

A VINEGAR-BASED ANTIMICROBIAL SOLUTION EXTENDS THE SHELF LIFE OF VACUUM-PACKAGED RAW CHICKEN PARTS

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I. OBJECTIVES

The study objective was to quantify the shelf life extension of freshly harvested, raw chicken parts following application of Verdad[®] N100 (vinegar-based solution) and subsequent vacuum packaging. Poultry shelf life is determined by the outgrowth of spoilage bacteria with or without the presence of undesirable organoleptic properties, for example, presence of off-*aroma* or textural changes.

II. MATERIALS AND METHODS

Chicken parts (skin-on drumsticks and boneless skinless breasts) were obtained from a processing facility prior to any parts-level antimicrobial intervention. Approximately 24 h postmortem, samples were fully submerged (by part type in fresh treatment solutions each time) in one of 2 treatments (10% concentration vinegar-based solution and 5% concentration vinegar-based solution) with agitation for 20 s, or they were not subjected to dip (negative control). Treated samples were permitted to drip dry for 5 min. Samples were packaged into 5-mil bags and vacuum sealed (3 breasts per bag; 4 drums per bag) and were stored at 2.2°C throughout the study. Aerobic plate counts (APC) and lactic acid bacteria counts were generated on days 0, 7, 14, 18, and 21. At each date, a breast and drum (composing a sample) were analyzed in triplicate. Samples were transferred to a sterile poultry rinse bag to which 100 mL of neutralizing buffer was added, and the bag was thoroughly shaken. Rinsate was appropriately diluted in Butterfield's buffer; APC bacteria were plated on 3M[™] APC Petrifilm (incubated 48 h at 35°C), and lactic acid bacteria were plated on De Man, Rogosa, and Sharpe agar (incubated 48 h at 30°C). Organoleptic qualities (*aroma*, texture, color, purge loss) were measured throughout the study by subjective panel analysis (*aroma* and texture) and instrumental measurement (color and purge loss). The experiment was conducted as a completely randomized design, and statistical analysis was performed using Fisher's least significant difference method in Minitab, with a significance level of $P = 0.05$.

III. RESULTS

Using a spoilage threshold of 6 log CFU/sample, the shelf life of breasts and drums was extended by application of vinegar solution treatment at 10% and 5% concentration. In drums, shelf life was extended by as many as 7 d; in breasts, shelf life was extended by as many as 10 d (Table [1](#)). On days 7, 14, and 18, populations were lower ($P < 0.05$) in treated samples compared to control (no dip). Therefore, when examining shelf life of raw poultry using microbial populations, the application of vinegar solution treatment extends the shelf life significantly. No difference was noted in the *aroma* of the samples until day 21, texture passed panel evaluation as acceptable on all dates, and $L^*a^*b^*$ colorimetric values were similar among treatments throughout the shelf life. Purge loss was higher in treated and nontreated chicken breasts compared to drumsticks from day 7 onward. By day 21, purge loss ranged from a low of 2.35% in control to a high of 3.34% in 5% vinegar solution

treatment for breasts; in drumsticks, purge loss ranged from 0.84% in control and 5% vinegar solution treatment to 1.38% in 10% vinegar solution treatment.

Table 1.

Days to reach 6 log CFU/sample by chicken part and media type (aerobic plate count, APC; lactic acid bacteria, LAB) following treatment application and vacuum packaging

Treatment	Days		Breasts	
	Drums		APC	LAB
Control (no dip)	14	12	7	7
Vinegar-based solution (10% concentration)	19	19	17	14
Vinegar-based solution (5% concentration)	16	16	15	14

IV. CONCLUSION

The application of Verdad® N100 on raw chicken parts (drums and breasts) extended product shelf life by 5–10 d (10% concentration) and 2–8 d (5% concentration). Use of this treatment solution may serve as a complementary processing step to further extend poultry shelf life.

Keywords: antimicrobial, fresh poultry, shelf life

