THE RESILIENCE OF *Listeria monocytogenes* TO ENVIRONMENTAL STRESSORS

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Introduction

Listeria monocytogenes is a significant foodborne pathogen capable of causing severe listeriosis, particularly in vulnerable people [1]. To prevent its spread, effective disinfection strategies are essential. Quaternary ammonium compounds, like benzalkonium chloride, and peracetic acid are commonly used biocides in food processing environments [2]. However, *L. monocytogenes* can exhibit remarkable resilience, particularly in high-salt conditions. This ability to survive in harsh environments, combined with its tolerance to certain disinfectants, is a persistent threat to food safety [3].

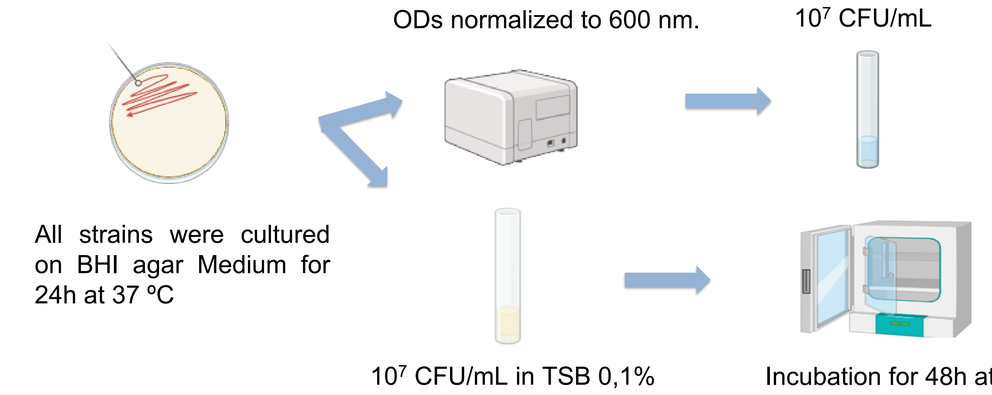
Purpose

This study evaluated the impact of high salt concentrations and common disinfectants, benzalkonium chloride and peracetic acid, on the viability of various *L. monocytogenes* strains. The goal was to understand how environmental stressors affect the survival and persistence of this foodborne pathogen in food processing environments.

Bacterial strains

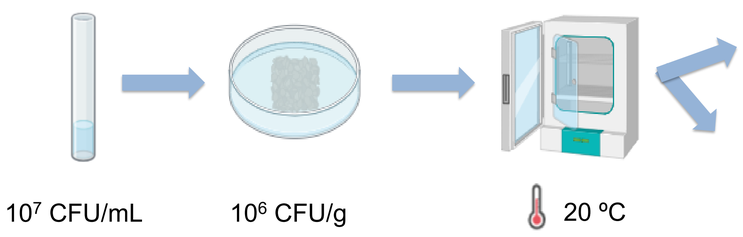
The selected strains are part of the *GenoPheno4Trait* project culture collection and include strains previously classified as persistent and non-persistent in food processing environments, as well as five clinical strains belonging to the top 5 major clonal complexes in Portugal.

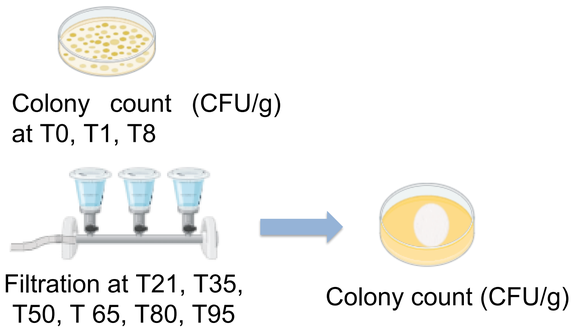
Inoculum



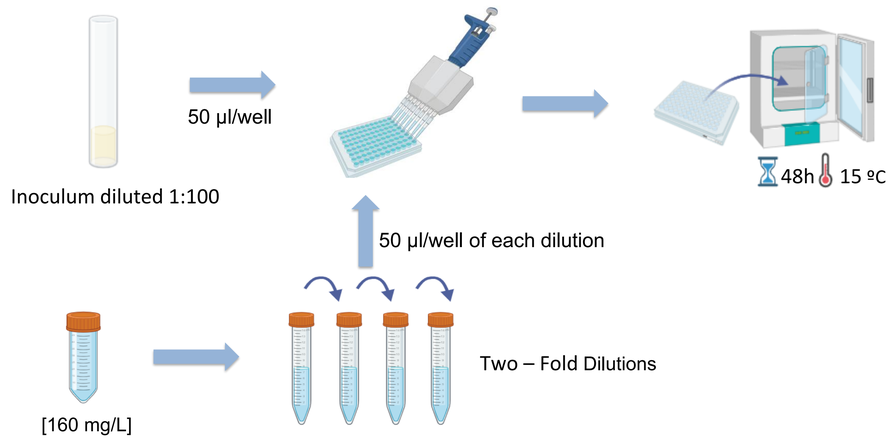
Inoculation

Osmotic Stress



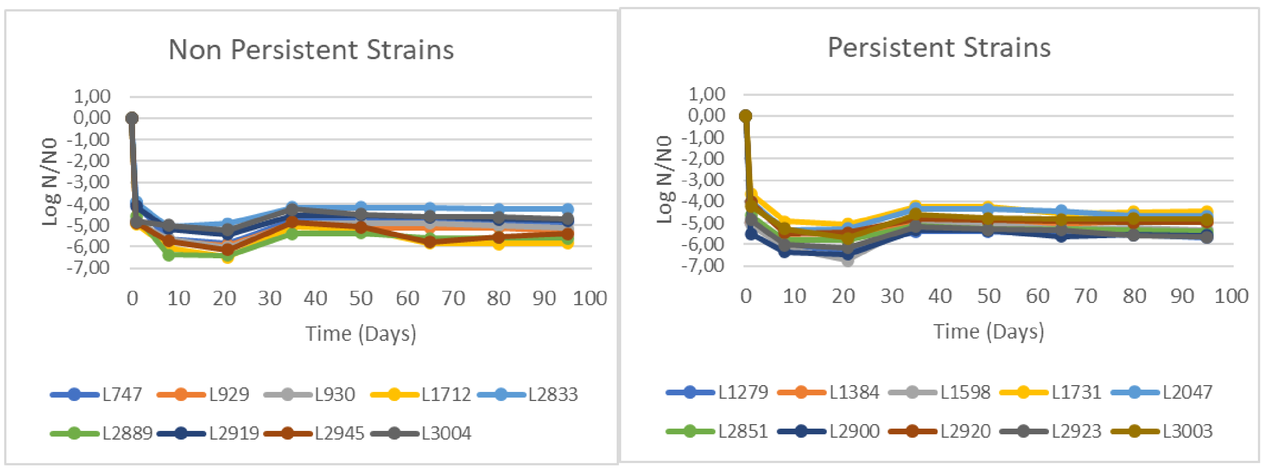


MICs Determination [4]



Results

Osmotic Stress



MICs Determination

Conclusion

- Strains showed resilience for extended periods of time under osmotic stress conditions.
- There was a significant difference in the way that persistent, non persistent and clinical strains responded to the different disinfectants, with MICs ranging from 50 to 100 mg/L for peracetic acid and 1.25 to 5 mg/L for benzalkonium chloride.
- The variation observed between strains suggests the need for a more controlled and specific evaluation in the food industry.
- Understanding these dynamics is essential to develop effective food safety strategies, given the ongoing challenge of *L. monocytogenes* contamination in the food industry.

References

[1] Wiktorczyk-Kapischke, N.; Skowron, K.; Wałecka-Zacharska, E. Frontiers in Molecular Biosciences 2023, 10, 1161486.
[2] Noll, M.; Trunzer, K.; Vondran, A.; Vincze, S.; Dieckmann, R.; Al Dahouk, S.; Gold, C. Microorganisms 2020, 8, 184.
[3] Alves, Â., Santos-Ferreira, N., Magalhães, R., Ferreira, V. & Teixeira, P. (2022) 'From chicken to salad: Cooking salt as a potential vehicle of Salmonella spp. and Listeria monocytogenes cross-contamination', Food Control, 137, 108959. doi: 10.1016/j.foodcont.2022.108959.
[4] Wiegand, I.; Hilpert, K.; Hancock RE. Nature Portfolio 2008, 3, 163-75.

Acknowledgements

This work was supported by National Funds from FCT - Fundação para a Ciência e a Tecnologia through the project GenoPhenoTraits4Persitence (PTDC/BAA-AGR/4194/2021). We also thank to the scientific collaboration under the FCT project UIDB/50016/2020.