

CUSTOM-BUILT STEAM CONDITIONING AS A PROCESSING INTERVENTION FOR *SALMONELLA ENTERICA* REDUCTION ON IN-SHELL PECANS

Dikshya Shilpakar¹ – Cameron Bardsley² – Achyut Adhikari¹ – Karuna Kharel¹

¹School of Nutrition and Food Sciences, LSU AgCenter, Baton Rouge, LA

²US Department of Agriculture, Agricultural Research Service, Southeastern Fruit and Tree Nut Research Station, Byron, GA 31008, United States

<https://doi.org/10.11118/978-80-7701-048-1-0224>



ABSTRACT

Pecan harvesting practice such as mechanically shaking the nuts to stay on the ground for several days until collected can pose food safety risk. Several agricultural practices such as cattle grazing, irrigation or rain events and unhygienic farm practices can lead to foodborne pathogen contamination of the in-shell nuts while on the farm. While steam treatment of in-shell pecans is a potential conditioning method that growers can use to facilitate shelling, it also holds potential as a decontamination strategy.

This study evaluated the efficacy of steam treatments on *Salmonella enterica* inactivation on in-shell pecans. In-shell pecans were inoculated with a five strain cocktail of nalidixic acid-resistant mutant of *Salmonella enterica* (Anatum, Tennessee, PT9c, Oranienberg, Enteritidis PT30) to ~8 log CFU/g. The samples were steam-treated at 70, 80 and 90°C for 0–300 s using a custom-designed batch setup system after a come-up time of 20s. After treatment, the pecans were massaged in 100 mL of 0.1% sterile peptone water, and plated on Xylose Lysine Deoxycholate agar with nalidixic acid (50µg/mL) and enumerated after incubation at 37°C for 24 and 48 h. The water activity of the samples before and after treatment was measured. The data was analyzed using mixed model with post-hoc Tukey test at $P < 0.05$. At 70°C, *Salmonella* was significantly reduced ($P < 0.05$) by 4.65 ± 0.01 log CFU/g within 120 s, whereas a 5-log reduction required 150 s of exposure. When the temperature was increased to 80°C, a 10 s exposure led to 2.10 log CFU/g reduction which increased ($P < 0.05$) to a 5.30 log CFU/g reduction at 90 s. Increasing the temperature to 90°C showed similar reduction trend as that of 80°C. A 5-log reduction was achieved within 90 s when in-shell pecans were treated at 90°C. Steam treating the pecans for up to 5 mins at all tested temperatures increased water activity of the kernel (0.608 ± 0.002 for 70°C, 0.615 ± 0.002 for 80°C and 0.608 ± 0.004 for 90°C vs 0.58 ± 0.006 for control).

Steam treatment of in-shell pecans holds potential to be an effective processing technology for enhancing their microbiological safety.

Keywords: in-shell pekans, steam treatments, Salmonella enterica

Contact Information: Dikshya Shilpaka, ¹School of Nutrition and Food Sciences, LSU AgCenter, Baton Rouge, LA.