RESEARCH ON THE LEVEL OF NITRATES OF THE MEAT OF CERTAIN BUTCHER ANIMALS

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Abstract
The research carried out aimed at establishing the level of nitrates, nitrites and volatile nitrosamines in some major animal products of meat and fish.

Key words: meat, animal, butcher's shop, nitrates, nitrites, smoking**.**

INTRODUCTION

The contents of nitrates in pork, beef and mutton has been established by the Griess method. The research results are presented in Table no. 1.

The data obtained show that the level of the residual nitrates varied within relatively wide limits for the meat of the three species studied, both in 2008 and in 2009.

MATERIAL AND METHOD

For these products the M-xylenol colorimetric method has been used, in which nitrates and nitrites are determined as total nitrogen and the nitrites are determined separately by the Griess method. The level of nitrates in the product is calculated by the difference between the level of total determined nitrates and the nitrites find and experienced in nitrates equivalent.

The method is based on the M-xylenol nitration in acid medium in ortho-nitroxilenol, but it is envisaged that this method is influenced by the presence of the nitrites, proteins and chlorides, substances which must be annihilated. To do this, the nitrites are converted into nitrates by oxidation with potassium permanganate ($KMnO_4$). The chlorides are removed by precipitation with ammoniac silver hydroxide and the proteins by precipitation with 20% phosphotungstic acid solution.

RESULTS AND DISCUSSION

During 2008, the limits of variation ranged from 0 to 24.00 mg / kg nitrates in the cattle meat, 0 to 19 mg / kg in the mutton meat and 0 to 48.60 mg / kg in the pork meat. There is therefore a very wide variation of the limits. Comparing the nitrate levels in the samples processed in 2009 with

those of 2010 we may see a very tight resemblance between the results on the limits of variation, i.e. from 0 to 20.60 mg / kg in the cattle meat, 0 to 16 mg / kg in the mutton meat and 0 to 42.80 mg / kg in the pork meat.

The average of residual nitrates in 2009 had values of 8.50 mg / kg in the cattle meat, 9.82 mg / kg in the mutton meat and 17.22 mg / kg in the pork meat. For 2009, the mean nitrate levels were very close to those of 2008, which according to the data were 8.94 mg / kg in the cattle meat, 9.29 mg / kg in the mutton meat and 17 29 mg / kg in the pork meat. The data obtained show higher nitrate levels in the pork meat, so coming from monogastric animals, in comparison to the meat from ruminants which can use the nitrates ingested in the synthesis of certain protein in the rumen based on the ruminal simbionts.

The levels of nitrates, with a value of 0 mg / kg could be established in both years on 6 samples of beef (14.63%), 3 samples of pork meat (7.5%) and 2 samples of mutton meat (8%).

Table 1

The level of residual nitrates in the fresh meat of cattle, mutton and pork

Species from which the meat comes	**2009**			**2010**			**Total**		
	No. of samples	**mg $NaNO_3$/kg**		**No. of samples**	**mg $NaNO_3$/kg**		**No. of samples**	**mg $NaNO_3$/kg**	
		Limits	**Average**		**Limits**	**Average**		**Limits**	**Average**
Cattle	20	0-24.00	8.50	21	0-20.60	8.94	41	0-24.00	8.72
Sheep	10	0-19.00	9.82	15	0-16.00	9.29	25	0-19.00	9.50
Pork	20	0-48.60	17.22	20	0-42.80	17.29	40	0-48.60	17.25

Throughout the period studied, the medium values of 1 nitrate content was of 8.72 ppm in the cattle meat, 9.50 ppm in the mutton meat and 17.25 ppm in the pork meat.

We do specify that the nitrate levels had values below 10 ppm on 53.65% of the beef samples, 40% of the sheep meat samples and 12.5% of the pork meat samples.

The data analysis revealed the following aspects:

- for the raw fish from freshwater from the area of Iasi, the nitrate content expressed in ppm of sodium nitrate ($NaNO_3$) presented limits of variations between 6-15 ppm and an average of 10.69 ppm;
- for the processed fish, for conservation, through salting, the nitrate content presented limits between 6.00 ppm and 19.00 ppm, with an average of 10.93 ppm;
- for the processed fish by smoking, the average of the nitrate content was of 9.92 ppm and the limits from 5.00 ppm to 14.20 ppm;

The data obtained shows relatively low levels of residual nitrates in the meat of fish that is unprocessed and preserved by salting or smoking.

Table 2

The average level of nitrates in fresh and preserved fish

Assortment	No. of samples	Nitrate level mg $NaNO_3$/kg		Frequency of exceeding the MRL
		Limits	Average	
Fresh fish	20	6.00-15.00	10.69	0
Salted fish	15	6.00-19.00	10.93	0
Smoked fish	15	5.00-14.20	9.92	0
Total/Average	50	5.00-19.00	10.53	0

The extensive research over many years refers to 21 types of animal products, 2 products of plant origin (used as an ingredient in the production of meat products) and water used to prepare the brat.

Such research, according to the objectives set, has been aimed at determining the residues of nitrates, nitrites and volatile nitrosamines in some unprocessed animal products and other products after the processing.

The nitrite residues determined for the unprocessed products refers to pork, beef, mutton and fish meat, cow and sheep milk. For the meat of butcher animals that was investigated, it was found that the level of the residual nitrates showed relatively wide ranges of variations, which on species ranged between:

- 0-24.00 ppm $NaNO_3$ in the cattle meat;
- 0-19.00 ppm $NaNO_3$ in the mutton meat;
- 0-48.60 ppm $NaNO_3$ in the pork meat;

For the pork meat, the average of the nitrate content had a value of 17.25 ppm $NaNO_3$ appearing as a double value compared to the cattle meat. For this meat coming from monogastric animals, a large variation of nitrate content (0 to 48.60 ppm $NaNO_3$) was observed, but where the nitrates by content were employed by percentage, as follows:

- free samples of nitrates at 7.5% (3 samples);
- samples with content < 10 ppm $NaNO_3$ at 10% (4 samples);
- samples with content between 10.1-15.00 ppm $NaNO_3$ at 30% (12 samples);
- samples with content > 15.00 ppm $NaNO_3$ at 52.50% (21 samples).

For the freshwater fish meat, the residual nitrate level is slightly higher than the cattle meat with an average of 10.69 ppm $NaNO_3$, a relatively close level set to both the salted (10.93 ppm) and the smoked fish (9.92 ppm).

CONCLUSIONS

The residual nitrates from animal products - meat, milk after the obtaining and even after the processing in derived products have not proven to be in amounts which could lead morbid conditions to the consumers, only in exceptional cases of acute poisoning in animals, or disease conditions or

the indiscriminate use of nitrates in the salting mixture, or in milk for the fraud or antibacterial purpose.

The residual nitrites in the unprocessed animal products have no important health signification through low levels in the contents.

In the meat of butcher animals, the nitrate content has average values below 10 mg $NaNO_{-3}$/kg in the cattle meat (8.72 ppm $NaNO_3$) and in the mutton meat (9.50 ppm NaNO3), but was almost double in the pork meat (17.25 ppm $NaNO_3$).

The residual nitrates in meat of fresh fish appear slightly higher than in the cattle and mutton meat, with an average value of 10.69 ppm $NaNO_3$, but very close to the value of the salted fish (10.93 ppm $NaNO_3$) and of the smoked fish (9.92 ppm $NaNO_3$).

The nitrite content in the cattle mutton and pork unprocessed meat in meat products, has no sanitary importance and significance, having values between 0 mg and 2.00 mg $NaNO_2$/kg $NaNO_2$/kg and the average value consistently below 1.00 mg $NaNO_2$/kg. A relatively high percentage of samples did not contain nitrites (51.22% in the samples of cattle meat, 32.50% in the pork meat and 28.00% in the cattle meat).

The relatively low average values were contained in the unprocessed fish meat (0.035 ppm $NaNO_2$), the salted fish meat (0.07 ppm $NaNO_2$) and the smoked fish (1.7 ppm $NaNO_2$).

For the nitrates it is recommended:

- the strictly limitation of their use only for the meat products as in smoked products.

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