COMMENTS CONCERNING SELENIUM CONTENT VARIATION IN SOME PLANTS AND FEED PRODUCTS FROM IASI AREA

OBSERVAŢII PRIVID VARIAŢIA CONŢINUTULUI DE SELENIU DIN UNELE PLANTE ŞI PRODUSE FURAJERE DIN ZONA IAŞULUI

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Abstract. *The paper presents results for selenium concentration determination by AAS method in various plant and derived feed (corn seeds, corn green and prepared sillage, Sudan herb, soy-green plant, green alfalfa, mown grass alfalfa, haw mowing, straw alfalfa and different mixt sillages) taken from a farm situated outskirts of Iasi, near the plant that provides heat for the city, and from a farm located about 100 km from Iasi. Selenium determination in the feed samples analyzed revealed three distinct situation in relation with selenium recommended optimal content(150-300) ppb as follows: critical deficiency (10-100) ppb Se, marginal deficiency (100-150) ppb, respectively toxic level (300 ppb higher). 52.17% of the feed samples analyzed showed an appropriate concentration with variations ranging from 158.62 to 259.28 ppb Se, while 26.08% of the samples showed selenium deficit content and 21.73% of the samples exceeded the content of the selenium optimal concentration set between150-300ppb*

Key words: Selenium, feed plants, Iaşi

Rezumat. *Lucrarea prezintă rezultatele determinării concentraţiei seleniului prin metoda SAA în diverse plante furajere şi furaje derivate, recoltate de la o fermă situată la periferia Iaşului, în vecinătatea centralei ce furnizează agentul termic pentru oraş, respectiv de la o fermă situată la aproximativ 100 km de Iaşi. Determinarea concentraţiei seleniului în probele de furaje analizate a evidenţiat trei cazuri distincte prin raportare la conţinutul optim recomandat (150-300) ppb Se şi anume: deficienţa critică (10-100) ppb Se, deficienţa marginală (100-150) ppb Se şi respectiv nivelul toxic corespunzător concentraţiilor de Se superioare a 300 ppb Se. Un procent de 52,17 % din probele de furaje analizate au prezentat o concentraţie adecvată cu variaţii cuprinse între 158,62-259,28 ppb Se, în timp ce 26,08% din probe au prezentat un conţinut deficitar de Se iar pentru 21,73% din probe conţinutul în Se a depăşit concentraţia optimă stabilită la 150-300 ppb.*

Cuvinte cheie: seleniu, plante furajere, Iaşi

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INTRODUCTION

Analysis of soil and feed introduced into food (by considering the biological cycle soil-plant-animal) provide information on any alleged deficiencies or metabolic disorders likely to be detected in livestock (primary failures caused by variation of the nutritional intake compared to recommended level) useful to determine final conclusions in assessing health of the animal organism (Reinds G. et al., 2006)

This paper aims to determine the various forage and feed derived by AAS in order to achieve an alleged balance of exogenous intake through food.

MATERIAL AND METHOD

Feed samples were collected from two farms, drive D (dairy farm) located on the outskirts of Iasi, near the plant that provides heat for the city and drive R (sheep farm) located about 100 km from Iasi. Samples from 1 to 12 are from farm D and 13 to 23 are from farm R. The selenium concentration was expressed in ppb (mg Se / kg)

RESULTS AND DISCUSSIONS

The data presented in table 1 and 2, shows a wide variation limit corresponding to deficit status, normal and toxic surpluss of selenium concentration in feed.

Table 1

Average amount of selenium content in feed samples collected from farm D

Crt Nr	Sample	Optimal Se concentration: 150-300ppb
		X
1	Corn silage(Aron Vodă Area)	55.03
2	Corn silage(Securitate Area)	138.49
3	Grass Sudan(Chiriţa Area)	504.63
4	Green soybean(Securitate Area)	73.47
5	Prepared corn sillage(Farm, platform)	70.50
6	Alfalfa, 3rd harverst (Aron Vodă Area)	173.39
7	Green alfalfa(Bazin Area)	317.35
8	Corn grains	158.42
9	Silage (grasses 20% leguminouses 80%)	183.38
10	Alfalfa hay wrapped	131.28
11	Hay wrapped	344.4
12	Barley straw	259.28

Regarding the concentration of analyzed feed samples three different cases were identified by reference to the optimum content ((Miron L. et al., 2004) recommended: (150-300) ppb Se (Pârvu Gh., 1992) named critical deficiency (10-100) ppb, marginal (100-150) ppb and toxic concentrations higher than 300 ppb.

Table 2

Average amount of selenium content in feed samples collected from farm R

Crt Nr	Sample	Optimal Se concentration: 150-300ppb
		X
1	Green corn silage (Canal 2 Area)	329.06
2	Green corn silage –(Cotul beşlegii Area)	205.08
3	Green alfalfa 3 harverst (Pump station Area)	191.1
4	Green alfalfa 1 harverst-(Pump station Area)	148.21
5	Alfalfa hay-Botoşani, 2007	152.5
6	Alfalfa hay-2007	135.68
7	Hay , 2007	306.99
8	Hay, 2006	164.37
9	Bramus hay, 2007	339.2
10	Corn silage, 2006	190.74
11	Complex (flour+bran+sunflower meal)	134.8

Table 3

Feed sample percent related to Selenium content

Crt Nr	Concentration Levels	Feed Sample Percent	Feed Type
1	Critical Deficiency : 10-100 ppb Se	13,04%	Corn, green silage Green soybeen Corn, prepared silage
2	Marginal Deficiency: 100-150 ppb Se	13,04%	Alfalfa hay, wrapped Hay alfalfa2007 Complex (flour+bran +sunflower mea
3	Optim Level: 150-300ppb Se	52,17 %	Green alfalfa Corn grains Silage (grass20% leguminouses80%) Straw, barley Hay, alfalfa Hay 2006 Corn silage2006
4	Toxic Level: >300 ppb Se	21,73%	Sudan grass Green alfalfa Hay, wrapped Hay, 2007 Bramus hay, 2007

The data in table 3 shows differences depending on weather and climatic conditions of the considered year (2007/2006) and for the same level/benchmark concentration differences due to varying degrees of availability of this element in soil (Gomes C.D. et al., 2007, Haug A. et al., 2007) and to the different fixing capacity of the forage plant (Kaklewski K.. et al., 2008).

Diversity of forage samples collected and analyzed induced a large number of variable factors difficult to be considered for statistical analysis. The Student t

test took into account the feed taken from the two farms, only derived from corn and alfalfa to ensure correct interpretation of data.

The data in table 4 confirm corn capitalization on fertile soils to ensure optimal levels of nutrients required for plant development - which explains the statistically not significant changes (p> 0.01) between sample site (D farm/ farm R) for the grains corn Se concentrations(figure 1).

Table4

Selenium concentration in feed from corn

Crt. Nr	Sample	Optimal Se concentration: 150-300ppb
		X
1	Corn, green silage,D	267,07±87.66
2	Corn, green silage,R	96,76±59.01
3	Corn, silage,D	190.74±47.3
4	Corn, silage, R	70.50±8.5
5	Corn, grains, D	179.80±16.6
6	Corn, grains, R	158.42±4.7

Hay instead exploit soils poor in nitrogen and other minerals, which explains the concentration of selenium (table 5) at higher toxic level (> 300 ppb Se) in natural hay collected from both farms(as shown in figure1).

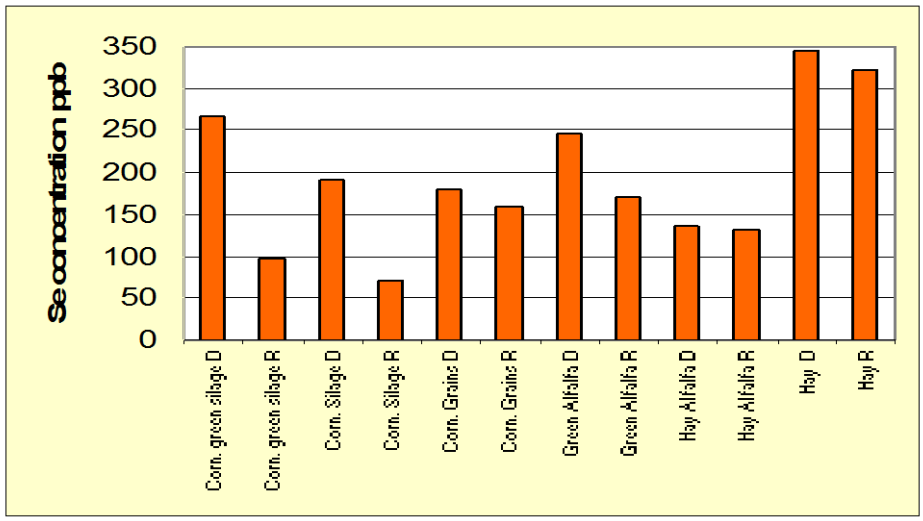

Fig. 1 - Selenium concentration in feed (corn, alfalfa and hay

Significantly concentration above the optimal concentration of selenium (Miron L. et al., 2004) in fibrous feed (hay samples coming from herbs preserved by drying) may be the consequence of dry weather climatic conditions of 2007 compared to 2006 year.

Table 5

Selenium concentration in feed derived from alfalfa

Nr crt	Sample	Optimal Se concentration: 150-300ppb
		X
1	Green Alfalfa,D	245,37±101.79
2	Green Alfalfa,R	169,655±30.32
3	Hay Alfalfa,D	135.68±17.5
4	Hay Alfalfa, R	131.28±8.5
5	Hay, D	344.4±48.7
6	Hay, R	323,090±16.6

Samples of alfalfa were characterized by significant differences in selenium content according to the collection site. Morfogeostructural measurement (Miron L. et al., 2004) showed the selenogen character of the farm D soil, which confirms the high degree of selenium availability in this land area when compared with R farm. On the other hand, data from scientific literature (Pârvu Gh., 1992) sustain the existence of a positive correlation between selenium and protein content of plants which would explain the significantly higher concentrations ($p < 0.01$) for alfalfa (provides significantly protein intake) compared to the corn samples (provides significantly carbohydrate intake).

CONCLUSIONS

1. Selenium determination in analyzed feed samples revealed three distinct cases in relation to the recommended optimal content (150-300) ppb Se as follows: critical deficiency (10-100) ppb Se, marginal deficiency (100-150) ppb, respectively toxic level (higher concentrations than 300 ppb).

2. Differences between selenium concentrations of the samples may be caused by different degrees of availability of this element in soil, different fixing capacity of the plant feed and the specific of weather and climate conditions for the considered year .

3. Selenogen character of the D farm area land versus R can induce an increased degree of selenium bioavailability to crop plants, which would explain the selenium concentration in the farm D forage plants.

4. Selenium concentration in analyzed hay samples may be the consequence of either specific recovery of nitrogen-poor soils but rich in mineral elements or either dry weather of the considered year (2007/2006).

5. Selenium concentration samples significantly higher in alfaalfa compared to corn can be caused by the increased capacity of the plants with a higher protein content to assimilate selenium.

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