Impact of antimicrobial ingredients and irradiation on the survival of Listeria monocytogenes and the quality of ready-to-eat turkey ham


Abstract:

Irradiation is an effective technology in eliminating Listeria monocytogenes, but it induces quality changes in meat products at or above specific radiation doses. To minimize irradiation-induced quality changes, only low irradiation doses are recommended. However, low-dose irradiation provides a chance for some pathogens to survive and proliferate during prolonged storage. To solve this problem, antimicrobial ingredients [2% sodium lactate (SL), 0.1% sodium diacetate (SDA), 0.1% potassium benzoate (PB)] and low-dose irradiation were combined and tested for their effects on the growth of L. monocytogenes and meat quality. The log10 reductions of L. monocytogenes in hams following exposure to 1.0 to 2.5 kGy of irradiation ranged from 2.0 to 5.0. The D10 values were 0.52 kGy for control ham or ham with PB, SL, or PB + SL; 0.49 kGy for ham with SL + SDA; and 0.48 kGy for ham with PB + SL + SDA (PSS). Addition of SL + SDA or PB + SL in combination with 1.0 kGy of irradiation was effective in suppressing the growth of L. monocytogenes for about 6 wk when stored at 4 degrees C, whereas 2.0 kGy of irradiation was listeriostatic. Ham irradiated with 1 kGy in combination with PSS was listeriostatic throughout storage. SL increased firmness of turkey hams, and sensory panelists noted that the saltiness was a little higher in products containing SL, but its overall impact on quality was minimal. Amounts of benzene were detected in irradiated hams with PB, showing PB was not fit as an antimicrobial ingredient for irradiated foods. In conclusion, 2% SL and 0.1% SDA in combination with low-dose irradiation were effective in ensuring the safety of ready-to-eat meat products against L. monocytogenes.

Keywords:

Listeria monocytogenes, e-beam irradiation, antimicrobial ingredient, ready-to-eat turkey ham, meat quality

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