

## **THE STUDY OF SOME EFFECTS OF NUTRITIONAL IMBALANCES IN A DAIRY FARM**

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### **Abstract**

*The research was carried out in the Solex dairy farm from Mureș County, on a herd of 187 lactating cows from Black and Red Holstein breeds. There were quantified a series of nutritional disorders such as: placental retention, ketosis, acidosis with various symptoms, displacement of the abomasum, the appearance of non-viable calves, slaughtered animals and even the death of some animals – all these being considered generated by inadequate nutrition. after returning to proper nutrition, these problems were partially or totally remedied. In both cases, the feeding was done with fodder specific to lactating cows such as hay, silage and concentrated fodder.*

### **INTRODUCTION**

Feeding is an important factor that contributes to the well-being and health of dairy cows. In this context, much attention has to be paid to identify and early remediate the nutritional health diseases in dairy cows such as ketosis, a disease due to decreased glucose levels and increased levels of ketone bodies in the blood, a situation that occurs with lower energy intake through food other than that spent on milk production (Gordon J. L., BS, DVM, et al., 2013; Duffield Todd DVM, 2000); acidosis that occurs due to a decrease in ruminal pH to a critical level for the dairy cow, which results from digestive disorders to ruminal ulcers (Morgante M. et. al. 2007; Plaizier J.C. 2008) and laminitis or podoflemmatitis, which it is an inflammation of the dermal lamina of the foot, with consequences for animal health and production (Nocek E. James, 1997; Stone W.C. 2004). In chronic cases, the animals might be compromised and even send to slaughterhouse.

The purpose of the research carried out was to establish the reasons for the occurrence of several health problems, namely nutritional diseases in lactating cows, but also the possibility of their remedy.

### **MATERIAL AND METHOD**

The research was performed on 187 dairy cows, belonging to the Solex farm from Lunca Mureșului, Aluniș, Mureș County for a period of 28 months (January 2020 - April 2022). The experiment was performed on

lactating cows, in three different periods, January 2020-March 2021 and March 2021-February 2022 and February 2022-1 May 2022. The three periods were characterized by fluctuations in animal feeding and nutrition, as follows: first period with an optimal level of feeding, the second period when cows fodder was partially molded and reduced in quantity compared to the fodder norm, and the third period when the nutrition returned to normal. The cows and heifers studied were up to 7 years old.

The feeding of lactating cows was done with bulky fodder (alfalfa hay, alfalfa silage and corn silage), respectively a mixture of energy concentrates consisting of corn bran which represents two thirds and barley one third. Among the protein concentrates, rapeseed meal and soybean meal were administered.

The quality of fodders has been done to the laboratory of Animal Nutrition from the University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca. Toate paragrafele de text vor fi scrise la un rând, cu prima linie având un aliniat (tab) de **1 cm**. O spațiere dublă între rânduri se va folosi înainte și după titluri și subtitluri de capitol, așa cum este arătat în acest exemplu. Poziționarea și caracterele titlurilor și subtitlurilor vor urma acest exemplu. Nu se vor lăsa spații între paragrafe.

The evaluation of dairy health status has been permanently evaluated in the farm. Although the level of production was relatively constant during the first period (an average of 25 liter/cow), when the fodder quality and quantity has been restricted (second period of monitoring) the production has dropped to 20 liters/cow on average. Simultaneous, the nutrition associated pathologies have been monitored, some of them with severe consequences (Figure 1). The first and second period feeding quantity is presented in Table 1 and Table 2, respectively. In the third period of evaluation, the cows received the same fodder quality and quantity as in the first period.

Table 1

Fodder characteristics during the first period of monitoring when cows had no nutritional pathologies and 25 liters/cow production

Minimal requests	Quantity /day	DM (kg)	UNL	PDIN (g)	PDIE (g)	Ca (g)	P (g)	USV
Values	Not specified	19,2	20,05	1717	1717	135	73	17,2
<b>Fodders (kg)</b>								
Alfalfa hay	3.5	2.98	2.26	399	273	44.45	8.61	3.22
Corn silage	30	9	2.98	420	600	39	20.07	9.9
Alfalfa silage	6	1.56	1.25	138	84	25.2	3.6	1.92
<i>Total volume feed</i>	39.5	13.54	6.49	957	957	108.65	32.28	15.04

<b>Concentrates added (kg)</b>								
Corn cob	3.4	2.97	4.24	252	347	0.88	8.6	
Barley cob	1.7	1.48	1.8	107	119	1.17	6.34	
Soybean meal	2.25	2	2.72	614	384	7.2	15	
Sun flower meal	2.5	2.25	1.08	420	158	9.9	23.4	
CaCO <sub>3</sub>	0.035	0.03				13.3		
NaCl	0.08							
<b>Total</b>		<b>22.27</b>	<b>16.33</b>	<b>2350</b>	<b>1929</b>	<b>141.1</b>	<b>86.25</b>	<b>15.04</b>

Note: DM = Dry matter; UNL = Nutritional Unity for Dairy Cows; PDIN and PDIE = Digestible Proteins in Intestines; USV = Unity of Cow Satiety.

In the first period of the experiment, because the corn was harvested at a humidity of over 20% it showed mold, and for binding and removal of mycotoxins produced by molds, sodium bentonite sprinkled on the feed was used. It seems that despite such intervention, the micro-toxins have affected the cow health. In addition to these inconveniences, barley showed inorganic and organic impurities, and part of the alfalfa hay was damaged by molds also. Also, the chemical analyses of contaminated fodders have revealed a decreased quality in crude proteins, fats, and carbohydrates.

Table 2.

Fodder characteristics during the second period of monitoring when cows had nutritional pathologies and 20 liters/cow average production

Minimal requests	Quantity /day	DM (kg)	UNL	PDIN (g)	PDIE (g)	Ca (g)	P (g)	USV
Values	Not specified	19,2	20,05	1717	1717	135	73	17,2
<b>Fodders (kg)</b>								
Alfalfa hay	5	3,4	2,58	427,5	292,5	63,5	12,3	4,6
Corn silage	30	6,6	6,9	315	450	39	20,7	9,9
Alfalfa silage	6	1,17	0,93	103,5	63	25,2	3,6	1,92
<i>Total volume feed</i>		11,7	10,41	846	805,5	127,7	36,6	16,42
<b>Concentrates added (kg)</b>								
Corn cob	4	2,44	3,49	207,2	285,6	1,04	10,12	
Barley cob	2	1,21	1,5	88,2	98	1,38	7,46	
Soybean meal	1,25	1	1,36	307,5	174,37	4	8,34	
Sun flower meal	1,5	1,19	1,04	295,65	159,3	5,94	14,04	
CaCO <sub>3</sub>	0,035	0,3				13,3		
NaCl	0,08							
<b>Total</b>		17,84	17,8	1744,55	1522,77	153,36	75,56	16,42

Note: DM = Dry matter; UNL = Nutritional Unity for Dairy Cows; PDIN and PDIE = Digestible Proteins in Intestines; USV = Unity of Cow Satiety.

The main mycotoxins produced by moldy corn are: Zearalenone; Fumonisin; Deoxynivalenol (DON, vomitoxin); Ochratoxin (Munkvold et

al., 2019). Mycotoxins cause the following symptoms in the body of animals: - increased fragility of blood vessels; internal hemorrhage in the mucous membranes and lungs; vomit; intestinal bleeding; liver necrosis; destruction of mucous membranes; heavy breathing; tremors; lack of muscle coordination; irritations; photosensitivity; infertility; nephrotoxicity; destroying the body's defenses and thus facilitating infection with other microorganisms. In conclusion, the problems on the farm are not strictly determined by these mycotoxins but by the cumulative effect of poor-quality cereals, dust and soil impurities, sprouted cereals and parasitic insects.

In the second experimental period, the problems were remedied by various techniques such as: drying, cleaning, and sorting of feed; verification and disposal of degraded fodder with earthy impurities; increasing the amount of protein fodders. As consequence, immediately after the second period, the cows returned to a better health and the level of production has increased to 23 liters/cow on average. Also, the nutritional pathologies have been eliminated, while the body score of the animals has also been improved.

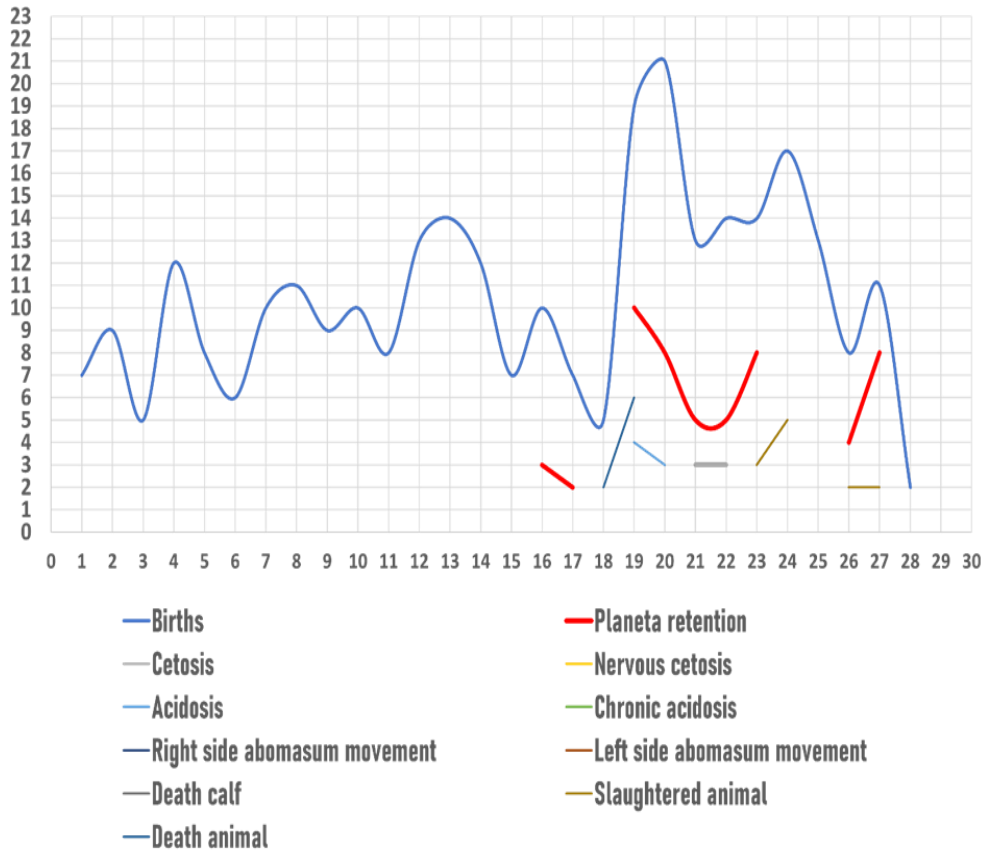


Fig. 1. Evolution of nutritional pathologies during experimental periods

## RESULTS AND DISCUSSION

The nutritional and pathological problems on the farm are most likely not strictly determined by mycotoxins but by the cumulative effect of poor-quality cereals, dust, and soil impurities, sprouted cereals and parasitic insects. Also, the reduced quantity of the foddere has led to milk productions decrease, animal weight loss, and nutritional associated pathologies such: placental retention, ketosis, acidosis with various symptoms, displacement of the abomasum, the appearance of non-viable calves, slaughtered animals and even the death of some animals. After increasing quality and quantity of feeding, the cows manifested a good health status, milk production recovery level and better reproduction indices.

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