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RESEARCH CONCERNING THE INFLUENCE OF USING DIFFERENT DOSES OF NON-PROTEIN NITROGEN IN COWS FEED OVER THE MILK QUANTITY AND QUALITY

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Abstract

The experiments followed the increase of nitrogen from a source inorganic (urea) used in feeding cows and its effect on milk production and milk quality. The OPTIGEN product is used in proportions between 1 and 3% of fodder for cows in lactation, which means quantities of urea between 60 and 180 g/head/day , the inorganic total crude protein weight source intake of cows varied between 10 and 20%. The quantitative determination of milk production and its qualitative analysis have revealed very little differences both between batches and between determinations from the same batch, which after processing the statistical differences proved insignificant. These results demonstrate that inorganic nitrogen in the OPTIGEN product can be harnessed properly by the lactating cows, also causing nutrition specialists to find solutions allowing both increasing the weight ratio of the inorganic source, and improving the milk production and quality parameters.

Keywords*: crude protein, lactating cows, milk production, non-proteic nitrogen, protein and fat from milk.*

INTRODUCTION

Achieving and maintaining a nutritional standard for a human being assumes a constant supply in the market with products that provide a nutritionally balanced calorie intake and at an affordable price allowing food preferences and satisfaction for all categories of population (Raducuta, 2008).
One of the foods that have taken part in very old times to balance the power equilibrium of the human being, thus contributing to maintaining health and improving the quality of life is the milk and, in particular, the one belonging to cows that provide about 90% of the market of this product (Akay et al., 2004).
If in terms of nutrient content is almost universally recognized that milk is a complete food, the question of solving the shortcomings related to the inconsistent production and price fluctuations is put (Inostroza et al., 2010; Bach et al., 2005), both affected mainly by the expenses in animal feed.
Growing specialized breeds for milk production and feeding them with feed ingredients to turn them up to maximum physiological peculiarities (Bourg et al., 2012) is the main route by which these shortcomings can be corrected.
The objective of this experiment is to track how different levels of substitution of a classic protein ingredient with non-protein nitrogen sources influence the milk production and the quality parameters of cow milk.

MATERIALS AND METHODS

The experiments were conducted in the Biobase ICDCB-Baloteşti over three months (December-March), the biological material was represented by 20 cows from the Romanian Black Spotted breed (BNR), divided into 4 groups, meaning 5 heads/batch .
Feeding of the animals was done with the entered feed rations specific to the winter season and different amounts of non-protein nitrogen have been used (Table 1).
Measuring the amount of milk which has been milked was done volumetric individually at each milking, and the determination of the physico-chemical parameters was performed using the Ekomilk Ultra apparatus (Banu et al., 2010).
The statistical data processing was done using Microsoft Excel spreadsheet application. The

database has been developed with the sequences of corresponding variations, each sequence being encoded in accordance with the specific studied information. To test the statistical significance of the differences between the average environment characters studied the Single Factor ANOVA algorithm was used.

Table 1. Experimental scheme

Batch	n	Treatment	Exp. period / determinations	Objectives
Control batch (C)	5	Vegetable protein soy meal 18%	Dec.-march (winter) The begining of the experience = R1 45 days of experience = R2 The end of experience (90 days) = R3	The evolution of: -milk production; - milk content in dry matter and its components; - values of milk pH
I Experimental Batch (E I)	5	Soy meal 12% +OPTIGEN 1%		
II Experimental Batch (E II)	5	Soy meal 6% +OPTIGEN 2%		
III Experimental Batch (E III)	5	OPTIGEN 8%		

RESULTS AND DISCUSSIONS

The situation of the production and composition of the produced milk during the progress of the experience is presented in Table 2. It can be noticed that, in terms of milk production, there were differences in both batches (maximum 7.73%) as well as between the determinations in the batches (7.36%), but these differences were not statistically covered (Table 3).

Table 3. The calculated values for Fisher test (F)

Calculated values F	Milk production	Fat	Protein	Glucides	Mineral subst.	pH
R1	0.590	1.649	1.334	0.742	1.909	2.538
R2	0.559	0.267	0.300	0.319	0.342	1.361
R3	1.352	0.816	0.520	0.567	0.768	0.927
C batch	0.324	0.392	0.537	1.224	0.504	0.863
E I batch	1.638	2.061	0.684	1.392	2.649	0.234
E II batch	0.286	0.964	0.576	0.371	2.519	0.357
E III batch	2.011	0.827	0.811	0.279	0.301	1.295

F tabular =3.24 for sampling (R1, R2, R3) between batches
F tabular =3.88 for differences in the experimental batches
F tabular > F calculated – insignificant differences

The milk fat content does not show significant differences in any of the determinations made both between batches and in those performed in the same batch, but it has been found that there is a single batch, the experimental batch II, where there is a constant increase over the experience of this parameter, the values being of 4.022 g/100 ml milk at first determination to 4.370 g/100 ml at the second determination and 4.690 g/100 ml at the third determination.

The determination of the nitrogenous substances highlighted a small fluctuation intensity values over the experience, the only batch where there was a continuous growth, but of low intensity (from 2.960 g/100 ml to 3.028 g/100 ml of milk), being the batch witness, all the other batches having an increasing trend between the first and the second measurement (maximum 7.82%) followed by a decline of about the same intensity (maximum 4.82%) between the second and third measurement.

The increasing trend between the first two measurements are recorded even for glucides in all the 4 batches of experience, the most obvious difference being recorded at the experimental batch E I (0.332 g%), followed by the E II batch (0.32 g%), the control batch with 0.18 g% and the batch E III with 0.07 g%. And glucides values recorded an increasing trend between the first two measurements in all the experimental batches (0.052 g% in the batch I E, 0.050 g% in the batch E II and 0.006 g% in the experimental batch E III) and descending to determine the third, except the control batch (0.05 g%), the decrease being of 0.22 g% for the experimental batch E II, 0.14 g% for the batch E I and 0.04 g% for the experimental batch E III. For all the experimental batches are recorded positive differences, but statistically uninsured between the first and last measurement.

The brute ash (minerals) has the same slight increase tendency between the first and the second measurement in the experimental batches, remaining the same for the control batch, after which the control batch encounters a slight increase (0.69 g% compared to 0.68 g %) and the experimental batches suffer a decrease between 0.002 g% for the experimental batch E III and 0.032 g% for the experimental batch E II. And in the case of the brute ash it can be observed that for all the batches the values are consistently higher between the first and last measurement.

The milk pH recorded very close values, between 6.322 and 6.590; the differences were recorded both between the batches and between measurements in the same batch by not being assured statistically.

Table 2. The evolution of physico-chemical parametrs of milk

Batch	Sampling	Milk production (l)		TCDM (%)		Fat (%)		Protein (%)		Glucides (%)		Mineral subst. (%)		pH	
		$x \pm s_x$	CV%	$x \pm s_x$	CV%	$x \pm s_x$	CV%	$x \pm s_x$	CV%	$x \pm s_x$	CV%	$x \pm s_x$	CV%	$x \pm s_x$	CV%
C	R1	20.83± 1.151	16.81	12.332± 0.67	5.46	4.372± 0.40	9.16	2.958± 0.11	3.85	4.314± 0.31	7.25	0.688± 0.05	7.36	6.544± 0.03	0.57
	R2	20.10± 1.66	18.46	12.55± 0.67	5.34	4.380± 0.48	11.14	3.000± 0.08	2.70	4.490± 0.12	2.81	0.680± 0.01	2.75	6.544± 0.05	0.90
	R3	20.06± 1.45	16.20	12.468± 1.02	1.16	4.212± 0.63	15.04	3.028± 0.16	5.57	4.538± 0.25	5.57	0.690± 0.03	5.70	6.322± 0.45	7.19
E I	R1	20.22± 0.75	8.31	11.866± 1.13	9.76	4.062± 0.71	18.39	2.864± 0.18	6.29	4.290± 0.26	6.26	0.650± 0.03	5.65	6.544± 0.03	0.49
	R2	21.32± 0.68	7.15	12.75± 1.87	14.27	4.400± 1.20	25.71	3.088± 0.25	8.36	4.622± 0.38	8.29	0.702± 0.05	8.26	6.590± 0.02	0.33
	R3	21.10± 0.38	4.03	12.508± 1.09	8.87	4.050± 1.03	26.91	2.994± 0.04	1.36	4.486± 0.06	1.37	0.684± 0.01	1.30	6.540± 0.04	0.66
E II	R1	19.74± 0.29	3.24	11.848± 0.71	5.99	4.022± 0.61	15.21	2.874± 0.05	2.00	4.302± 0.08	2.06	0.650± 0.01	2.17	6.514± 0.03	0.61
	R2	19.82± 0.51	5.75	12.782± 1.11	8.73	4.370± 0.67	15.55	3.086± 0.17	5.71	4.626± 0.26	5.76	0.700± 0.04	5.80	6.576± 0.02	0.41
	R3	20.05± 0.31	3.49	12.71± 0.56	4.43	4.690± 0,54	11.64	2.944± 0.11	3.75	4.408± 0.16	3.76	0.668± 0.02	3.57	6.520± 0.01	0.21
E III	R1	20.62± 0.88	9.60	12.684± 0.45	3.62	4.546± 0.39	8.60	2.986± 0.07	2.67	4.470± 0.12	2.68	0.682± 0.01	2.17	6.490± 0.03	0.56
	R2	20.12± 0.28	3.13	12.918± 0.75	5.86	4.658± 0.40	8.64	3.032± 0.13	4.49	4.540± 0.20	4.41	0.688± 0.03	4.40	6.578± 0.03	0.46
	R3	21.60± 0.20	2.08	12.31± 1.25	10.17	4.116± 1.11	27.01	3.004± 0.07	2.47	4.504± 0.10	2.36	0.686± 0.01	2.21	6.470± 0.01	0.24

CONCLUSIONS

The lactating cows use better the nitrogen from a non-protein source (urea) included in rations between 60 and 180 g/head/day.

The amount of milk obtained from cows during the experience was not significantly influenced by the use of doses between 10 and 30 g/100 kg body weight.

The physic-chemical features of the milk collected during the experience recorded very similar values both between batches and between the determinations from the same batch, the differences recorded were not assured statistically.

It is necessary to find solutions allowing both the increase in the proportion of non-protein nitrogen in the ration, as well as to improve the production and the milk quality.

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