Influence of Biopolym Granulat Effects on Reduction of Ammonia Concentration in Stables of Intensive Farm Animals Breeding

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Abstract

The living environment distress is connected currently not only with industrial production but also agriculture is biggest producer of toxic gas – ammonia (NH_3) .Emissions of that gas originate mainly in the farm animals breeding and generate within storage and handling with farmyard manure, slurry, poultry excrements and litter. Agriculture influences considerably the landscape. It has impact on basic effect on soil, water and air. In assessing experiment the preparation Biopolym Granulat rumen metabolism and N-balance was found positive effects in terms of increased ammonia nitrogen, the number of ciliates and the reduction of N-compounds in feces. It was confirmed the impact on the ammonia content in well-ventilated dairy stable. The economic evaluation depends on the exercise price of milk.

Keywords: ammonia emissions, cows, living environment, rumen metabolism, slurry

1. Introduction

Biopolym hydrolyzate is brown seaweed *Ascophyllum nodosum*. It contains vitamins, iodine, amino acids, alginate acid in the form of sodium alginate and other trace elements. It is designed for addition to drinking water and feed [1]. Seaweed support the development of intestinal micro flora, digestion and stomach accelerates the transmission of nutrients into the bloodstream. This will also promote feed intake and nutrient utilization resulting from the diet [2, 6]. Biopolym has diverse effects, one of which is an increase in milk yield in dairy cows [3, 5]. Milk is a suitable medium for assessing the development of energy metabolism of dairy cows. Changes in metabolism, which have a negative impact on quality and quantitative composition of milk, were often manifested as rumen dysfunction. They are failures and synthetic fermentation processes in the rumen caused by a sudden change in diet, by poor physical structure, low quality or digestibility and by other shortcomings to the required quality of feed. Unless optimum nutrition is ensured, there cannot be any expectations on good milk production. In assessing the level of nutrition it is not enough to judge only from the content of nutrients in the ration, but also from the reached levels of fermentation processes in rumen, as these actually decide the conversion of nutrients and the level of milk production [2]. The most important processes that take place in the rumen, are the fermentation of carbohydrates and the conversion of the less valuable vegetable protein for high quality -bacterial protein [2]. An integral part of the rumen are microflora bacteria such as cellulolytic bacteria, bacteria producing volatile fatty acids (VFA), lactic acid and methane and proteolytic and lipolytic bacteria, protozoa, that uses slightly fermented sugars and polysaccharides, preventing pH decline and

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stabilizing hemicellulolytic activity and fungi, that show high cellulolytic and hemicellulolytic activity [4]. Carbohydrates are the most important source of energy for rumen microbes [5]. The function of enzymes of the rumen micro flora is to degrade soluble carbohydrates from simple sugars to cellulose. The resulting products of this fermentation are volatile fatty acids [2, 3]. Proteins are partially decomposed by rumen bacteria and protozoa to peptides, amino acids and finally to ammonia [6]. Freed ammonia is used by rumen micro flora in bacterial biomass production. Nutrients created by microbial activity are the basis of nutrition for the organism and precursors for milk production [2, 3].

2. Materials and methods

The effect of Biopolym Granulat on the daily milk yield of dairy cows and on the quality of milk constituents (fat, protein) was studied on selected animals, located near České Budějovice. The original barn, located at an altitude of 440 m above sea level, has undergone a complete modernization, is equipped with three milking robots (Astronaut A2) and operation is now fully automated. The barn has a capacity of 210 pieces of cows of Holstain Friezien cattle breed. The experiment conducted in this chosen location involved adding Biopolym Granulat (bioalginate seaweed) at a dose of 10 g/cow/day diluted 1: 1 in concentrate to one of the robots (robot number 3). Robot number 3 thus serves the experimental group of cows, while robot number 2 serves a control group, i.e. without product addition. In both groups (control, experimental) the cows were divided according to lactation (1, 2, 3). The individual lactations for the two groups were then compared as to the daily milk yield, respectively to the average daily milk yield and milk components (fat, protein). The experimental period lasted 5 months (July-November). Daily milk yield were recorded by the milking robots and were subsequently stored in a computer, while data on milk components (fat, protein) were derived from monthly monitoring tests.

3. Results and discussion

In terms of assessing the quality of milk components occurred in dairy cows in all lactations was slight impairment of protein, while the values of fat in all lactations of dairy cows showed a slight increase. The biggest effect can be observed in the second lactation, Table1). These results show a slight increase in milk yield in dairy cows that were administered Biopolym [1, 2]. Also, as shown by [2, 4-6] and proved by this experiment, it is important to ensure optimal nutrition for the subsequent achievement of desired fermentation processes that greatly determine the conversion of nutrients and milk production. In each lactation the daily milk yield increased (average 2.7 kg). Protein content in milk significant increased on 1,2 of lactations. On 3 and higher lactation this component are slightly decreased. High impact has the Biopolym granulat on urea content per 100 ml. In each lactation this parameter are decreased (2.8 mg/100 ml.)

Table 1. The average milk yield per cow in control and experimental groups

	Control (kg)	Experimental (kg)	Average difference between groups (kg)	Average increasing of milk production per day (kg)
1. lactation	33.5	36.6	3.1	2.7
2. lactation	28.8	34.6	5.8	
3. lactation	30.2	28.4	-1.8	
4. a more lactation	30.9	34.6	3.7	

Table 2. Average protein content in milk (%)

	Control (%)	Experimental (%)	Average difference between groups (%)	Average increasing of milk protein per cow (%)
1. lactation	3.43	3.58	0.15	0.02
2. lactation	3.56	3.62	0.06	
3. lactation	3.49	3.46	-0.03	
4. a more lactation	3.34	3.23	-0.11	

Table 3. Average of urea content in milk (mg/100 ml)

	Control (mg/100 ml)	Experimental (mg/100 ml)	Average difference between groups (mg/100 ml)	Average increasing of milk protein per cow (mg/100 ml)
1. lactation	27.3	24.6	-2.7	-2.80
2. lactation	29.1	24.7	-4.4	
3. lactation	28.3	25.6	-2.7	
4. a more lactation	28.6	7.4	-1.2	

4. Conclusions

The product Biopolym positively influenced the average daily milk yield for all lactations. The components of milk were only slightly affected by Biopolym where protein levels showed a decrease, while fat levels increased slightly. In each lactation the milk daily milk yield increased (average 2.7 kg). Protein content in milk significant increased on 1,2 of lactations. On 3 and higher lactation this component are slightly decreased. High impact has the Biopolym granulat on urea content per 100 ml. In each lactation this parameter are decreased (2.8 mg/100 ml.)

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