achieve a 7-log reduction. Recovery of thermally injured cells was assessed using TSA and TSA/XLD overlay agar. *Salmonella* inactivation was markedly temperature-dependent, with more than 5 log reductions achieved within 15 min at 60 °C, compared to a gradual reduction at 55 °C. The D-values of *Salmonella* spp. in tandoori chicken were 3.79 min at 55°C and 1.02 min at 60°C, with a z-value of 8.77°C. The corresponding  $F_7$  values were 26.53 min and 7.14 min at 55°C and 60°C, respectively, demonstrating substantially greater lethality at the higher treatment temperature. Enhanced recovery on TSA/XLD overlay agar suggested the presence of sublethal injured cells following thermal exposure. These findings provide matrix-specific thermal inactivation parameters for *Salmonella* spp. in marinated poultry and contribute data for the validation of scientifically robust cooking processes and HACCP-based control strategies to improve poultry product safety.

**Keywords:** D-value; Marination; *Salmonella*; Tandoori Chicken; Thermal Inactivation; z-value

