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Validation of Novel Cultured Cane Sugar and Vinegar Powder to Extend Shelf Life in Fresh Turkey Sausage

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Objectives

The objective of this study was to assess the antimicrobial efficacy of Verdad® Opti. Powder N70 (CSV-P) on inhibition of aerobic plate counts, lactic acid bacteria, and *Enterobacteriacae* growth kinetics in fresh turkey sausage formulation for 24 d of storage at 40°F.

Materials and Methods

Fresh turkey sausage formulation containing turkey thigh and skin, water, sea salt, and different levels of natural antimicrobial interventions: (A) Control, (B) 1.55% CSV-P, (C) 2.1% CSV-P, and (D) 2.5% CSV-P. Each treatment was prepared independently, ground, mixed, vacuum stuffed, clipped, and incubated at 40°F. Table 1 outlines the treatment structure, proximate values for the treatments and the different microorganisms outgrowth data. The samples were enumerated for aerobic plate counts (APC), lactic acid bacteria (LAB), *Enterobacteriacae* (in duplicate), at 6 regular intervals for 24 d of incubation, using Tryptic Soy Agar plate, MRS and VRBG Agar, respectively. Proximate analyses were performed for all the treatments.

Results

Treatments containing CSV-P in general, had lower a_w values in comparison to control (Table 1). Water activity is a major factor influencing the outgrowth of lactic acid bacteria strains, thereby preventing early spoilage. The antimicrobial treatments had no major impact on the ionic strength of the formulations as evidenced by similar pH values. The use of CSV-P at 1.55%, 2.10% and 2.50%, showed control of APC outgrowth. CSV-P treatments at all use level also delayed the outgrowth of LAB and *Enterobacteriaceae* counts compared to the control treatment. The 8 log10 CFU/g limit for APC and LAB bacteria outgrowth was reached in 7 and 6 d, for control treatment, respectively. The 8 log10 CFU/g limit for APC and LAB outgrowth was reached for 1.55% CSV-P in 9 and 7 d, 2.10% CSV-P in 12 and 12 d, and 2.50% CSV-P in 14 and 13 d, respectively. *Enterobacteriacae* counts did not exceed 1 log10CFU/g increase during 21 d of incubation for any treatments containing CSV-P.

Conclusion

The research validates the antimicrobial efficacy of cultured cane sugar and vinegar powder to control the outgrowth of APC, LAB and *Enterobacteriacae*, thus providing the industry with an effective natural and clean label antimicrobial solution to improve shelf life and food safety in fresh poultry sausage.

Table 1: Water activity, pH, moisture, aerobic plate counts, lactic acid bacteria, and *Enterobacteriaceae* outgrowth kinetics details for different antimicrobial treatments

Treatment	a_w	pH	Moisture (%)	Days until 8 log_{10} CFU/g of APC	Days until 8 log_{10} CFU/g of *LAB*	Days for >1 log CFU/g increase in *Enterobacteriaceae* counts
Control	0.986	6.28	71.7	7	6	14
1.55% CSV-P	0.978	6.21	70.2	9	7	>21
2.1% CSV-P	0.979	6.21	69.9	12	12	>21
2.5% CSV-P	0.968	6.22	69.1	14	13	>21

