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SUPPLEMENTARY MATERIAL

Inactivation of *Listeria innocua* and *Salmonella* spp. in traditional Italian Spianata piccante: a comparative study of three formulations

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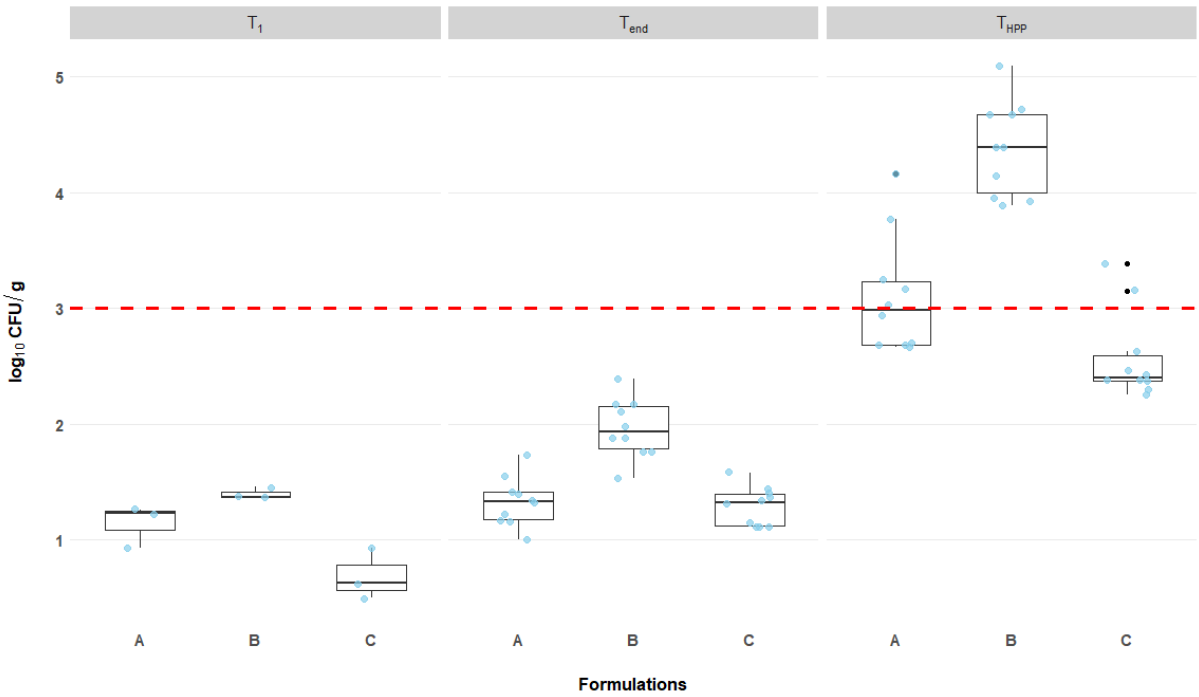
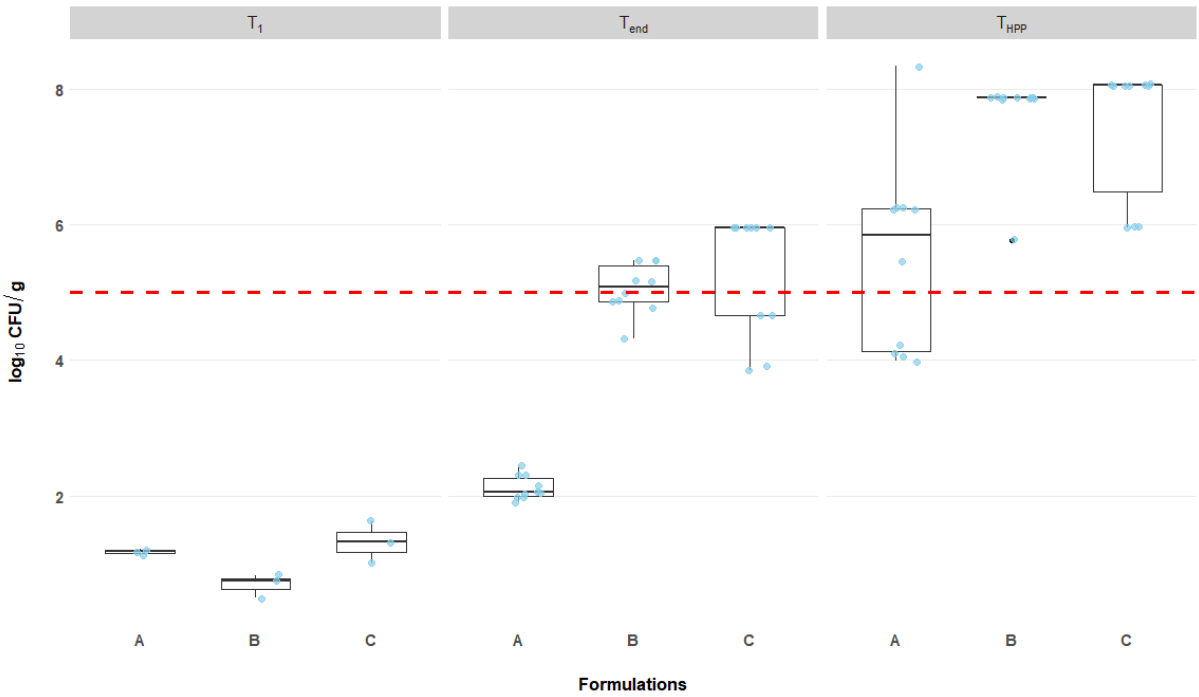
Key words: Spianata piccante, Italian salami, *Salmonella* spp., *Listeria innocua*, High-pressure processing.



Supplementary Figure 1. Box plot representation of logarithmic reduction (Δ log_{10} CFU/g) of *L. innocua* for formulations A, B, and C at three processing time points (T_1, T_end, T_HPP). Note: the horizontal bold line within each box represents the median, while the box boundaries indicate the first and third quartiles. Blue dots represent individual data points from replicates. The dashed red line at 3 log_{10} CFU/g indicates the FSIS target reduction.



Supplementary Figure 2. Box plot representation of logarithmic reduction (Δ log_{10} CFU/g) of *Salmonella* spp. for formulations A, B, and C across the processing stages (T1, T_end, T_HPP). Note: the horizontal bold line within each box represents the median, while the box boundaries indicate the first and third quartiles. Blue dots represent individual data points from replicates. The dashed red line at 5 log_{10} CFU/g indicates the FSIS target reduction.

Supplementary Table 1. Experimental design with the number of sample units analysed at each processing step and the corresponding analyses.

Sampling Time	*L.* innocua or *Salmonella* spp. enumeration	LAB enumeration	pH	a_w
T0	3	3	3	3
T1	3	3	3	3
T_end	10	3	3	3
T_HPP	10	3	nd	nd

LAB, lactic acid bacteria; nd, not determined.

Supplementary Table 2. Evolution of pH and water activity (a_w) in the three formulations of Spianata piccante (A, B and C) throughout the process.

Pathogen	Parameter	Time	A	B	C	*p* - value
L. innocua	pH	T_0	5.65 ± 0.05^{a}	5.67 ± 0.04^{a}	5.68 ± 0.02^{a}	0.623
		T_1	4.82 ± 0.03^{a}	4.80 ± 0.02^{ab}	4.76 ± 0.01^{b}	0.035
		T_end	4.87 ± 0.02^{a}	4.80 ± 0.03^{ab}	4.76 ± 0.04^{b}	0.009
	a_w	T_0	0.96 ± 0.00^{a}	0.94 ± 0.02^{a}	0.95 ± 0.01^{a}	0.228
		T_1	0.95 ± 0.00^{a}	0.95 ± 0.00^{a}	0.94 ± 0.01^{a}	0.079
		T_end	0.94 ± 0.00^{a}	0.94 ± 0.01^{a}	0.93 ± 0.01^{a}	0.671
Salmonella spp.	pH	T_0	5.67 ± 0.05^{a}	5.71 ± 0.06^{a}	5.67 ± 0.03^{a}	0.541
		T_1	4.82 ± 0.02^{a}	4.84 ± 0.02^{a}	4.71 ± 0.05^{b}	0.010
		T_end	4.86 ± 0.02^{a}	4.83 ± 0.02^{a}	4.84 ± 0.04^{a}	0.637
	a_w	T_0	0.96 ± 0.00^{a}	0.95 ± 0.01^{a}	0.95 ± 0.02^{a}	0.535
		T_1	0.95 ± 0.00^{a}	0.95 ± 0.00^{a}	0.94 ± 0.00^{b}	0.010
		T_end	0.94 ± 0.00^{a}	0.92 ± 0.01^{a}	0.92 ± 0.01^{a}	0.046

Note: Values are expressed as Mean ± Standard Deviation (n = 3). Different superscript letters (a, b) within the same row indicate statistically significant differences between recipes ($p < 0.05$). For data meeting parametric assumptions (Shapiro-Wilk $p > 0.05$ and Levene's test $p > 0.05$), significance was determined using one-way ANOVA followed by Tukey's HSD post-hoc test. For data sets where assumptions were violated (e.g., a_W for *L. innocua* batch at T1), the non-parametric Kruskal-Wallis test was applied, followed by Dunn's post-hoc test with Benjamini-Hochberg correction.