

## STUDY ON SOME TYPE OF POLLUTANTS FOUND IN CONVENTIONAL PRODUCED FEEDS

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### Abstract

*Changes in European policy regarding the environment and food safety, requires changes in agricultural practices for the sustainable production and quality of product. For the study it was consulted the national and international literature in the last 10 years and we focused on a number of eight feeds in an effort to consider the values of heavy metals found at their level. Analysis of data showed high variability, for Pb limits ranging from 0.060 mg / kg for wheat berries and 42.20÷61.40 mg/kg green forage (natural grassland), and Cd 0.025 mg / kg for wheat berries and 11,2÷14.4 mg/kg of green forage (natural grassland). Peaks found for both Pb and Cd are above the law in force in accordance with MPL ANSVSA Order no. 18/2007 and no. 19/2009, the final conclusion is that an alternative to reduce the pollutant content in feeds, such heavy metals, may be the use of organic agricultural system.*

**Key words:** feed, pollutants, lead, cadmium

### INTRODUCTION

In a world in continuous development and industrialization the individual health gains special importance as sources of contaminated air, water, soil and hence the food is multiplied exponentially with the degree of development of a region.

In order to have a safe finished product, all the prior stages should be constantly monitored.

From the multitude of chemicals polluting the environment, which have different sources heavy metals are showing their potential toxicity by a great danger not only for the environment but also for animals and human health as a result of their participation in the food chain.

Heavy metals originating from the anthropogenic sources, enter the environment and are developing their normal cycle.

Behavior of metals in each ecosystem is very complex and therefore usually been studied separately for air, soil, water, and plants. The main criteria for heavy metals are considered hazardous are: bioaccumulation, toxicity and persistence, and therefore they are considered "risk factors", not only for their toxic effect on animals but also because

there is a possible increased exposure for man due to residues in food of animal origin [12, 16]. Due to their persistence in major pollutants, two metals were chosen to represent the subject of the present study: lead and cadmium, metals considered very toxic.

The purpose of this study is to assess the degree of contamination with Pb and Cd in some fodder (maize, wheat, wheat bran, soybean meal, full fat soy grits, alfalfa hay, alfalfa, natural grassland), on the basis of some studies conducted in the last 10 years.

### MATERIAL AND METHOD

Biological material was composed of eight forage namely maize, wheat, wheat bran, soybean grits, full fat soybean, alfalfa hay, alfalfa, natural grassland.

Track parameters in this paper are the levels of heavy metals Pb and Cd found in studied feed composition.

Determination of Pb and Cd in vegetable feed samples was performed by atomic absorption spectrophotometric method in accordance with applicable standards.

**RESULTS AND DISCUSSION**

Analyzing data from a total of 15 sources (six from Romania, two from other EU countries and one from the U.S.) could be noted that in all tracked fodder (maize, wheat

berries, wheat bran, soybean grits, full fat soybean, alfalfa hay, alfalfa, natural grassland) was detected the presence of different concentration of Pb and Cd as shown in table 1.

Table 1 The average content of Pb and Cd in some vegetable products after various authors

Types of feed	The average content, mg/kg		Sampling area	MPL*	
	Pb	Cd		Pb	Cd
Maize	0,48÷1,23	0,42÷0,155	lași [ 10]	10 mg/kg	1 mg/kg
	5,85÷8,39	0,31÷0,46	Argeș, Slobozia, Urziceni [3]		
	3,80	0,21	Germania [5]		
	0,7÷1,91	2,1÷3,3	Copșa Mică-Platforma industrială SOMETRA [1]		
	0,134	0,159	Winsconson [2]		
	0,415	0,099	lași [4]		
Wheat	0,19÷2,03	0,025÷0,162	lași [14]		
	6,38÷11,19	0,45÷0,90	Argeș, Slobozia, Urziceni [3]		
	0,15	0,08	Germania [5]		
	2,6÷3,4	3,7÷4,6	Copșa Mică-Platforma industrială SOMETRA [1]		
Full fat soybean	0,52÷1,77	0,026÷0,18	lași [10]		
	5,29	1,07	Argeș, Slobozia, Urziceni [3]		
Soy grits	0,66÷2,23	0,124÷0,180	lași [4]		
	3,90	1,03	Argeș, Slobozia, Urziceni [3]		
Wheat bran	0,58	0,043	lași [10]		
Alfalfa hay	0,53÷2,45	0,026÷0,111	lași [10]		
	0,198	0,074	Winsconsin [2]		
	0,433	0,045	lași [4]		
Natural grassland	0,60÷1,166	0,082÷0,122	lași [10]	30 mg/kg	
	2,49	0,15	Germania [5]		
	42,2÷61,4	11,2÷14,4	Copșa Mică-Platforma industrială SOMETRA [1]		
Alfalfa	0,133	0,64÷2,58	lași [10]		
	0,536	0,040	lași [ 4]		

\*MPL=maximum permissible limit under ANSVSA Ord No 19/2009

In Romania, the National Veterinary and Food Safety (ANSVSA) issued Ord. 18/2007 completed with Ord. 19/2009 for the approval of the sanitary, veterinary and food

safety of animal feed and unwanted substances, setting some maximum permissible limits (MPL) presented in table 2:

Table 2 The maximum allowed in feed (ppm) for Pb and Cd under ANSVSA Ord. 18/2007

Substance	Product intended for animal feed	Mximum content in mg/kg with 12 % humidity
Lead (Pb)	Feed materials except: • green fodder	10
		30
Cadmium (Cd)	Feed materials of plant origin	1

Research undertaken so far have revealed that once Pb, Cd and other heavy metals waste enter the food chain, by their level of harm can cause various morbid conditions, acute and chronic to consumers [8, 14,15]. Should be taken into account that some mineral elements such as Pb and Cd occur to be antagonistic to other elements in the body and in excess can change their normal status [10]

The presence of heavy metals is a potential ecologic risk. In animals, the accumulation of heavy metals depends of their concentration in food, the duration of exposure, ration composition and age of the animal [7].

From the investigations conducted on heavy metals, it is known that they have properties of bioaccumulation and bioconcentration in different tissues and organs of plants and animals [11].

These elements can become toxic when it exceeds the normal daily intake through food (feed), water and air[5, 7, 9].

Comparing the studies analyzed the MPL, for Pb and Cd for each category of feed, provided in ANSVSA Ord. 18/2007 and 19/2009 was found that accumulation of both Pb and Cd exceeded the MPL in some feed on some areas.

For instance, for Pb value of 11,9 mg/kg for wheat grain in the Arges, Slobozia and Urziceni areas and 42,2 to 62,4 mg/kg for natural grassland in Copsa Mica area, exceeded the MPL that is 10 mg/kg and 30 mg/kg. For Cd, values above MPL 1 mg/kg, were found in corn from 2,1 to 3,3 mg/kg, wheat grain from 3,7 to 4,6 mg/kg and 11,2 to 14,4 mg/kg for natural grassland in Copșa Mică area, then for soy grits 1,03 mg/kg and full fat soybean 1,07 mg/kg in Arges area.

The maximum Pb concentration resulting from the study was 11,19 mg/kg in wheat grain in the Arges area, 42,2 to 62,4 mg/kg natural grassland in Copșa Mică area and for Cd 11,2 to 14,4 mg/kg natural grassland in Copsa Mica area.

The lowest concentration of Pb was found in wheat grain 0,06 mg/kg in Poland, Warnia and Mazury district, and the minimum value for Cd was also found in wheat grain 0.025

mg/kg in Iași area equal to the amount recovered in Poland, Warnia and Mazury district.

## CONCLUSIONS

Based on analysed data, in terms of Pb and Cd concentration in some vegetables feed, we can conclude as follows:

- values above MPL were found in the intense industrialized areas;
- to reduce contamination below MPL requires the application of specific measures (prevention of contamination, sanitation) and constant area monitoring;
- application of organic farming system is also appropriate in areas where values were found below MPL, in order to maintain or minimize the level of contamination.

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