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Salmonella Lethality Kinetics Using Weak Organic and Inorganic Acids in Rendered Chicken Fat Used in Pet Food

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Objectives

The objective of this study was to assess the antimicrobial efficacy of fumaric acid, phosphoric acid and lactic acid at different concentrations and pH points in rendered chicken fat against a *Salmonella* cocktail at room temperature.

Materials and Methods

Fresh rendered chicken fat was obtained from a commercial facility, divided into 1L bottles and autoclaved to remove any background microbial flora. Chicken fat was allowed to cool to room temp. A 3 strain *Salmonella* cocktail consisting of *Salmonella enterica* serovars Enteritidis, Typhimurium and Heidelberg was added to each individual tube of chicken fat treatment to obtain 7 log CFU/g start-

ing counts. The chicken fat was homogenized, weighed into sterile centrifuge tubes, treatments were applied, and the tubes were vortexed. Application rates of fumaric, phosphoric, and lactic acid treatments are detailed in Table 1. The plating was done after 20 min delay post addition of acid and mixing. Spread plating was done using TSA with an XLT4 agar overlay using the thin agar layer method. The plates were then incubated at 35°C for 24 h.

Results

The *Salmonella* counts (Table 1.) show that fumaric and phosphoric acid were unable to provide lethality with use rates up to 0.60%. However, lactic acid had a bactericidal effect, providing *Salmonella* lethality, in application rates as low as 0.20%.

Table 1. *Salmonella* counts for the different organic and inorganic acid treatments

Fumaric acid (Strong acid)	Log ₁₀ CFU/g	Phosphoric acid (Strong acid)	Log ₁₀ CFU/g	Lactic acid (Weak acid)	Log ₁₀ CFU/g
Control	6.89	Control	6.93	Control	6.93
0.05%	6.96	0.05%	6.96	0.10%	6.03
0.10%	6.87	0.10%	6.56	0.20%	4.00
0.15%	6.90	0.15%	6.71	0.30%	1.00
0.20%	7.00	0.20%	6.20	0.40%	1.00
0.25%	6.93	0.25%	5.88	0.50%	1.74
0.35%	6.87	0.35%	6.14	0.70%	1.00
0.40%	6.56	0.40%	5.46	0.80%	1.00
0.45%	7.40	0.45%	6.24	0.90%	1.00
0.50%	7.27	0.50%	5.95	1.0%	1.00
		0.60%	6.57	1.50%	1.00

Conclusion

This research verifies the antimicrobial efficacy of lactic acid over inorganic acids such as fumaric and phosphoric acid. Thus providing the pet food industry with a natural antimicrobial to provide *Salmonella* lethality in the rendered chicken fat and protecting pet food.