# THE EFFECT OF NITRITE AND SALT REDUCTION ON THE MICROBIOLOGICAL PROFILE OF AN INDUSTRIAL PEPPERONI RECIPE

Ciaran Crowley[1*], Joseph Kerry[1] and Geraldine Duffy[3]

[1]School of Food and Nutritional Sciences, University College Cork, Cork, Ireland

[2]Teagasc Ashtown Food Research Centre, Ashtown, Dublin 15, Ireland.

*Corresponding author email: 116402292@umail.ucc.ie

## I. INTRODUCTION

With the growing consciousness of the health, safety and nutrition of foods. Fermented meat products have come to the forefront of public concern due to their high salt and nitrate content. Since the properties of these ingredients are essential for the safe and effective manufacture of fermented meats, this study aims to investigate whether their concentrations can be reduced in combination with the hurdles of heat treatment and water activity ($a_w$) without compromising the microbiological safety of the products.

## II. MATERIALS AND METHODS

Pepperoni was manufactured according to an industrial recipe provided by a manufacturer partnered to the project. The recipe currently in production for the market was used as the control. A series of recipes with varying $a_w$, salt content, nitrite content and heat treatment were manufactured (Table 1). Physicochemical analysis and microbial screening for, Total Viable count, Lactic acid bacteria, *Staphylococcus spp.*, *Pseudomonas, Brochothrix, Enterobacteriaceae*, Coliforms and Yeasts and moulds were carried out at four time points, Pre fermentation, Post-fermentation, Post heat treatment and post drying [1-4].

Table 1. Recipes

| Recipe | $a_w$ | Salt (%) | Nitrite (ppm) | Heat treatment |
|---|---|---|---|---|
| 0 (Control) | 0.91 | 2.5 | 150 | 53.5°C for 61 minutes |
| 1a | 0.91 | 2.5 | 50 | 53.5°C for 61 minutes |
| 1b | 0.91 | 1.4 | 150 | 53.5°C for 61 minutes |
| 1 | 0.91 | 1.4 | 50 | 61°C for 40 minutes |
| 4 | 0.94 | 1.4 | 150 | 61°C for 40 minutes |
| 6 | 0.94 | 2.5 | 50 | 61°C for 40 minutes |
| 10 | 0.94 | 1.4 | 50 | 64°C for 20 minutes |
| 15 | 0.91 | 2.5 | 150 | 64°C for 20 minutes |

$a_w$: water activity.

## III. RESULTS AND DISCUSSION

It was found that as expected, recipes with high salt/high nitrite, were effective at eliminating spoilage and pathogenic species in the dry product despite which heat treatment was used. It was found that in high salt/low nitrite and low salt/high nitrite recipes that all spoilage and pathogenic species were eliminated by the end of drying in all heat treatments. It was found that the decrease varied in inclination to the industrial control and the rate of reduction of these species was more variable and not as rapid as the high salt/ high nitrite control. The effect of heat treatment became apparent in low salt/ low nitrite recipes. In recipe 1 (low salt/low nitrite), a heat treatment of 53.5°C for 61 minutes was not sufficient to reduce all pathogenic and spoilage species. Recipe 10, with the same composition as recipe 1, when heat treated at 64°C for 20 minutes was effective at eliminating all spoilage species despite its higher $a_w$ of 0.94.

## IV. CONCLUSION

The results of this study show that with the use of additional hurdles like heat treatment, the flexibility of salt and nitrite content is apparent and given the effective supplementation of their reduction with an adequate alternative, the microbial safety of the product can be successfully maintained without compromise to the quality of the product.

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