RESEARCH ON THE LEVEL OF NITRATE CONTENTS IN MILK AND SOME DIARY PRODUCTS

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Abstract

Part of the nitrates from the ration of ruminants are converted into assimilable products in the rumen, and some will be found in the blood, organs and muscles that will be eliminated in the urine and even milk

Normal equilibrium relation between plant - animal appears to be maintained by the condition of a supply of nitrogen to 0.5 g x 100g. Any deviation can lead to increases in blood level in organs and tissues.

Key words: nitrates, nitrites, milk, diary products, animals.

INTRODUCTION

Taking into consideration that milk as a food product may be contaminated with a relatively large number of physical pollutants (foreign bodies, radionuclides), chemicals (pesticides, heavy metals, mycotoxins, antibiotics, dioxins, nitrates, liters, etc.). we set to determine the nitrate content in the area of mixed milk, pasteurized milk, sheep's milk and reconstituted milk powder.

Bibliographical studies on nitrate in milk, divide the authors into two categories:

- Followers of milk pollution by nitrates from water used to wash udders, vessels, installations, adding to milk for the deceptive anti-microbial effects of "anti-microbial and / or negligence in the operation to correct density and proper cleaning after removal of milk stone "with nitric acid, nitrates formed in the operation;
- Followers of nitrate in the milk of ruminants and monogastric intake consumed by high nitrate content of food given.

MATERIAL AND METHODS

For milk and dairy products there has been used the method with cadmium column reduction and expression was made in ions of NO^-_3 and NO^-_2.

Samples of milk mixture (10 ml) were initially subjected to correct deproteinization after their dilution with hot distilled water and the addition of protein-free substances and filtering, to obtain a filtrate volume of 200 ml, volume that will be considered in the calculation.

The same method was used for sheep's milk, reconstituted milk powder and cheese, indicating that for work with cheese (fresh cottage cheese, curd cheese from sheep's milk, cow's milk curd, cheese) there were used 10 g of the product.

In this context, there was determined by the cadmium column reduction over four years, 95 milk samples, and within two years, 30 samples of sheep milk, 40 pasteurized milk samples and 45 samples reconstituted powdered milk. The results will be presented below.

RESULTS AND DISCUSSION

Research on levels of nitrates in fresh collected milk

For this category of dairy research has been carried out during the years 2007, 2008, 2009 and 2010.

The results obtained are shown in Table. 1.

The analysis of data for 2007 show that nitrate ions (NO^-_3) had limits between 0 and 6.40 mg / l with an average of 2.66 mg NO^-_3 For 2008 the limits were between 0.40 and 7.50 mg NO^-_3/l and had an average value of 2.39 mg NO^-_3 /l.

In 2009 the average nitrate was 3.08 mg NO^-_3/l, and the limits ranged from 0 to 5.10 mg NO^-_3/l.

During 2010 the average nitrate level was 2.67 mg NO^-_3/l and the limits ranged between 1.40 and 6.10 mg NO^-_3/l. For all years, the level of nitrates in fresh milk had an average of 2,70mg NO^-_3/l.

Table 1

Level of nitrates in fresh milk (NO^-_3/l)

year	No of samples	mg nitrates (NO^-_3)/l		Frequency of overcome LMA	
		Limits	Average	A	R
2007	25	0-6,40	2,66	0	0
2008	25	0,40-7,50	2,39	0	0
2009	25	0-5,10	3,08	0	0
2010	20	1,40-6,10	2,67	0	0
Total/ Average	95	0-7,50	2,70	0	0

Careful analysis of primary data have enabled us the following classification of levels of nitrates in fresh cow milk;

- Level 0 NO^-_3mg/l in two samples (2.1%);
- Level between 0.1 to 1 mg NO^-_3mg /l in 13 samples (13.68%)
- Level between 1.1 to 2 mg NO^-_3mg /l in seven samples (7.37%);
- Level between 2.1 to 3 mg NO^-_3mg /l in 43 samples (45.26%);
- Level between 3.1 to 4 mg NO^-_3mg /l in 18 samples (18.95%);
- Level between 4.1 to 5 mg NO^-_3mg /l, 8 samples (8.42%);
- Level between 5.1 to 6 mg NO^-_3mg /l in one sample (1.05%);
- Level above 6 mg NO^-_3mg /l in 3 samples (3.16%).

The data we obtained show a variation of nitrate content expressed in ions of NO^-_3mg /l within relatively large limits, ie. at 0 mg / l at a level of 7.5 mg / l.

The average of the nitrate content throughout the investigated period for fresh collected milk had an average value of 2.70 mg NO^-_3mg/l. This may mean the following aspects:

- A normal balance relation between the amount of nitrates in soil and plants;
- An apparently steady relationship between nitrates in consumed forage and animal, ie of nitrate in forage and condition of the herd;
- apparent lack (absence) of situations where the relationship between animal milk producer and consumer would threaten consumer health by inducing high levels of nitrates from acute toxic condition.

The exposed situation refers to the described milk mixture, collected for processing, which can not show the extreme cases when the apparent equilibrium can not be destroyed by disease conditions and consumption of forage with high content of nitrates. Milk, as a biological product with great nutritional value can be a source of the content of nitrate release of toxic conditions in humans that DL is 8-12 g, but there has to be taken into consideration had the effect of small quantities of nitrates on organisms for a long period.

Research on nitrates in pasteurized milk

During the years 2009 and 2010 there were determined nitrates in 40 samples of drinking milk packaged in plastic sheeting, originated from various processing units and sold in the market area of Iasi. The research results are presented in summary table 2. The obtained data for 2009 indicate an average of ions NO^-_3/l 2.48 mg and the limits ranging between 0 and 4.00 mg / l.

Table 2

Level of nitrate contents in pasteurized milk

Year	No.	mg ions NO^-_3/l		Overcome of
	Of samples	Limits	Average	LMA
2009	20	0-4,00	2,48	0
2010	20	0-4,10	2,75	0
Total/ Average	40	0-4,10	2,61	0

For 2010, the average nitrate ions (NO^-_3)/l was of 2.75 mg, and the limits ranged from 0 to 4.10 mg / l.

The average value of ions content of NO^-_3/l during the two years was of 2.61 mg / l.

Comparing the obtained values from pasteurized milk with those of fresh milk there have not noticed differences, but very similar values both of the limits of variation and especially the average values of 2.61 mg / l to 2.70 mg pasteurized milk and fresh milk.

The content of NO^-_3/l of the 40 samples of pasteurized milk in percentage ranked as follows:

- NO^-_3/l content between 0 mg / l and 1.00 mg / l to 5% of samples (two samples);
- Ion content of NO^-_3 between 1.10 mg and 2.00 mg / l the 12.50% of the samples (5 samples);
- Ion content of NO^-_3 between 2.10 mg and 3.00 mg / l at 55.00% of the samples (22 samples);
- Ion content of NO^-_3 between 3.10 mg and 4.1 mg / l to 27.50% of the samples (11 samples);

Research on the nitrate content of reconstituted milk powder

In the 45 samples of reconstituted milk during the years 2009-2010, the nitrate (NO^-_3ion) had an average value of 2.13 mg NO^-_3/l (Table no. 26). Annual averages and limits of variation in reconstituted milk had the values:

- 2.30 mg NO^-_3/l of milk with limits ranging from 1.30 to 2.80 mg in 2009;
- 2.05 mg NO^-_3/l and the limits between 0 to 2.60 mg in 2010;

In Table 3 there are shown average values of nitrate content in reconstituted milk powder.

Table 3

Average values of nitrate content in reconstituted milk powder

Year	No. of sample	mg NO-3/l		Overcome of LMA
		Limits	Average	
2009	15	1,30-2,80	2,30	0
2010	30	0-2,60	2,05	0
Total/Average	40	0-2,80	2,13	0

The data obtained show a conservation level of nitrate initially present in milk, without being metabolized by microorganisms in milk, which were killed by heat treatment to which milk is subjected in the process of obtaining milk powder.

Research on the nitrate content in sheep milk

In the 30 examined samples of sheep milk during the years 2009-2010, the average value of nitrate content was below the limit of 0.4 to 0.9 per 100 ml of milk and relatively close to that determined the fresh milk cow. In sheep's milk, this average had a value of 2.19 mg NO^-_3/ l of milk. The data obtained for 2009 reveal that the limits had the value of 0.5 to 3.90 mg NO^-_3/l and an average of 2.146 mg NO^-_3/l and for 2010 they ranged between 0.4 and 3.80 mg NO^-_3/l and had the average value was of 2.233 mg / l.

In Table 4 there are given the average values of nitrates in this type of milk.

Table 4

The content of nitrates of ovine milk

Year	No. of samples	mg NO^-_3/l de lapte		Overcome of LMA
		Limits	Average	
2009	15	0,5-3,90	2,146	0
2010	15	0,4-3,80	2,233	0
Total/Average	30	0,4-3,90	2,190	0

In the summary table 5 there are displayed the nitrate content in the four types of milk studied, which shows that the average nitrate levels in the four items had values less than 3.00 mg / l and in descending order amounted to:

- 2.70 mg NO^-_3/l in fresh cow's milk;
- 2.61 mg NO^-_3/l in pasteurized milk;
- 2.19 mg NO^-_3/l in sheep's milk;
- 2.13 mg NO^-_3/l in reconstituted powdered milk;

The data show a relatively large variation in nitrate content of milk in all categories examined, specifying that the average nitrate levels ranged from 2.50 mg NO^-_3/l

Table 5

Average values of nitrates in the some milk assortments

Assortment of milk	No. of samples	mg NO^-_3/l		Overcome of LMA
		Limits	Average	
Fresh milk	95	0-7,50	2,70	0
Pasteurized milk	40	0-4,10	2,61	0
Sheep milk	30	0,40-3,90	2,19	0
Reconstituted powder milk	45	0-2,80	2,13	0
Total/Average	210	0-7,50	2,50	0

Comparing the data we obtained with data of other authors for the milk of the area Iasi, Cluj-Napoca and Timisoara there can be shown the following levels of NO^-_3/l in milk mixture:

- Average level of 4.56 mg NO^-_3 in milk mixture collected from a farm in Cluj-Napoca, set by V. Stanescu and colleagues (1984); - Average level of 1.86 mg NO^-_3in sheep's milk from a farm in Timis county established by Trif Alexandrina and colleagues (1997) on the intake of pasture nitrate content was below permitted limits;
- - Average 2.76 mg NO^-_3 in cow's milk in Iasi area set Hura Carmen (2001).

These differences, relatively different in containt of nitrates in milk seem to reflect the level of nitrates in forage.

CONCLUSIONS

At the four categories of milk investigated, the maximum nitrate level for all categories was below 10 mg NO^-_3m/l and minimum value at 0 ppm. Thus, the maximum value was 7.50 mg NO^-_3/l in milk mixture, 4.10 mg NO-3/l pasteurized milk, 2.80 mg NO^-_3/l in reconstituted powdered milk and 3 , 90 mg NO^-_3/ l for sheep milk.

The average values of mg NO^-_3/l content were:
-2.70 mg / l in milk mixture;

- 2.61 mg / l in pasteurized milk;
- 2.13 mg / l in reconstituted powdered milk;
- 2.19 mg / l in sheep milk

Fresh milk mixture had a nitrate content between 0 mg NO^-_2/l and 0,6 mg NO^-_2/l, an average of 0.062 mg NO^-_2/l and approximately 58.00% of the samples did not contain nitrites.

The level of nitrites in pasteurized milk varied between 0 and 0.4 ppm NO^-_2 showed an average value of 0.087 ppm $NO^-_2$to 1.4 times greater than the unpasteurized milk.

The reconstituted milk powder, the level of nitrites had the limits of 0 and

0.32 ppm NO^-_2, an average of 0.10 ppm NO^-_2, which is 1.7 times greater than that of fresh milk.
The level of nitrite in milk sheep ranged from 0 to 0.20 ppm NO^-_2 and an average of 0.062 ppm NO^-_2 that is very close to the average value determined from fresh cow milk and 40% of samples there were not found nitrites.
For cow and sheep milk it is proposed that the maximum permissible limit should be the value of 10 ppm NO^-_3.

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