INFLTRATON, SURVIVAL, AND GROWTH OF SALMONELLA ON PECANS AS AFFECTED BY ENVIRONMENTAL CONDITIONS

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Two outbreaks of salmonellosis associated with almonds and one outbreak of Escherichia coli O157:H7 infection associated with cashew nuts have been documented. Pecan handling and processing practices have potential for enhancing or compromising safety. However, factors that may affect infiltration, survival, and growth of foodborne pathogens on pecans have been given only meager research attention. We conducted a study to determine (1) the effect of temperature on infiltration of Salmonella into inshell pecans; (2) survival characteristics of the pathogen on and in inshell pecans and pecan nutmeats as affected by temperature during long-term storage; and (3) survival and growth characteristics of Salmonella on high-a_w nutmeats. Infiltration of Salmonella into inshell pecans as affected by temperature differential (nuts at -20, 4, 21, and 37°C; suspension at 21°C) was studied. Survival of the pathogen on and in dry inshell pecans, pecan halves, and pecan pieces during storage at -20, 4, 21, and 37°C was monitored. Survival and growth characteristics on high-a_w (0.96 to 0.99) nutmeats held at 4, 21, 30, and 37°C were determined. The rate of infiltration of water into inshell pecans was greater when pecans were at a temperature higher than that of the water. Salmonella was isolated from nutmeats of inshell pecans that had been immersed in a cell suspension, dried, and stored at 4°C for 4 weeks, indicating that the pathogen can infiltrate the nut, reach the edible portion, and survive. Populations of Salmonella on and in inshell pecans (nutmeat a_w, 0.43 to 0.51; moisture, 3.2 to 3.6%) and nutmeats (a_w, 0.53 to 0.63; moisture, 3.7 to 3.8%) stored for up to 78 and 52 weeks, respectively, at -20 and 4°C decreased slightly; significant decreases occurred at 21 and 37°C but viable cells were detected. The pathogen grew at 21, 30, and 37°C but not at 4°C on high-a_w (0.96 to 0.99) pecan halves, pieces, and granules. The ability of Salmonella to infiltrate pecans and survive for long periods of time, coupled with its ability to grow on high-a_w nutmeats, emphasizes the importance of preventing contamination of nuts and applying process treatments that will inactivate the pathogen.