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## NITRITE CONTENTS OF MEAT PRODUCTS AVAILABLE IN THE ROMANIAN MARKET

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### Abstract:

Meat products are an important source of nutrients and are a convenient food alternative in the human diet. However, there are concerns about their quality and safety. Nitrites are food additives commonly used in cured meats, with several beneficial effects, including maintaining the red color, and preventing the risk of bacterial contamination, especially with spore-forming bacteria. On the other hand, nitrite can be transformed to carcinogenic nitrosamines in the human digestive tract. Considering this issue, the study aimed to evaluate the monitoring of nitrite content in meat products available on the Romanian market. To determine the nitrite level, 45 samples were purchased from various retail units in Arad, Timiș, Sibiu, and Gorj counties, representing four product categories: raw and dried meat products (n=10), pasteurized products (n=12), boiled and double-smoked specialties (n=11), and smoked products (n=12). The Griess technique was used to determine the nitrite content. The UV spectrophotometer T60 was used to read the data for all four sample categories. The nitrite value for each studied sample in the first category of samples was below the maximum limit, with the exception of raw muscle, which had a nitrite level of 5.1 mg/100 g. The second category had an average nitrite level of 4.76 mg/100. However, boiled ham prepared from pork exceeded the regulatory limit by 11.2 mg/100 g. The third category of items had an average nitrite concentration of 5.19 mg/100 g, although none exceeded the maximum limits. In the fourth category of products, the samples had an average nitrite value of 5.4 mg/100 g. The homemade Kaiser had the highest content, of 11.6 mg/100 g. The findings of the current investigation revealed that, as a safety criterion, nitrite concentration levels in each tested meat product were less than the maximum limit allowed by legislation. However, producers should stay attentive in adhering to good manufacturing standards to reduce any potential related hazard.

**Keywords:** nitrites, meat products, safety, food quality.

### • Introduction

Meat and meat products currently represent an important source of protein in the human diet, and their quality varies according to intrinsic and extrinsic parameters that can sometimes be shaped to make a product more desirable. Most meat products sold in Romania include the following groups: raw and dry-cured meat products, pasteurized products, smoked products and hot smoked and cured meat product. Nitrite is an important additive for the development of cured color and flavor, inhibition of microbial growth and preventing rancidity of meat products. It was reported that the risk increases with the amount of meat consumed, and taking into consideration a large number of people consuming processed meat, it is of significant importance for public health. It is well known that nitrite in food causes health problems primarily because its presence both in food and in the body may lead to the formation of carcinogenic nitrosoamines.

### • Material and method

To determine the nitrite level, 45 samples of meat products were purchased from various retail outlets in the counties of Arad, Timiș, Sibiu, and Gorj. Subsequently, the products underwent analysis to determine the nitrite level. The samples were classified into four categories as followed: raw and dried meat products (n=10), pasteurized products (n=12), boiled and double-smoked specialties (n=11), and smoked products (n=12), in accordance with Order 210/2006 approving the Norms regarding the commercialization of meat products.

The Griess method was employed for determining the nitrite content. Nitrites in an acidic medium can react with a primary aromatic amine, forming a diazonium salt. If this salt condenses or couples with another aromatic amine, a colored complex is formed. The color intensity of the solution under analysis is compared with that of a standard solution containing a known quantity of nitrites. Reading is performed using a spectrophotometer. The results for the four categories of samples were read using the UV T60 spectrophotometer. Subsequently, the absorbance of the samples read on the spectrophotometer at a wavelength of 520 nm was converted into nitrite concentration in mg/100 g, according to pre-calculated values.

### • Conclusions

All meat product samples analysed complied with EU regulations, reflecting a successful HACCP system implementation in processing units. The results of this study do not support consumer concerns about non-compliant products on the Romanian market.

### • Results and discussions

#### Raw and dried meat products

No.	Type of products	Nitrite level (mg/100 g)
1	Dried salami	2,5
2	Dried raw beef tenderloin	2,5
3	Traditional beef jerky	3,0
4	Chicken breast jerky	3,0
5	Raw beef tenderloin	5,1
6	Beef jerky	4,7
7	Fresh sausages	3,2
8	Raw pork sausages	2,0
9	Minced meat	4,4
10	Ground meat	2,8

#### Boiled and double-smoked specialties

No.	Type of products	Nitrite level (mg/100 g)
1	German bulk salami	2,5
2	Bulk salami	8,1
3	Pork pulp salami	4,3
4	Victoria salami	3,2
5	Bulk Sibiu salami	2,5
6	Boiled and smoked breast	5,4
7	Pork loin	9,2
8	"Oltenești" pork sausages	8,5
9	Pork cabanos	4,4
10	Homemade pork sausages	6,8
11	Pork and lamb sausages	2,2

#### Pasteurized products

No.	Type of products	Nitrite level - mg/100g
1	Ham slices	7,1
2	Pork sausages	3,2
3	Bulk chicken sausages	4,1
4	Chicken breast ham	4,5
5	Boiled ham	11,2
6	Chicken sausages	2,6
7	Pork head cheese	2,5
8	Turkey head cheese	2,7
9	Pressed chicken ham	6,6
10	Pork ham	3,4
11	Chicken roll	5,7
12	Chicken breast roll	3,6

#### Smoked products

No.	Type of products	Nitrite level (mg/100 g)
1	Homemade Kaiser	6,7
2	Smoked ribs	2,5
3	Spicy sausages	2,5
4	Smoked bacon	5,3
5	Boiled and smoked breast	5,4
6	Smoked sausages	8,8
7	Home-style sliced ham	5,5
8	Smoked lamb loin	3,8
9	Home-style bacon	1,9
10	Smoked homemade Kaiser	11,6
11	"Haiducec" loin	4,3
12	"Montana" tenderloin	6,5

The results of the ongoing investigation indicate that the nitrite concentration levels in each tested meat product met safety criteria, remaining below the maximum limit permitted by legislation. Aligning with these findings, Drăghici et al. utilized spectrophotometer analysis and similarly found that the residual nitrite content in all samples fell below the maximum threshold outlined in Romanian regulations. A similar result was detected by Casoni et al. where in all the analyzed samples (n=20) the nitrite content was below the maximum admitted concentrations established by European Commission Regulations in meat products.