Reducing the amount of nitrate/nitrite added to meat products: Challenges and possible solutions (NitRed) – CORNET –

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Industrial Branch:	Meat products
Duration:	2025 – 2027
Volume:	€ 837.717,-- (total)

Initial Situation

Potassium and sodium nitrite (E 249, E 250) as well as sodium and potassium nitrate (E 251, E 252) are authorized substances in accordance with EU Regulation (EC No. 1333/2008) and have played an important role in the production of meat products for decades. They contribute significantly to organoleptic properties such as color (color development and stability) and the development of characteristic flavor profiles, which are characterized by the so-called "cured aroma". In addition, nitrate and nitrite act as antioxidants that can neutralize free radicals. These are formed during lipid peroxidation and promote the formation of rancid, undesirable

aromas. In addition, nitrate and nitrite are used for their antimicrobial properties, which inhibit the growth of e.g. *Clostridium botulinum*, and thus contribute to the microbiological safety and shelf life of meat products. Under certain conditions, however, nitrate and nitrite can react with secondary amines in meat and form nitrosamines, which are considered potentially carcinogenic. Due to the health risks associated with the addition of nitrates and nitrites, the current addition limits for heated and non-heated meat products are to be reduced by around 20% by October 2025. In addition, the permitted residual amounts for nitrate and nitrite must now also be taken into account (for products such as raw ham, the focus is entirely on the residual content in the muscle). However, other countries within the EU are already aiming for significantly lower limits for the various product categories. However, a reduction in the nitrate/nitrite content can have an impact on the organoleptic properties (appearance, smell, taste) and microbial safety of meat products, especially if the concentrations are lowered further than the values specified in the current EU directive.

The project “NitRed” aims to provide a comprehensive understanding of the future reduction of nitrate and nitrite in heated and unheated meat products. In addition to the process and product matrix-related formation of nitrosamines, the main focus is on the effect of reduced nitrate and nitrite concentrations on the sensory properties color/appearance, curing aroma, taste) and the microbiological safety of the products.

The project also aims to identify possible solutions for a greatly reduced use of nitrate/nitrite (far below the currently permitted limits) without compromising the organoleptic and microbiological quality of the meat products. In order to generate a complete picture, the nitrate/nitrite dose-dependent health aspects during gastrointestinal digestion of processed meat products will also be analyzed and evaluated as part of "NitRed".

The project will address the following questions:

i) How does the reduction of nitrate and/or nitrite affect the sensory properties such as color, aroma and taste as well as the microbiological safety of the target products raw ham, fermented raw sausage and cooked sausage? And how does the reduction of nitrate/nitrite influence color formation and color stability over time under typical storage and retail conditions (sliced/packaged)?

ii) What influence does the matrix, the nitrate/nitrite dosage and selected process parameters (pH reduction ± heating, smoking) have on the formation of nitrosamines?

iii) What ingredient-based and technological options are available to ensure the product quality and characteristic properties of raw and cooked sausage with greatly reduced nitrate/nitrite levels? Which of the ingredient-based solutions are already established on the European market or are about to be approved (during the project period)?

iv) How does the dose-dependent application of nitrate/nitrite curing in meat products influence the formation of lipid and protein oxidation products, glycation end products and nitrosamines during gastrointestinal digestion?

Economic Impact

“NitRed” pursues a multidisciplinary approach to the reduction of nitrate and nitrite in meat products. The results of this project will benefit the meat processing industry in particular SME, as they can be directly integrated into production practice. In the long term, the findings of this project will help to gain a competitive advantage, as some countries are already pushing for a further reduction of nitrate and nitrite in meat products at national level compared to the new EU regulation (EU 2023/2108). This project is also of interest to producers and suppliers of ingredients and additives as well as manufacturers of starter cultures.

Further Information

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Förderhinweis

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