

Evaluation of the antimicrobial activity of different natural extracts used to marinate a meat matrix artificially contaminated with foodborne pathogens

Tiago Ribeiro, Joana Barbosa, Paula Teixeira

Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina - Laboratório Associado, Escola Superior de Biotecnologia, Porto, Portugal, Rua Diego Botelho 1327, 4169-005 Porto, Portugal

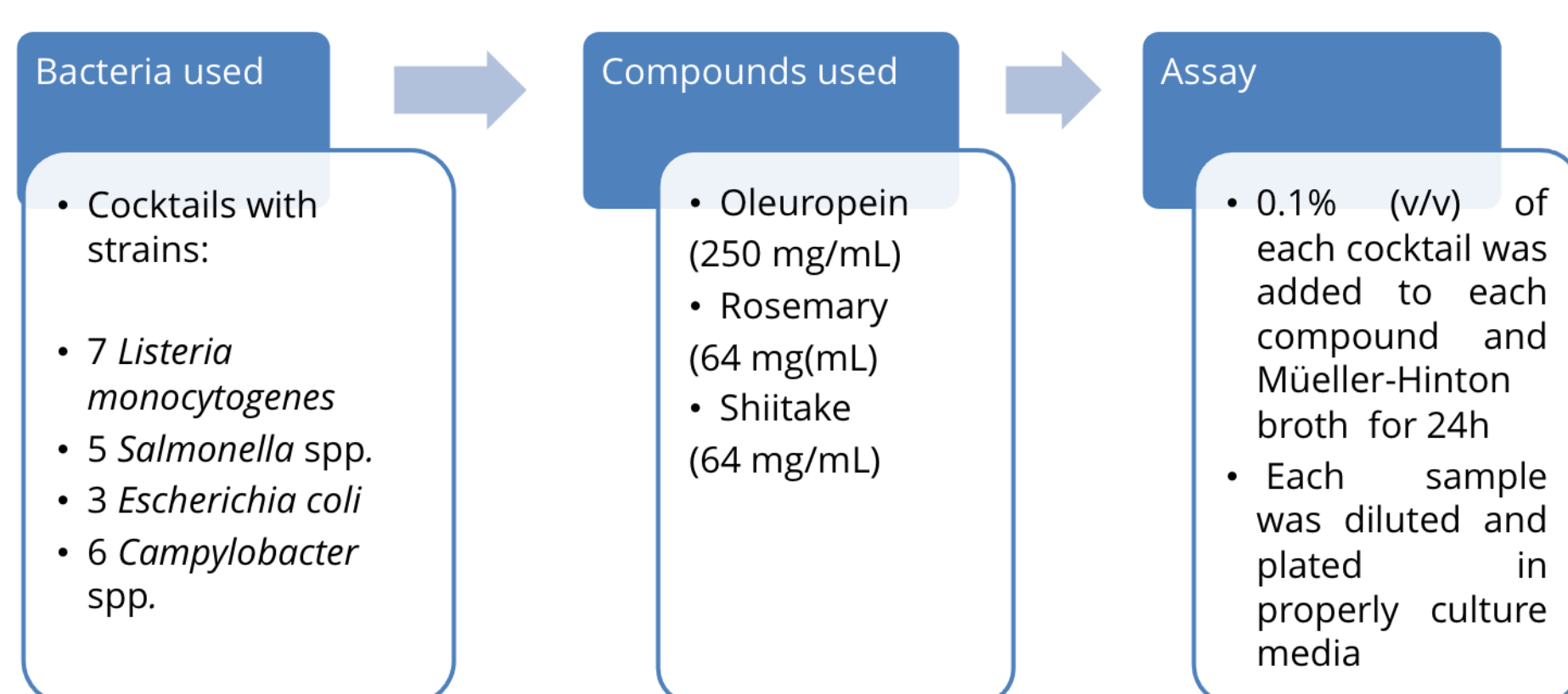


Introduction

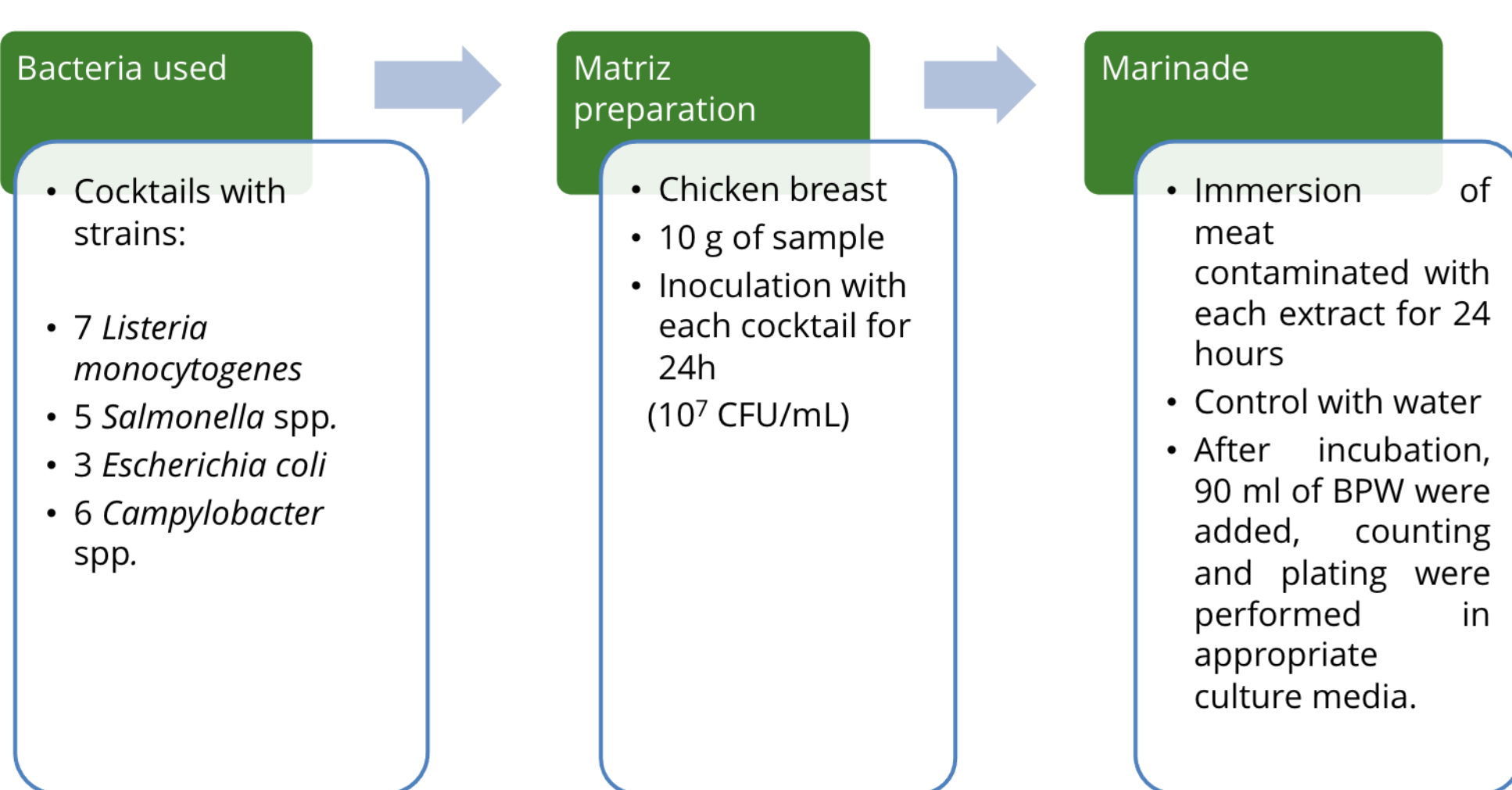
Several pathogens threaten the safety and commercial viability of foods at all stages before reaching the final consumer [1]. Although all pathogens are of concern for the food industry, *Campylobacter jejuni* and *Campylobacter coli* are particularly relevant being commonly detected in poultry, cattle, sheep, wild birds, and pigs [2]. Ingestion of food contaminated with this pathogen causes several pathologies, the most common being gastroenteritis in humans [3]. Several measures can be taken to reduce levels of the pathogen, such as the use of antibiotics and vaccination to reduce colonization in the poultry gut, or even the decontamination of carcasses in industrial processing [4]. Recently, the use of natural extracts to combat pathogens present in food has been an increasingly explored and debated topic, not only due to their antimicrobial capabilities but also due to the health benefits they provide and for allowing the reduction of the use of artificial components in the food industry.

Methods

I. Antimicrobial activity of three natural compounds in culture medium



II. Antimicrobial activity of three natural compounds in meat matrix



Objective

This work aimed to test the antimicrobial activity of three natural extracts against three foodborne pathogens, using each extract solution to marinate an artificially contaminated meat matrix.

Results

Table 1. Logarithmic reductions of the different microorganisms in contact with the compounds used, in the absence of the meat matrix

	Log N/N0		
	Oleuropein	Rosemary	Shiitake
<i>Escherichia coli</i>	-7,63 ± 0,00	-3,77 ± 0,32	-3,81 ± 0,32
<i>Listeria monocytogenes</i>	-7,61 ± 0,00	-3,97 ± 0,98	-3,54 ± 0,67
<i>Salmonella</i> spp.	-7,53 ± 0,00	-3,64 ± 0,32	-3,57 ± 0,17
<i>Campylobacter</i> spp.	-7,19 ± 0,00	-4,02 ± 0,82	-4,44 ± 0,08

- In culture medium, Rosemary (64 mg/mL) and Shiitake (250 mg/mL) extracts showed high antimicrobial capacity against all the tested pathogens.
- In addition, Oleuropein extract (250 mg/mL) inhibited all pathogens to values below the detection limit of the enumeration technique (<1.3 log CFU/mL).

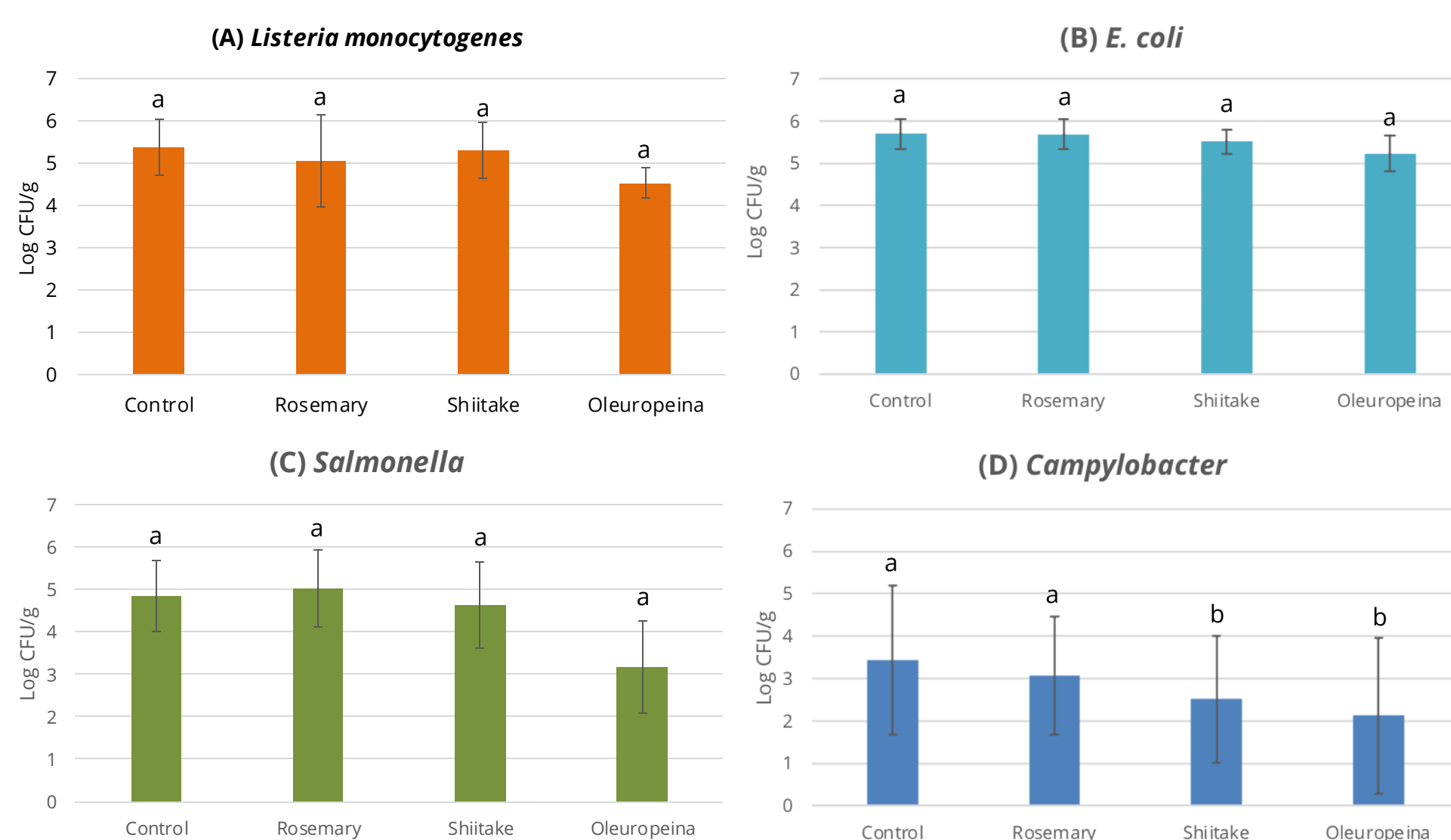


Figure 2. Counts for each pathogen incorporated into the chicken matrix untreated (control) and treated with each of the tested extracts. Equivalent lowercase letters alone mean non-significant differences between each condition ($P > 0.05$).

- Both for *L. monocytogenes* (Fig. 2A) and *Salmonella* spp. (Fig. 2C) there was a reduction of about 1 log cycle in the meat marinated with the Oleuropein. However, these reductions were not significantly different ($P=0.537$ and $P=0.477$, respectively)
- No significant reductions were observed for *E. coli* (Fig. 2B).
- For *Campylobacter* spp. (Fig. 2D), reductions greater than 1 log cycle were observed in the meat marinated with the Oleuropein and Shiitake solution, significantly different from the control ($P=0.071$ and $P=0.033$, respectively).

Conclusions

The antimicrobial activity of the studied extracts was reduced in the presence of a meat matrix. Future studies on the synergy between the studied extracts, as well as their incorporation into different food matrices, would be interesting and lead to new strategies to combat pathogens by the food industry.

References

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Acknowledgements

This work was developed in the scope of the project "Campyfree: *Campylobacter* control strategies in poultry and meat products (GO228 PDR2020-1.0.1-FEADER-PDR2020-101-031254), funded by National Funds and co-funded by the European Union. The authors would like to thank the scientific collaboration under the *Fundação para a Ciência e a Tecnologia* (FCT) project UIDP/00329/2020. Financial support for author J. Barbosa was provided by a post-doctoral fellowship SFRH/BPD/113303/2015 (FCT).

