ANTIMICROBIAL EFFICACY OF CHEMICAL TREATMENTS APPLIED BY IMMERSION OR SPRAYING AGAINST *CAMPYLOBACTER JEJUNI* INOCULATED ON CHICKEN WINGS

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I. OBJECTIVES

Campylobacter is the leading bacterial cause of diarrheal illness in the United States, with an estimated 1.3 million infections each year. Food-related cases of campylobacteriosis are mainly associated with consumption of unintentionally undercooked contaminated poultry products. Therefore, continued research efforts are needed on different strategies to reduce this pathogen on poultry products. The objective of this study was to evaluate the decontamination efficacy of various antimicrobial treatments, when applied by immersion or spray application, to chicken wings inoculated with *C. jejuni.*

II. MATERIALS AND METHODS

Skin-on chicken wings were surface-inoculated (3 to 4 log CFU/mL of wing rinsate) with a 6-strain mixture of *C. jejuni* of poultry origin. Following inoculation, samples remained untreated (control) or were treated by immersion (500 mL solution per wing; 5 s) or spray application (10 to 12 psi; 4 s) with water, a proprietary blend of sulfuric acid and sodium sulfate (SSS; pH 1.2), formic acid (FA; 1.5%), peroxyacetic acid (PAA; 550 ppm), PAA (550 ppm) acidified with SSS (pH 1.2), or PAA (550 ppm) acidified with FA (1.5%). Samples were analyzed for *C. jejuni* counts immediately after treatment application (0 h) and following 24 h of refrigerated (4°C) storage. The study was designed as a 7 (treatments) × 2 (sampling times) factorial for each application method (immersion, spraying), blocked by trial day. The experiment was repeated on 2 separate days, and 3 samples were analyzed per treatment and sampling time in each trial ($n = 6$ samples per treatment and sampling time). Data were analyzed using the emmeans package in R (version 3.5.1). Least-squares means were separated using a significance level of $\alpha = 0.05$.

III. RESULTS

All chemical treatments evaluated in this study were effective ($P < 0.05$) at reducing the initial inoculated (3.9 log CFU/mL) *C. jejuni* populations on chicken wings, regardless of treatment application method. Spray application of the chemical treatments resulted in immediate (0 h) pathogen reductions ranging from 0.5 (SSS) to 1.2 (PAA acidified with FA) log CFU/mL, whereas their application by immersion resulted in reductions ranging from 1.7 (SSS) to 2.2 (PAA, and PAA acidified with SSS) log CFU/mL. The PAA and acidified PAA treatments were equally ($P \geq 0.05$) effective at reducing initial *C. jejuni* populations, regardless of treatment application method. However, following refrigerated storage, samples that had been spray- or immersion-treated with SSS- or FA-acidified PAA had lower ($P < 0.05$) pathogen counts than those that had been treated with the nonacidified PAA treatment. Additionally, *C. jejuni* counts of wings that had been immersion-treated with SSS, FA, or one

of the acidified PAA treatments, and stored for 24 h, were lower ($P < 0.05$) than those recovered from the corresponding 0-h samples.

IV. CONCLUSION

Application of the chemical interventions by immersion resulted in greater immediate reductions of *C. jejuni* than when applied by spraying. Overall, regardless of treatment application method, wings treated with the acidified solutions of PAA and stored at 4°C for 24 h had the lowest pathogen counts. Findings of this study should be useful to the poultry industry as they consider new interventions against *C. jejuni* on chicken parts.

Keywords: antimicrobials, *Campylobacter jejuni*, chicken wings