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RESEARCH REGARDING THE EFFECT OF THE METHIONINE HYDROXY ANALOGUE USED IN THE FEEDING OF HIGH PRODUCTIVITY COWS DURING THE EARLY LACTATION PERIOD

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Abstract

Supplementing the ration of dairy cows with methionine hydroxy analogue (0.3% in the structure of mixed forage) improves the production of milk, the degree of food capitalization and reduces the losses of body mass during the first weeks of lactation in cows with high productions of milk. The methionine hydroxy analogue did not influence the daily production of milk and its content of fat-free dry substance, but, on the other hand, it increased the production of fat, that is the milk's content of fat, which led to the increase with 7.91% in the production of milk corrected according to the content of fat. In the presence of the methionine hydroxy analogue, the degree of capitalization of the food improved and, especially, the consumption of concentrates for 1 liter of milk corrected according to the content of fat decreased 4.10%.

Key words: cow, methionine hydroxy analogue

INTRODUCTION

The processes of ruminal fermentation result in large quantities of amino acids, which, in the case of high productivity dairy cows especially during early lactation, do not satisfy the specific nutritional requirements (Halga P. 2000; 2002).

During the first 10 – 12 weeks of lactation, especially in cows with high productions of milk, the usual method is to administer large quantities of concentrates, in hopes of increasing to the maximum the consumption of energy and reducing the bodily deposits of fat (McDonald P. et al. 2002). Under these conditions, the consumption of coarse fibers is low, which will lead to an increase in the relative proportion of propionic acid and thus to the decrease of the percentage of fat in the milk (Rulquin R 2006).

Polar et. al. have noticed an increase in the production of milk when 25 g of methionine hydroxy analogue were administered in the cows' food, and the percentage of fat in the milk recorded a significant growth when the daily ration was supplemented with 80 g/day of methionine hydroxyl analogue (Graulet B. et al. 2005).

Bertics S.J et. al. (1999) have demonstrated that methionine is the first amino acid to constitute the limiting factor in cows of high productivity, and Can A (1998) have pointed out an increase of the milk

production corrected according to the percentage of fat, following a daily administering of 40 g of calcium DL-alpha-hydroxy-gamma-methyl-mercapto butyrate to dairy cows during early lactation. Crawley D.D et al (2005) have noticed a significant growth of the total lipid synthesis, as a result of the addition of L-methionine in the ruminal liquid incubated in vitro, and Clark A.K. et al (1982) mentions an increase of cellulose digestibility as well.

Other researches have shown that the methionine supplement stimulates the formation of polar lipids in the rumen and their absorption and, on the other hand, that it leads to the multiplication of protozoa (Pond W.G. et al. 1995).

The object of this report was to study the effect of supplementing rations rich in concentrates with methionine hydroxy analogue on the productive performances of high productivity cows during the period of early lactation.

MATERIAL AND METHOD

Based on the production attained during the previous lactation, two groups of Holstein cows in their 2 – 4 lactations were created, each group consisting of 8 heads of cattle. The corrected milk production (4.0% fat) was used, because there were some differences between the cows regarding the content of fat in the milk.

The experiment began in the second week after calving and lasted until the twelfth week after calving, this period being considered critical as to the satisfying of high productivity cows' nutritional requirements (NRC, 2001).

The ration was made of (% of DM): 15% natural hay hashed in two centimeter long pieces, 40% corn silage (28% DM) and 45% forage mixed with 21.8% raw protein and 1630 Kcal ENL. In the case of the experimental group, the methionine hydroxy analogue was introduced in the structure of the forage in a proportion of 0.30% (table 1).

The ration was administered in abundance to cows of the two groups, in the form of mixtures of unique forages (total mixed rations).

The administered food, the remains of the forage and the production of milk were recorded daily. Every two weeks, the content of fat in the milk, the milk's fat free dry substance and the cows' weight were recorded.

Table 1

The structure and nutritional value of the administered food (TMR – total mixed rations)

The structure of TMR (total mixed rations) (% of DM)	The structure of the mixed forage (% of weight)
Natural hay – 15% Corn silage – 40% Mixed concentrates – 45%	Corn – 38 Barley – 20 Sunflower meal – 14 Soybean meal – 25 Salt – 0.5 Vitamin - mineral premix – 2.5
Calculated nutritional characteristics / kg DM 1.00 UNL 16.2% Pb. 101.6 g PDIE 104.2 g PDIN 10.5 g Ca 5.4 g P	Calculated nutritional characteristics / kg 0.889 kg DM 1.12 UNL 21.8% Pb. 129.7 g PDIE 146.1 g PDIN 4.9 g Ca 7.0 g P ** In the experimental group, 0.3% HM was added in the mixed forage (NC).*

RESULTS AND DISCUSSIONS

The average daily consumption of forage, the average productions of milk and the degree of food capitalization are all shown in table 2. The use of methionine hydroxy analogue in the food of dairy cows determined an insignificant growth of SU consumption during the first 10 weeks of lactation. The production of milk, as well as the milk's content of fat-free dry substance, were not affected. The methionine hydroxy analogue increased the total production of fat and the percentage of fat in the milk, while the proportion of nitrogen from the ration excreted in the milk was not affected by the treatment. Because the methionine hydroxy analogue increased the secretion of fat in the milk, probably by stimulating the development of protozoa in the rumen (McDonald P. et al. 2002), it is fair to assume that the proteins in the body were mobilized to transport lipids. One may emphasize the observation that the methionine hydroxy analogue, although it does not influence the production of milk and the content of protein, manages to increase by 7.91% the production of milk corrected according to the content of fat during the first ten weeks of lactation, by improving the production of fat (figure 1).

Beside the improvement of the milk production corrected according to the content of fat, the methionine hydroxy analogue in the food also determined a better employment of nutrients in the organism, which was positively reflected in the cows' body mass.

Table 2

The effect of methionine hydroxy analogue on the consumption of the ration and on the main productive performances of cows

Specification	Week 6		Week 10		Average of weeks 6- 10	
	Control	AHM[1]	Control	AHM	Control	AHM
Body weight (kg)	561	558	554	556	-7 kg	-2 kg
Average daily consumption						
- DM (kg)	17,8	18,2	18,7	19,6	18,00	18,90
- hay (kg DM)	2,67	2,73	2,81	2,94	2,74	2,83
- silage (kg DM)	7,12	7,28	7,48	7,84	7,30	7,56
-concentrates (kg)	8,01	8,19	8,41	8,82	8,21	8,50
- UNL	17,80	18,2	18,7	19,6	18,25	18,90
- PDIE (g)	1808	1849	1900	1991	1854	1920
- PDIN (g)	1855	1896	1949	2042	1902	1969
Milk production kg	30,0	29,4	29,0	29,4	29,50	29,4
Corrected milk production - (kg)	25,7	27,5	27,2	29,6	26,45	28,55
- %	100,00	107,00	100,00	108,82	100,00	107,91
Milk fat (%)	3,43	3,74	3,75	4,03	3,59	3,88
Fat-free DM in the milk (%)	8,47	8,49	8,46	8,51	8,465	8,50
Total production of fat - (kg)	1,028	1,10	1,088	1,184	1,05	1,14
- %	100,00	107,00	100,00	108,82	100,00	107,91
Specific consumption for 1 liter of milk - concentrates (g/l)						
- UNL/l	311,7	297,8	309,2	298,0	310,4	297,7
- PDIE (g/l)	0,69	0,66	0,69	0,66	0,69	0,66
- PDIN (g/l)	70,35	67,23	69,85	67,26	70,1	67,2
	72,18	68,94	71,65	68,98	71,9	68,9

[1] - AHM - methionine hydroxy analogue.

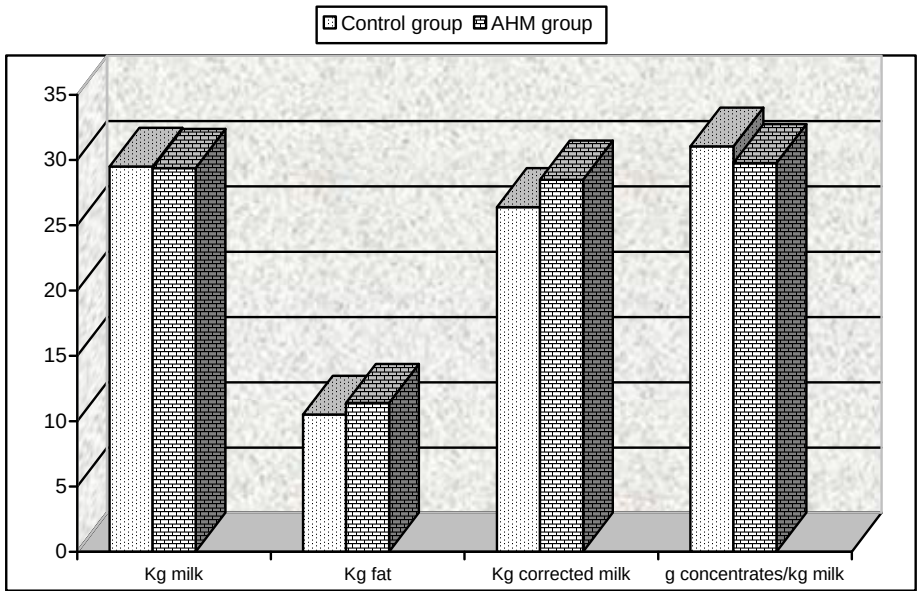

Fig. 1 The influence of the methionine hydroxyl analogue (AHM) on the production performances of dairy cows

Thus, in the first ten weeks of lactation, the body mass decreased an average of 7 kg/head of cow belonging to the control group and only 2 kg/head of those from the experimental group, which ensures better conditions for resuming a new reproductive cycle.

As to the degree of food capitalization in the production of milk, the methionine hydroxy analogue determined an average decrease of 4.10% in the consumption of concentrates per kg of milk. Similar aspects were registered concerning the consumption of energy and proteins for 1 kg of milk corrected according to the content of fat.

The positive results recorded in the experimental group regarding the production of milk as well as the degree of food capitalization impose the performing of some studies about the way in which methionine hydroxy analogue works, with the purpose of correlating its effect on milk production and of its composition with the bio-chemical processes within the digestive tube, respectively the general metabolism of nitrogen and energy in dairy cows.

CONCLUSIONS

1. Supplementing the ration of dairy cows with methionine hydroxy analogue (0.3% in the structure of mixed forage) improves the production of milk, the degree of food capitalization and reduces the losses of body mass during the first weeks of lactation in cows with high productions of milk.

2. The methionine hydroxy analogue did not influence the daily production of milk and its content of fat-free dry substance, but, on the other hand, it increased the production of fat, that is the milk's content of fat, which led to the increase with 7.91% in the production of milk corrected according to the content of fat.

3. In the presence of the methionine hydroxy analogue, the degree of capitalization of the food improved and, especially, the consumption of concentrates for 1 liter of milk corrected according to the content of fat decreased 4.10%.

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