

Evaluating the Effectiveness of Four Preservatives in Enhancing the Shelf Life and Safety of Meat Analogues

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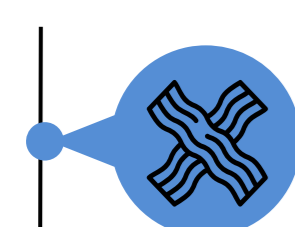
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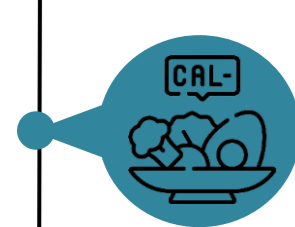
Background and Objectives

Meat analogues benefits



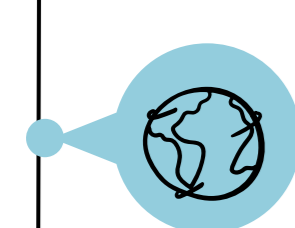
Alternatives to meat consumption

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 altering its properties



Methods

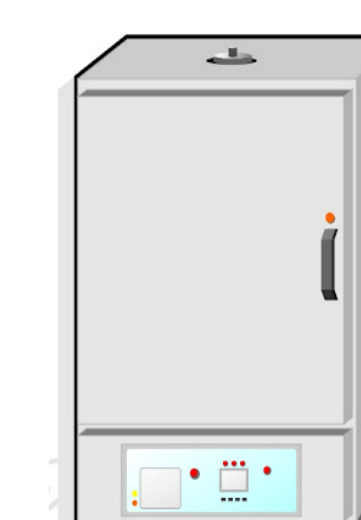
How to produce the meat analogue



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 placed in a plastic casing 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

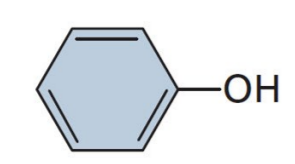
Results

Each letter represent one preservative that correspond to:



Control: Product with the original recipe of Primor – Charcutaria Prima

B: Cultured dextrose



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



H: Vinegar derivative

G: Grape extract



Figure 1: Meat analogue prototypes with different preservatives after the heat treatment (each one with around 200 g)

A preliminary study was carried out with different preservatives to assess the microbiological and technological characteristics during the shelf life of the product, resulting in prototypes as shown in Figure 1. The results obtained during the shelf life of the product are presented in Table 1 and Figure 2.

Table 1: Technological characteristics of the meat analogues

Preservative	Colour - ΔE				pH				a _w			
	T0	T7	T21	T28	T0	T7	T21	T28	T0	T7	T21	T28
Control	-	-	-	-	6.2	6.3	6.2	6.3	0.966	0.962	0.963	0.964
B	1.5	1.6	2.5	1.8	6.3	6.5	6.3	6.5	0.966	0.965	0.969	0.961
H	5.4	4.6	5.1	6.6	6.1	6.3	6.2	6.3	0.966	0.973	0.952	0.958
G	1.2	1.8	0.9	4.4	6.1	6.3	6.1	6.3	0.966	0.955	0.965	0.958
F	2.6	3.8	3.0	4.2	6.5	6.5	6.4	6.5	0.966	0.959	0.961	0.963

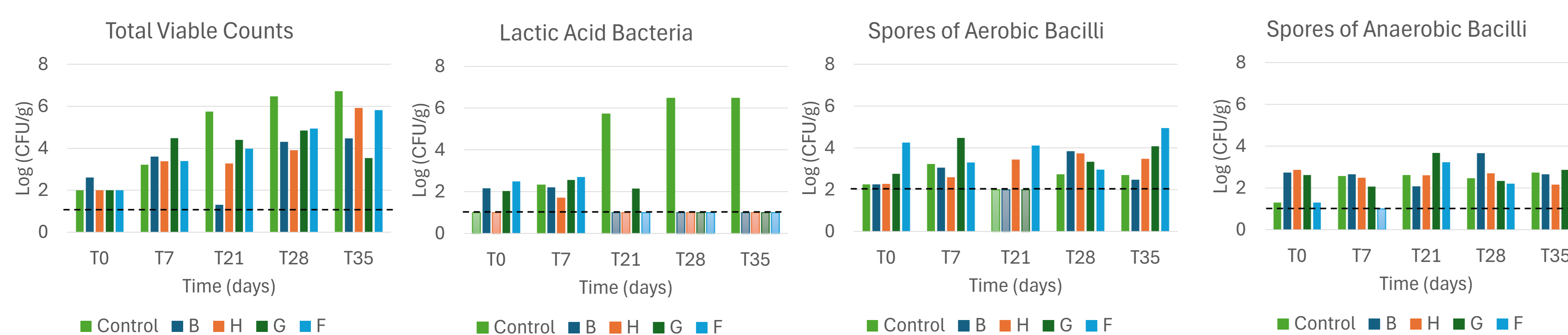


Figure 2: Microbiological characteristics of prototypes during shelf life; the dashed line represents the detection limit of the methods (Log(CFU/g) = 1 to TVC, LAB, Spores of anaerobic bacilli; Log(CFU/g) = 2 to spores of aerobic bacilli and yeast and moulds).

References

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Acknowledgements

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Conclusion

The technological properties of the products showed that the colour was visually different when the conventional preservative was replaced. Besides the colour changes, healthier replacements were found, as some alternatives to the synthetic chemical preservative are made from plant extracts and act as natural barriers to micro-organisms.

It is also important to refer that the faded bars for LAB in Figure 2 represent counts lower than the detection limit, since occurred the overgrowth of unidentified colonies that did not allow a correct count.

For all the samples, the numbers of yeasts and moulds were below the detection limit of the enumeration technique (<2 log CFU/g).

In general, it seems possible to conclude that some of the alternative preservatives used have the potential to be included in the recipe of meat analogues, but further studies need to be carried out.

→ Future work →

The next step is to carry out sensory analysis to guarantee the taste and texture of the products. Challenge tests will then be carried out to understand whether the different preservatives have a greater effect (or not) on pathogens and spoilage bacteria.



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