

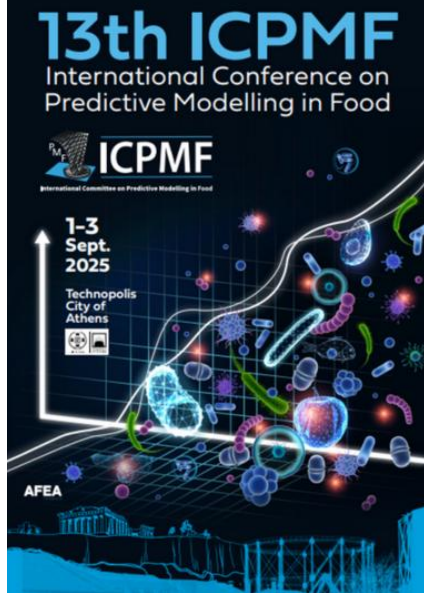
# Nitrite Reduction in Cooked Pork Ham: A Risk for Food Safety?

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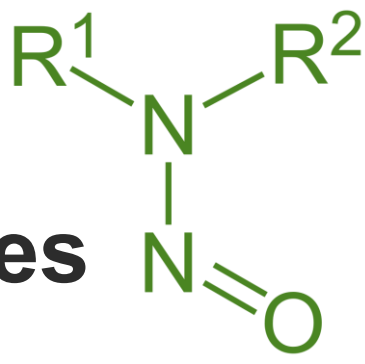


## MOTIVATION and OBJECTIVE

**Nitrite** (E249 and E250) is a regulated food additive commonly used in processed meats. However...



Potential formation of carcinogenic **nitrosamines**



**Revised regulation** has defined maximum levels of 80 mg of nitrite per kg of meat.



Regulation nº 1333/2008



Revised limits for nitrite addition  
Regulation nº 2108/2023

Thus, **PRODUCT REFORMULATION** is needed...

But **does it affect food safety?**



**What is the effect of reducing nitrite in cooked ham on *L. monocytogenes*?**

## METHODOLOGY

**STANDARD (150 ppm) vs. NEW FORMULATION (80 ppm)**



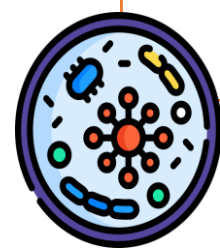
**Inoculation of slices (10-12 g) with *L. monocytogenes* cocktail**  
~4.5 log CFU/g



**Packaging**  
80% N<sub>2</sub>, 20% CO<sub>2</sub>



**Storage**  
4 °C and 8 °C for 35 days



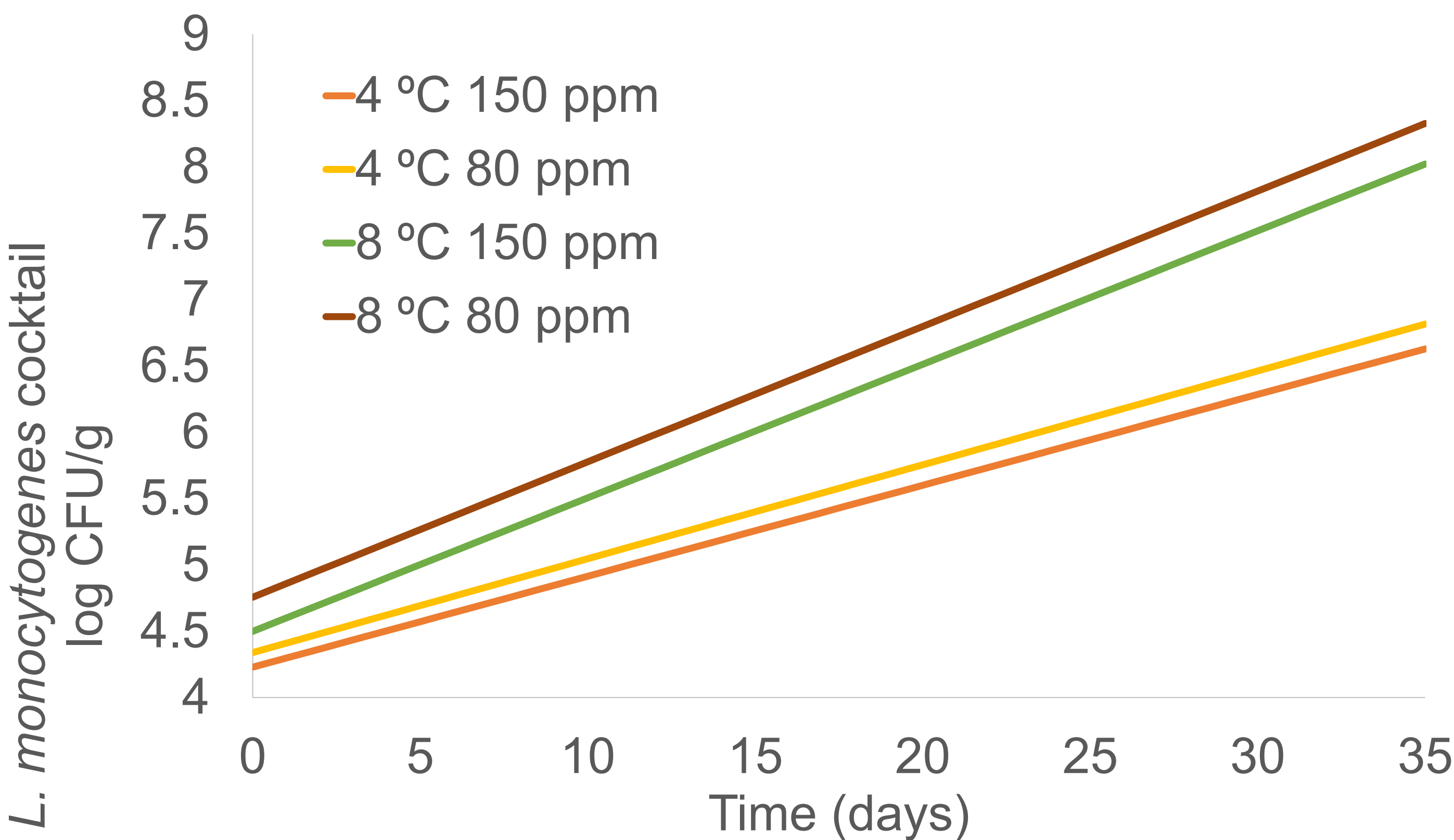
**Microbiological analysis (n=2) at t = 0, 7, 14, 21, 28, 35 days**  
PALCAM agar, 37 °C, 24-48 h  
(ISO 11290-2:2017)



**Model fitting**  
Baranyi and Roberts and Linear Model

## RESULTS

### MICROBIOLOGICAL ANALYSIS



- Data sparsity in early measurements made nonlinear fitting unsuitable → therefore, linear models were fitted
  - $\mu_{\max}$  was primarily affected by storage temperature (4 °C vs. 8 °C)
- Nitrite reduction from 150 ppm to 80 ppm does not appear to have a significant impact on  $\mu_{\max}$

### MODEL FITTING

| Linear model  | R <sup>2</sup> | Initial value (log CFU/g) | $\mu_{\max}$ (log CFU/g day <sup>-1</sup> ) |
|---------------|----------------|---------------------------|---------------------------------------------|
| 4 °C, 150 ppm | 0.917          | 4.23 ± 0.13               | 0.07 ± 0.01                                 |
| 4 °C, 80 ppm  | 0.922          | 4.34 ± 0.14               | 0.07 ± 0.01                                 |
| 8 °C, 150 ppm | 0.952          | 4.50 ± 0.14               | 0.10 ± 0.01                                 |
| 8 °C, 80 ppm  | 0.902          | 4.76 ± 0.21               | 0.10 ± 0.01                                 |

## CONCLUSIONS



**Reducing nitrite content in cooked ham does not result in greater *L. monocytogenes* growth than the original formulation**

This encouraging finding supports the potential for product reformulation with lower nitrite levels in the cured meat industry



### Model fitting

- Linear models appear enough to answer the research question
- However, prediction of the full growth curves is not possible
- When appropriate, and if needed:
  - $\lambda$  (lag time) could be fixed or constrained to a plausible range, or
  - $\lambda$  (lag time) could be back-calculated by extrapolating the exponential line to the initial population and finding the intercept shift

## ACKNOWLEDGMENTS

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