

# Controlling the microbiological quality of fresh sausages with reduced nitrite content by means of biopreservation

FEURER C., MARGERIN J., NIVEAU F., FREMAUX B., MARTIN J.-L.

IFIP- Institut du Porc, F-94700 Maisons-Alfort, France

Contact: carole.feurer@ifip.asso.fr

## Introduction

Potassium and sodium nitrite (E249 and E250) are used as preservatives and added to meat products to allow, amongst others, the development of the pink color specific to cured meat products. Because nitrite is a co-carcinogen molecule, some disparage its use in food processing, and rules are currently under review to reduce their amount in meat products. This study aimed at preparing craftsmen pork butchers for the coming shift in rules, by offering tools to keep microbiological quality of fresh sausages under control, without altering their organoleptic attributes. Here we considered the use of biopreservation to achieve this goal.



## Material and methods

■ **Product:** French raw sausages (chipolatas) filled into a natural casing and stored under film during 7 days (usual shelf-life: 5 days)

■ **Protective culture:** SafePro® B-SF-77 (*Staphylococcus carnosus* and *Leuconostoc carnosum*, Chr Hansen)

■ **Experiments:** Five conditions were tested and repeated 4 times on an independent basis. At each sampling date (day 0, day 5 and day 7), three samples were analyzed

■ Control sample: 120 mg/Kg nitrite (current dose used by manufacturers) – no protective culture added

■ Test trial 1: 120 mg/Kg nitrite + SafePro® B-SF-77 (to control the absence of spoiling effect of the protective culture)

■ Test trial 2: 100 mg/Kg nitrite + SafePro® B-SF-77

■ Test trial 3: 80 mg/Kg nitrite + SafePro® B-SF-77

■ Test trial 4: 0 mg/Kg nitrite + SafePro® B-SF-77

■ **Analyses:** sensory (colour, general aspect), colorimetric ( $L^*$ ,  $a^*$ ,  $b^*$ ), physico-chemical (pH,  $a_w$ ) and microbiological (Enterobacteriaceae at 30°C (NF V08-054), Total mesophilic flora (NF ISO 4833-1), Lactic acid bacteria (NF ISO 15214) and *Pseudomonas* (BKR 23/09-05/15 A))

## Results

### Physico-chemical and sensory measurements

■ A stable  $a_w$  value (0,968-0,976) all along the shelf life for all tested conditions.

■ An initial average pH value of 5,95 and a decrease of 0,2 units between D5 and D7 for biopreserved test trials only.

■ An oxydation of the product significantly higher in conditions using higher concentrations of nitrite.

■ All five conditions deemed acceptable by the sensory analysis panel

### Microbiology

■ A total mesophilic flora of 6,3 log CFU/g on average in biopreserved test trials, largely composed of lactic acid bacteria.

■ Whatever the condition tested, the 5 log CFU/g shelf life criterion for enterobacteria was fulfilled from day 0 to day 7 (figure 1).

■ A bacteriostatic trend of nitrite combined to SafePro® B-SF-77 against enterobacteriaceae has to be confirmed.

■ The *Pseudomonas* criterion was fulfilled from day 0 to day 7 for conditions combining nitrite and SafePro® B-SF-77 only (figure 2).

■ The combined use of nitrite and SafePro® B-SF-77 appears to limit the growth of *Pseudomonas*

Figure 1: Average evolution of the enterobacteriaceae concentration for each condition

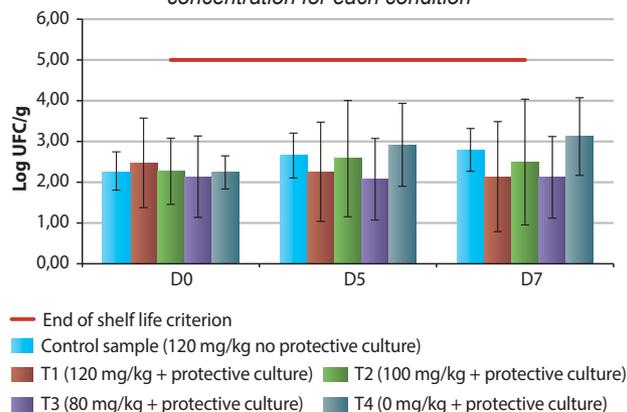
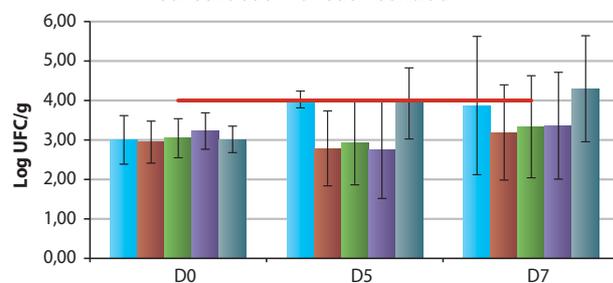


Figure 2: Average evolution of the *Pseudomonas* sp. concentration for each condition



## Conclusion

The use of the protective culture SafePro® B-SF-77 allowed to reduce the nitrite content in chipolatas from 120 to 100 or 80 mg / kg while guaranteeing microbiological and organoleptic qualities of the sausages. It was even possible to extend the shelf life of the product by five to seven days, since the contamination levels were always acceptable for chipolatas with such a nitrite content.