

Quality assessment of the feed in dairy cows diet from a Bucovina Farm

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Abstract

The study was conducted on a cattle farm with a number of 200 cows located in Bucovina County. With the help of the information received from the staff employed on the farm and through the visual examination, assessments were made on the technology of raising dairy cattle, the hygiene and welfare conditions on the farm and on the animal feed. A number of 4 feed samples were collected, representing all the feed used in the feed of these categories of dairy cows, both components and mixtures administered to animals. Sampling was done individually and was conditioned shortly after harvest by relative drying and grinding. The organoleptic examination was performed, the crude chemical composition was determined, the mycotoxicological examination was performed and the aflatoxin and zearalenone content was determined. The results obtained indicated an adequate quality of the fodder from the organoleptic point of view and of the crude chemical composition. Following the mycotoxicological examination, it was found that the fodder was contaminated with aflatoxin B1 in all the samples examined, but no sample exceeded the maximum permitted values, and with regard to the zearalenone values in the samples we analyzed, we found that the values recorded in lucerne hay, natural hay and concentrate for dairy cows were below the maximum limits imposed, instead the corn silo showed values that exceed twice the maximum values allowed by regulations for calves and dairy cows, respectively, we recorder a value of 1098,41 µg/kg.

Keywords: *cattle, gross chemical composition, mycotoxins, aflatoxin B1, zearalenone.*

Introduction

Diseases caused by the consumption of contaminated feed and food are becoming an increasingly important problem worldwide. The most important factor involved in food and feed contamination is represented by microorganisms and among them, especially fungi. They make secondary metabolites with toxic properties called mycotoxins. Most mycotoxins are ubiquitously encountered and can cause serious health disorders (such as neurological disorders and even tumours) in both animals and humans. That is why their study, information and public awareness, as well as the development and implementation of effective methods of detection and inactivation is a matter of utmost importance for veterinary public health (Bhat et al., 2010).

The indispensable nutritional factors, which the animals provide in a minimum dose, in the conditions of free access to food, cannot be ensured without a rigorous scientific control to the animals raised in artificial conditions.

In principle, increasing the economic efficiency of raising different categories of animals cannot be achieved without knowing the level of food and the quality of feed used and these goals also require continuous assessment of the quality of food used.

The quality of fodder is determined by a lot of factors related to soil and plant, as well as all the conditions of production, transport, storage and handling.

The quality assessment allows the knowledge of the measures to be taken in the technological process of animal feeding.

Materials and methods

A number of 4 fodder samples that made up the diet of 200 dairy cows were analyzed, assessing the organoleptic characteristics, raw chemical composition and mycotoxicological examination of the fodder samples. The method of collecting and forming the laboratory sample corresponded to the regulations in force. Thus, from the elementary samples collected from different points, general well-homogenized samples were constituted. The laboratory sample was

extracted from the general sample. The method of successive reduction of the general sample was used, up to the weight of 1-3 kg.

To determine aflatoxin B1 in feed, we used the Ridacscreen®Aflatoxin B1 kit, which is an ELISA kit based on the competition method for the quantitative detection of aflatoxin B1 in cereals and feed. The test is based on the antigen-antibody immuno-enzymatic reaction. The wells of the plate are labeled with anti-aflatoxin B1 antibodies. All reagents required for enzymatic determination (including standards) were included in the kit. The detection limit is 1 ppb (1µg / kg) and the reproducibility of the test is 80-100%.

In performing mycotoxicological examinations we also used the RIDASCREEN® Zearalenone test, which is based on competitive enzyme-linked immunosorbent assays in order to determine the quantitative determination of zearalenone in cereals, feed, beer, serum and urine. All reagents required for enzyme immunoassays are continuous in the Test Kit. The test is based on the antigen-antibody reaction. The microtiter wells are coated with capture antibodies, directed against anti-mycotoxin antibodies. Enzyme conjugate and anti - mycotoxin antibodies are added to each well for both standard and sample. The free mycotoxin and the enzyme conjugate compete for the binding sites of the well-covering antibodies (competitive enzyme-linked immunosorbent assay). The unbound enzyme conjugate is removed in the washing phase. Add substrate / chromogen, observing the color change from red to blue. The addition of the reaction stop reagent causes the blue to yellow to change color. The samples are read at 450 nm. The absorbance is inversely proportional to the concentration of mycotoxin in the sample.

Results and discussions

Following the analysis of the chemical composition of the alfalfa hay sample, the percentage of protein is above average, being 21.95%, while an average value of this type of feed is 17%. Low values were obtained in fat 1.66%, the average value being 2.3% (Table 1).

Feeds had values of humidity within normal limits, and their composition in protein, fat, cellulose, ash and non-nitrogenous extractive substances are close in value to those found in the literature (Preston, 2013).

Regarding the values of zearalenone in the 4 samples analysed, we found that the values recorded for alfalfa hay, natural hay and dairy cow concentrate were below the maximum limits of 500µg/kg imposed by the European Commission. Instead, the corn silo presented values that exceed twice the maximum values allowed by regulations for calves and dairy cows, namely we recorded a value of 1098.41µg/kg (Table 2). We replaced this fodder assortment with farm animal feed to avoid reproductive problems such as ovarian cysts, placental retention or premature abortions that could be caused by elevated zearalenone levels in the ration.

Table 1.
Crude chemical composition (%)

Sample No.	Sample type	D.M.*	Crude protein	Crude fat	Crude cellulose	N.F.E.**	Crude ash
1.	Corn silage	35,39	3,60	0,86	5,91	23,67	1,35
		100	10,17	2,43	16,70	66,88	3,82
2.	Alfalfa hay	89,56	21,95	1,66	21,94	39,78	4,23
		100	24,51	1,85	24,50	44,42	4,72
3.	Natural hay	90,22	11,76	2,15	22,43	46,05	7,83
		100	13,04	2,38	24,86	51,04	8,68

4.	Dairy cow concentrate	88,49	21,04	2,57	6,44	52,96	5,48
		100	23,78	2,90	7,28	59,85	6,19

D.M.*- dry matter, N.F.E.** - nitrogen free extract

Aflatoxin B1 was detected in all examined samples, but none of them exceeded the maximum values of 20 µg/kg allowed in the feeding of dairy cows (Table 2). The values of total aflatoxins in the 4 analyzed samples were: 13.97 µg / kg - corn silage; 9.41 µg / kg - alfalfa hay; 12.28 µg / kg - natural hay; 17.32 ppb - concentrated dairy cows.

Table 2.
Zearalenone and Aflatoxin B1 values

Number of samples	4	
	Zearalenone (µg/kg)	Aflatoxin B1 (µg/kg)
% positive samples	100	100
Interval	180,96-1098,41	9,41-17,32
Average	443,8	13,245
Median	247,915	13,125
Standard deviation	437,8444	3,305032

The low values of Aflatoxin B1 in the samples analyzed by us were also confirmed by the fact that Aflatoxin M1 from milk coming from farm cows, no problems were reported regarding the maximum level allowed by European legislation for Aflatoxin M1.

In 2015, Milășan determined zearalenone in several types of bread such as: white bread, intermediate bread, black bread, which were sold in several regions of Romania. The limit value allowed according to Regulation (EC) no. 856/2005 is 50 µg / kg.

Conclusions

Aflatoxin B1 was detected in all analyzed samples, but none of the samples analyzed did exceed the maximum values allowed for this mycotoxin. The values of zearalenone recorded in the samples of natural hay, alfalfa hay and concentrate for dairy cows were within normal limits, and however in the corn silage sample was recorded a value that exceeded twice the maximum value allowed by European legislation.

We proposed to eliminate from the ratio the assortment of corn silage contaminated with zearalenone due to the fact that the high values recorded for this mycotoxin could lead to reproductive disorders in heifers and dairy cows.

We recommend to the farmer the use of mycotoxin inhibitors in the ratio of dairy cows in order to avoid the problems caused by the accidental consumption of mycotoxins in fodder.

References

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