Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

Evaluating the Efficacy of Four Preservatives Against Pathogenic Bacteria in Meat Analogues

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INTRODUCTION & AIM

Meat analogues benefits

Alternatives to meat consumption

Increasing promotion of the vegetarian diet
The demand for variety by consumers [1]

Low in fat and calories

Healthier alternatives to the consumer, with low content of fatty acids [2]

Reduce greenhouse gas emission

Can lead to a reduction of the gas emission caused by agriculture (animal farming) [2]

Why testing different preservatives?

- To search for more 'natural' alternatives to conventional synthetic chemical preservatives
- To develop strategies for the food industry to extend the shelf life of products that rely on preservatives
- To provide the food industry with robust studies that can improve their methods and processes
- To assess the food safety of products and the effect of preservatives on pathogenic bacteria
- To study natural hurdles that act as preservatives and have a beneficial effect on food without modifying its properties

METHODS

How to produce meat analogue?

1) Mix all the ingredients in a bowl. Ensure that there is no formation of lumps by keeping a steady pace. Follow the recipe in order to guarantee the product texture.

2) The homogenized moisture is separated into distinct plastic cases and cooked in the oven to the desired temperature.
Heat treatment is essential to ensure a **safe product** for the consumer.

3) Let the product cool and it is ready to eat. Serve in slices or in pieces

Challenge testing

Inoculation with pathogenic bacteria

Cocktail of seven strains of *Listeria monocytogenes*, inoculated after cooking and slicing to mimic cross-contamination of the product

Spores of *Clostridium sporogenes* PA 3679 as a surrogate of *C. botulinum* [3], inoculated before the heat treatment to simulate raw material contamination and resistance to temperature

RESULTS & DISCUSSION

Each letter represent one preservative that correspond to:

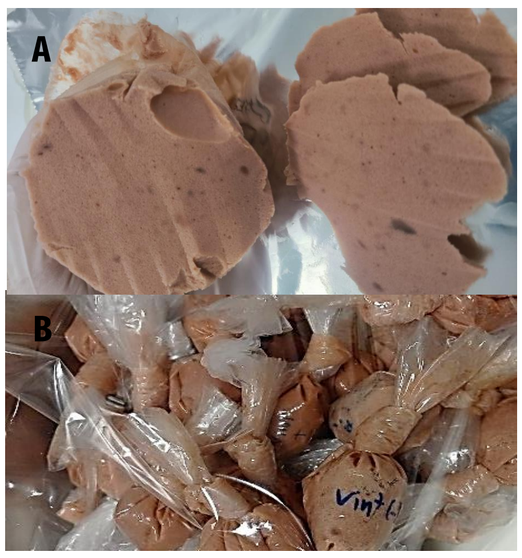
Control: Product without preservative

B: Fermentation extract

F: Phenolic compounds obtained from *Olea europaea* by-products

G: Grape extract

H: Vinegar derivative



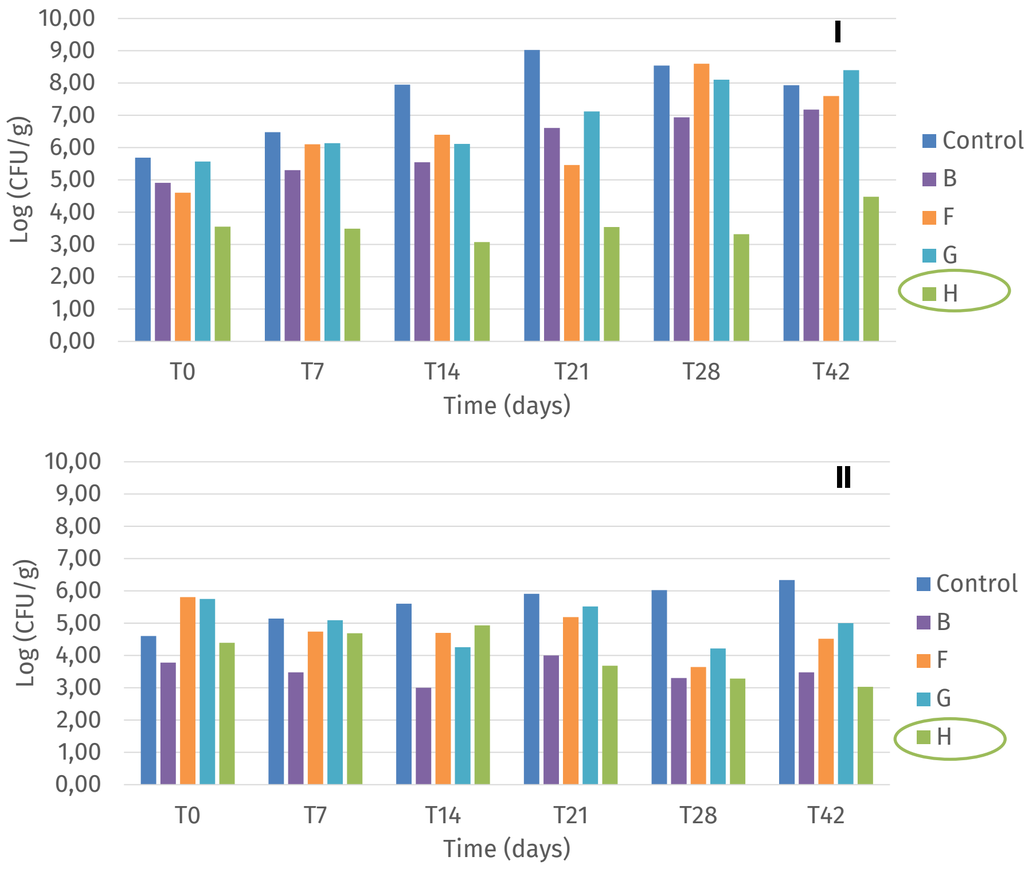


Figure 1. Results for the challenge testing for *Listeria monocytogenes* (I) and *Clostridium sporogenes* (II) during the product shelf-life and one sampling point (Time = 42 days) after due date, representing the various preservatives.

Figure 2. Prototypes of the meat analogues inoculated with *L. monocytogenes* (A) and *C. sporogenes* (B)

CONCLUSION

The graphs depicted in Figure 1 show that both pathogens have a higher growth rate when no conservative was added. The effect of the preservatives is notorious against the microorganisms, with a special highlight in **preservative H**, which causes an inhibition for both *L. monocytogenes* and *C. sporogenes*. The use of alternative preservatives is an emerging topic, to substitute synthetical chemical conventional food additives and promote the consumer's health.

Future work

Sensorial testing the products with the conservatives, to understand its acceptability in the market and, texture and flavor alterations caused by the components.

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M. J. M. N. thanks FCT – Fundação para a Ciência e Tecnologia – for the Grant SFRH/BDANA/02204/2023. This work was supported by agenda VIIAFOOD – Plataforma de Valorização, Industrialização e Inovação Comercial para o setor Agroalimentar (C644929456-00000040), financiado pelo PRR – Plano de Recuperação e Resiliência e pelos Fundos Europeus NextGeneration EU and project micrOOrc – Orchestrating Food System Microbiomes to Minimize Food Waste , funded from the Horizon Europe programme for research and innovation under the grant agreement N° 101136248. We would also like to thank the scientific collaboration under the FCT project UIDB/50016/2020. The author also would like to thank Primor – Charcutaria Prima, S.A. and Associação Colab4Food – Laboratório Colaborativo para Inovação da Indústria Alimentar for the guidance.