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Comparison of the Efficacy of Electrostatic versus Conventional Sprayer with Commercial Antimicrobials To Inactivate *Salmonella*, *Listeria monocytogenes*, and *Campylobacter jejuni* for Eggs and Economic Feasibility Analysis

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Abstract

This study was conducted to compare the efficacy of antimicrobials sprayed by electrostatic versus conventional sprayer for inactivation of *Salmonella*, *Listeria monocytogenes*, and *Campylobacter jejuni* on eggs and to determine the economic feasibility of these treatments. Eggs were dip inoculated with overnight cultures (18 h) of *Salmonella Typhimurium*, *Salmonella Tennessee*, a two-strain mixture of *L. monocytogenes*, and a three-strain mixture of *C. jejuni* (microaerophilic condition). Inoculated eggs were then not sprayed or subjected to electrostatic and conventional spraying with peroxyacetic acid (PAA; 0.1%), lactic acid (5.0%), lactic and citric acid blend (2.5%), sodium hypochlorite (SH; 50 ppm), and SaniDate-5.0 (SD [a mixture of PAA and H₂O₂]; 0.25%) for 30 s (15 s each side). Surviving bacteria on eggshells were recovered on xylose lysine Tergitol 4 agar (*Salmonella*), modified Oxford agar (*L. monocytogenes*), or Brucella agar (*C. jejuni*). Compared with conventional spraying, electrostatic spraying of PAA, SD, and SH achieved significant additional reductions ($P < 0.05$) of *Salmonella*, *L. monocytogenes*, and *C. jejuni* of 0.96 to 3.18, 1.19 to 3.05, and 0.96 to 1.62 log CFU per egg, respectively. A simple cost comparison suggests that regardless of the antimicrobial agent used, the cost of using an electrostatic sprayer is 20 to 40% lower than that of a conventional sprayer for a small poultry farm that produces 1,500 eggs per day. Among the five antimicrobials, the total sanitizing cost was lowest for SH, followed by PAA and SD. The results indicated that electrostatic spraying of commercial antimicrobials can be considered an effective and economical approach to enhancing the microbial safety of eggs, especially for small poultry processors.

Keywords: Antimicrobials; Economic feasibility analysis; Egg; Electrostatic sprayer; Pathogens.

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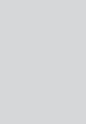
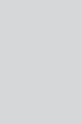
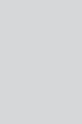
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