

# EFFECTS OF INCUBATION CONDITION AND DIFFERENT STARTER STRAINS FOR THE PRODUCTION OF NITRITES FROM NATURAL NITRATE SOURCES

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## Abstract

Nitrates and nitrites are used in production of meat products and they play an important role as preservatives, but also in the formation of characteristic red color and taste of the meat. Vegetable products represent a significant potential as a natural source of nitrate for producing organic cooked meat products. The aim of this paper was to investigate the effect of temperature changes on the degree and speed of reduction of nitrates to nitrite salts, using different starter strains of microorganisms.

*Staphylococcus carnosus* was used as nitro-reducing starter culture for the first model, and *S. carnosus* in combination with *Lactobacillus sakei*, for the second model. Celery powder was used as a natural source of nitrate salts. Both models were incubated in the temperature range from 20 °C to 40 °C with a temperature gradient of 2 °C, for 24 and 48 hours. A method for determining nitrite is defined by the international standard ISO 2918:1999. Obtained values of nitrite concentrations were used to calculate the degree and speed of reduction of nitrates to nitrites.

The degree and speed of a chemical reaction increase with increasing temperature. The final concentration of nitrite salts after 24 hours of incubation for the first model was  $85 \pm 2$  ppm at 40 °C and for the same model after 48 hours of incubation,  $100 \pm 10$  ppm (40 °C). The second model showed similar patterns of increase,  $81 \pm 9$  ppm (24h, 40 °C) and  $83 \pm 10$  ppm (24h, 40 °C). The concentration of nitrite salts, the degree and speed of reduction of nitrate salts after 48 hours of incubation was increased, compared to the concentration of nitrite salts after incubation for 24 hours, in both models.

The starter culture in which it was used only *S. carnosus*, proved to be more efficient when it comes to the reduction of nitrates.

**Key words:** Temperature, Reduction, Nitrate, Nitrite, Celery, Microorganisms.