IMPACT OF NITRITE REDUCTION ON THE MICROBIOLOGICAL SAFETY OF COOKED PORK HAM

Maria J. M. Nunes[1], Lúcia Noronha[2], Inês Cruz[3], Norton Komora, Rui Pereira[4], Joana Barbosa[1], Fátima Carvalho[3], Paula Teixeira[1*]

[1] Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal; [2] Associação Colab4Food, Rua dos Lagidos, 4485-655, Vairão, Portugal; [3] Primor – Charcutaria Prima, S. A., Avenida de Santiago de Gavião, 4760-003 Vila Nova de Famalicão, Portugal; [4] Tecmeat - Centro de Competências do Agroalimentar para o Setor das Carnes, Av. de Tibães n.º 1199, 4770-568 São Cosme Vale, Portugal *pcteixeira@ucp.pt

Background

Nitrite benefits in cooked ham

Organoleptic properties
Including texture, syneresis, colour, flavour, odour, among others

Food safety
Protects against pathogenic bacteria such as *Clostridium botulinum*

Bactericidal effect
Avoid the product spoilage before the shelf-life - preservative

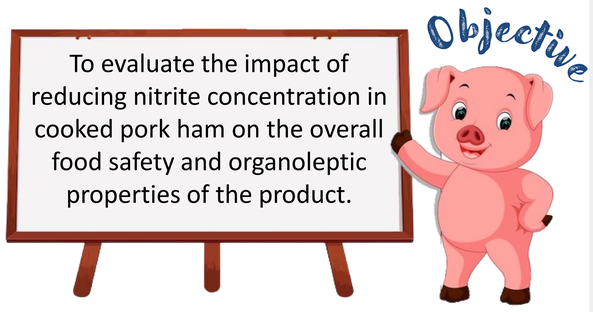
Nitrite is a food additive (E249 & E250) used in various products and is subjected to strict legislation. Nitrite reduction aims a healthier diet, preventing nitrosamine formation.

Regulation nº 1331/2008

Revised limits for nitrite addition Regulation nº 2108/2023

Objective

To evaluate the impact of reducing nitrite concentration in cooked pork ham on the overall food safety and organoleptic properties of the product.



Discussion

Counts of *Enterobacteriaceae, Staphylococcus aureus and Escherichia coli* were below the detection limit of the enumeration technique (UFC/g < 10). *Listeria monocytogenes, Salmonella* spp. and sulphite reducing *Clostridium* spores were not found in 25 g of the product. Moreover, the product meets or exceeds Primor's safety guidelines, which indicates it is safe for consumption.

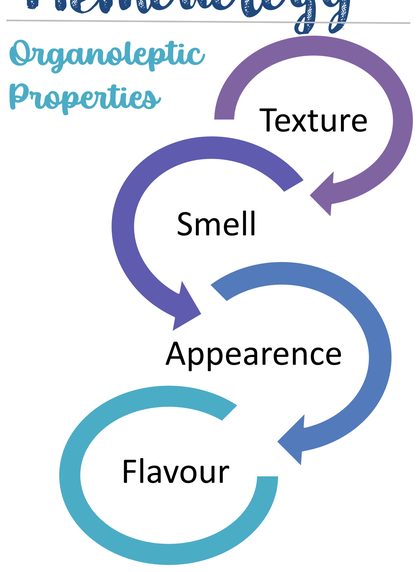
The lack of nitrite in the product leads to an oxidation, as is possible to see in Figure 1. Additionally, the withdrawal of nitrite had a negative impact on the product, potentially leading to lower water retention and resulting in a slightly drier product. However, texture analysis indicated that the absence of nitrite did not significantly affect the overall texture of the product.

Conclusion & Future work

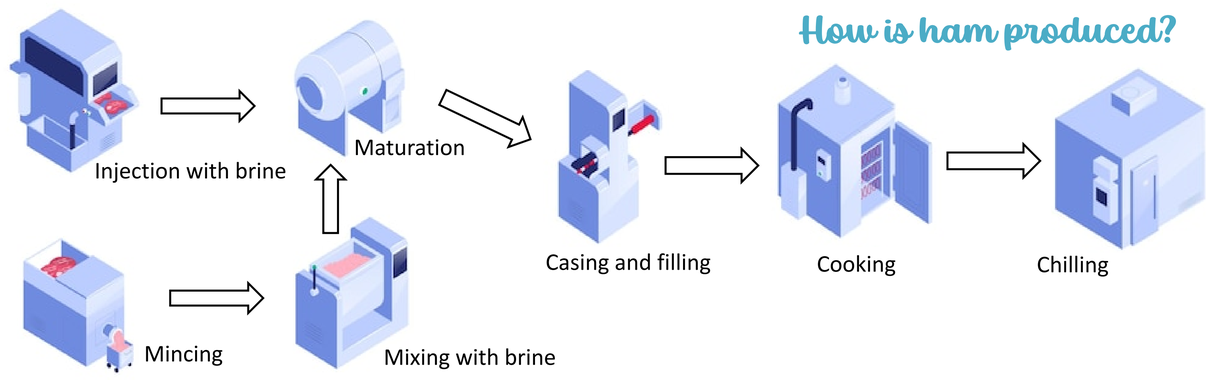
In a first approach, it seems possible to **reduce** the concentration of nitrite since no differences were observed in microbiological and organoleptic characteristics along the product shelf-life.
In the future, it is essential to evaluate the effect of nitrite reduction on the growth of pathogenic bacteria and to assess the product's behavior when subjected to abuse temperatures. Additionally, it would be valuable to investigate nitrite reduction in other processed meat products.

Methodology

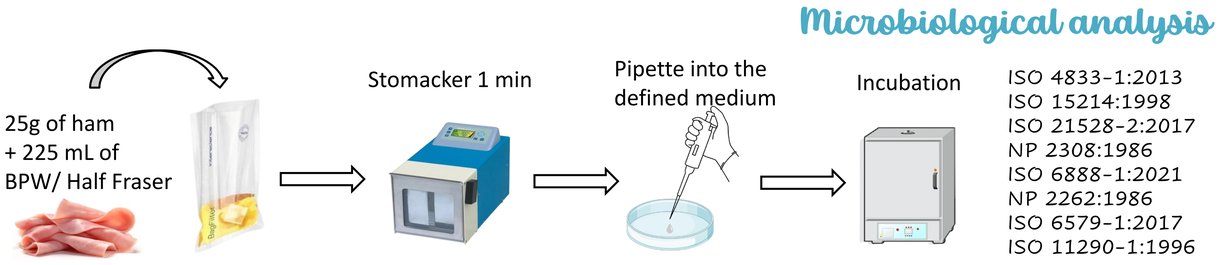
Organoleptic Properties



How is ham produced?



Microbiological analysis



ISO 4833-1:2013
ISO 15214:1998
ISO 21528-2:2017
NP 2308:1986
ISO 6888-1:2021
NP 2262:1986
ISO 6579-1:2017
ISO 11290-1:1996

Results

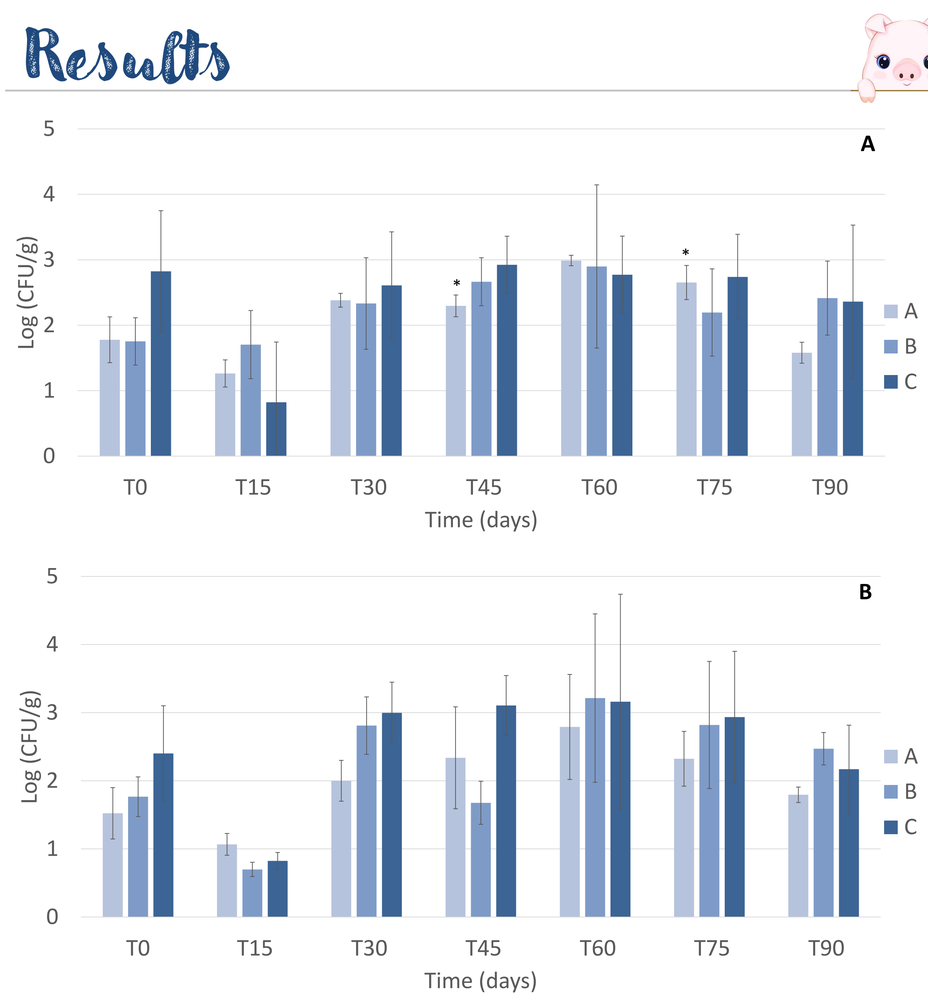


Figure 2: Results for Total Viable Counts (A), and Lactic Acid Bacteria (B) expressed in Log (CFU/g) during the product shelf-life.

Label

A: Standard Ham
B: Ham with nitrite reduction, according to Reg. nº 2108/2023
C: Ham without nitrite

Consumer's panel

Diference from control (DFC) test:

- There were no significant diferences between ham A and B (smell, flavour and colour)
- Ham C was not included in the sensory analysis due to the oxidation, causing the absense of the typical pink colour (Figure 1)

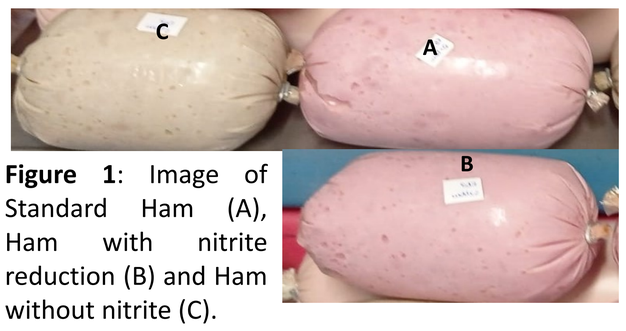


Figure 1: Image of Standard Ham (A), Ham with nitrite reduction (B) and Ham without nitrite (C).

Tecnologycal properties

➢ Slicing	No diferences were found
➢ Syneresis	Ham without nitrite had more free water (exsudate)
➢ pH	pH decreased over time
➢ Water activity	Water activity decreased over time

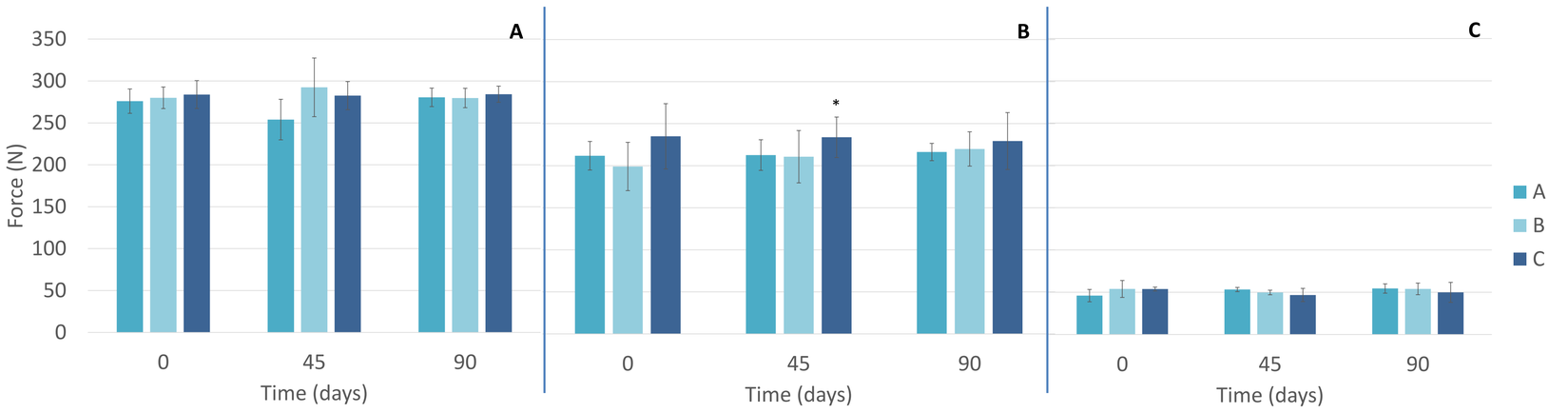


Figure 3: Results for texture profile analysis (TPA), regarding hardness (A), fracturability (B) and chewiness (C), at three different sampling times

Acknowledgements

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