

APPLICATION AND REGULATION OF NITRATE AND NITRITE IN MANUFACTURING OF CHICKEN SAUSAGE

Kasun Kumara Dissanayake¹, Mohamed Rifky^{1,2}, Murodjon Samadiy³

¹Tashkent Chemical-Technological Institute, Tashkent, Uzbekistan.

²Eastern University, Sri Lanka, Chenkalady, Sri Lanka.

³University of Pedagogy and Economic, Karshi, Uzbekistan.

kasunkumar86@gmail.com, rifkyalm@esn.ac.lk, samadiy@inbox.ru

Abstract

Sodium nitrate (NaNO₃) and sodium nitrite (NaNO₂) are essential chemical compounds extensively employed in the food industry, particularly in the production of chicken sausages. These additives serve multiple vital functions, including preservation, flavor enhancement, and microbial control. They safeguard against bacterial growth, particularly the perilous *Clostridium botulinum*, which can produce botulism toxin in inadequately processed meat products.

Keywords: Sodium nitrate, sodium nitrite, maximum residual limits (MRLs), preservation, additives

Introduction.

Sodium nitrate (NaNO₃) and sodium nitrite (NaNO₂) are chemical compounds that are commonly used in the food industry, including the manufacturing of chicken sausage. These chemicals serve several important purposes, such as preserving the meat, enhancing flavor, and preventing the growth of harmful microorganisms. However, their use is strictly regulated by food safety authorities due to potential health risks associated with excessive consumption [1]. Sodium nitrate and sodium nitrite impart the characteristic color and taste to cured meats, endowing sausages with their distinctive pink or reddish hue and flavor.

Maximum Residue Limits (MRLs) are established to ensure safe consumption, preventing excessive concentrations in processed meats. Safety measures dictate precise control of chemical concentrations during sausage production. Labeling requirements require clear disclosure of these additives to inform consumers.

Sodium nitrate can convert into sodium nitrite, primarily through bacterial action, during sausage curing. Thus, meticulous monitoring is crucial to prevent overuse. Concerns over excessive consumption of processed meats containing these additives have raised questions about potential health risks, including an elevated risk of certain cancers, especially when these chemicals react with amines in meat during high-temperature cooking.

Preservation: Sodium nitrate and sodium nitrite are primarily used as preservatives in chicken sausage. They help extend the shelf life of the product by inhibiting the growth of bacteria, particularly *Clostridium botulinum*, which can produce botulism toxin in improperly processed meat products [2,3].

Flavor Enhancement: These chemicals also contribute to the characteristic flavor and color of cured meats like sausages. They give the sausage a pink or reddish hue and a distinctive taste [4].

Regulation: The use of sodium nitrate and sodium nitrite in food products, including chicken sausage, is subject to strict regulations by food safety authorities in many countries, including the U.S. (e.g., the FDA) and the EU (e.g., EFSA) [2].

Regulatory Guidelines: Maximum Residue Limits (MRLs): These guidelines specify the maximum allowable levels of sodium nitrate and sodium nitrite in processed meats. MRLs are set to ensure that the concentrations used are safe for human consumption and do not exceed acceptable levels [5].

Safety Measures: The manufacturing process of chicken sausage must adhere to specific guidelines to ensure the safe use of sodium nitrate and sodium nitrite. This includes accurate measurement and control of the chemicals' concentrations [2].

Labeling Requirements: Food products containing sodium nitrate or sodium nitrite must clearly indicate their presence on the label. This allows consumers to make informed choices and be aware of the ingredients used [6].

Nitrate-to-Nitrite Conversion: Sodium nitrate can be converted into sodium nitrite, primarily through bacterial action, during the sausage curing process. The concentration of sodium nitrite must be carefully monitored and controlled to prevent overuse [1].

Health Concerns: Excessive consumption of processed meats containing sodium nitrate and sodium nitrite has been associated with potential health risks, including an increased risk of certain cancers, particularly when these chemicals react with amines in meat at high temperatures (e.g., during cooking). As a result, there are ongoing debates and research on the safety of their use in food products [7].

Conclusion: sodium nitrate and sodium nitrite play a crucial role in the manufacturing of chicken sausage by preserving the product and enhancing its flavor and appearance. However, their use is tightly regulated to ensure consumer safety, and it is essential for manufacturers to follow guidelines and label products accurately to inform consumers about their presence in the final product.

Reference.

- [1] Zhang Y, Zhang Y, Jia J, Peng H, Qian Q, Pan Z, Liu D. Nitrite and nitrate in meat processing, Functions and alternatives, *Current Research in Food Science*, 2023, p.100470.
- [2] Merino L, Darnerud PO, Toldrá F, Ilbäck NG, Time-dependent depletion of nitrite in pork/beef and chicken meat products and its effect on nitrite intake estimation, *Food Additives & Contaminants*, part a. 2016, 33(2), p.186-192.
- [3] Karwowska M, Stadnik J, Stasiak DM, Wójciak K, Lorenzo JM, Strategies to improve the nutritional value of meat products, Incorporation of bioactive compounds, reduction or elimination of harmful components and alternative technologies, *International Journal of Food Science & Technology*, 2021, 56(12), p.6142-6156.
- [4] Sindelar JJ, Houser TA. Alternative curing systems, *Ingredients in meat products, Properties, functionality and applications*, 2009, p.379-405.
- [5] Zhou Y, Wang Q, Wang S, Effects of rosemary extract, grape seed extract and green tea polyphenol on the formation of N-nitrosamines and quality of western-style smoked sausage, *Journal of Food Processing and Preservation*, 2020, 44(6), p.14459.
- [6] Ferysiuk K, Wójciak KM, Reduction of nitrite in meat products through the application of various plant-based ingredients., *Antioxidants*, 2020, 9(8), p.711
- [7] Iammarino M, Di Taranto A, Cristino M, Endogenous levels of nitrites and nitrates in wide consumption foodstuffs, Results of five years of official controls and monitoring, *Food chemistry*, 2013, 140(4), p.763-771.