

Evaluation of Biostimulants for Correction of Immune System Disorders in Cows and Influence for Improving the Composition of Milk Quality

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Abstract To create an optimal ruminal environment for the vital activity of microorganisms and the digestion of food substrates of the diet when fed to ruminants, feed additives with various biological properties, such as biostimulants, modifiers, antioxidants, enzymes and phytobiotics, were used. The study conducted by the authors was to study the effect of biostimulants on milk production and the state of the immune system of cattle. The nutritional quality of ruminant animals must be improved and optimized in terms of the number of degradable and non-degradable parts. Based on the above, one of the ways to solve this problem on farms is to study the targeted effect of probiotic preparations on the intestinal microflora of ruminant animals. The prevention of metabolic diseases in animals is facilitated by the rational use of dietary nutrients. The results of the study conducted by the authors showed that the introduction of biostimulants into the body of animals changes milk production. And, importantly, the biologically active substances in milk correspond to the physiological norm. Livestock intensification and application industrial technologies significantly increase the load on the body cow and contributes to the tension of its functionality. It is known that changing technological conditions of detention do not always correspond to the physiological needs of animals, and in this situations, diseases arise that are based on metabolic disorders.

Keywords Feed additives, Correction, Immunostimulants, Biostimulants, Milk, Cattle breeding, Leukocytes

1. Relevance

Currently, one of the main objectives of the state policy of Uzbekistan in the field of nutrition of the population is the production and sale of products that are not only of high nutritional and biological value, but most importantly, safe for human life and health. Today, manufacturers are actively introducing technology for the production of biostimulants, which can be used both in the form of a solution and in the form of a dry additive to feed; it provides a high economic effect as it helps to increase the digestibility of feed [3,7]. The use of a biostimulant increases additional weight gain in animals, also helps reduce morbidity and increases the resistance of young animals. For the normal development of animals, easily digestible feed and biologically active additives are necessary, which have a positive effect on the digestive tract, stimulate metabolic processes and the development of internal organs, providing the growing body

with biologically available substances. [11,14]. Cattle breeding is one of the strategically important branches of agriculture. Milk obtained from a cow is processed into dairy products, such as butter - a source of energy and fat-soluble vitamins, kefir - a source of beneficial lactobacteria and easily digestible milk protein, cheese - a source of protein, calcium, etc. In order to satisfy the population's needs for dairy products and not depend on imports, it is necessary to increase the milk productivity of cows. The main role in this matter is given to proper feeding. The domestic feed supply has a sufficient range of feed for the needs of dairy cattle breeding, but with modern high demands on animals and the high degree of influence of stress factors on their body, it is impossible to do without the use of feed additives. The positive properties of feed additives are widely known [1]. Various mineral, vitamin, protein supplements, biostimulants, etc. have been productively used in animal husbandry for many years. Particularly valuable in this regard are feed additives with biologically active properties (vitamin, mineral, natural compounds, such as humic acids, etc.), which not only replenish the animal diet for missing nutrients, but also serve as activators of metabolic processes, providing comprehensive has a positive effect on the entire body [1,2]. It is known that

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both the intensification of cattle breeding and the use of industrial technologies significantly increase the load on the cow's body and contribute to the strain of its functionality. Changing technological conditions of detention do not always correspond to the physiological needs of animals, and in this situation, diseases associated with disruption of metabolic processes arise [3]. Among the complex of external conditions that affect the physical and chemical parameters of milk and their biological value, special attention should be paid to feeding dairy cattle. In addition, feed not only directly affects the productivity and quality of milk, but also indirectly affects the immune system [4]. In maintaining the efficiency of dairy cattle breeding, two main strategic directions can be distinguished: ensuring the health and high productivity of cows, direct milk producers, and raising strong, high-quality young animals for reparation and replenishment of the herd.

In this study, the authors consider the issue of using feed additives based on humic acids for growing replacement young cattle and biostimulants in the diets of highly productive dairy cows.

In recent years, in livestock farming, much attention has been paid to the development of various additives that can increase milk productivity, milk fat content, increase feed digestibility and stimulate metabolic processes. And these additives are mineral and probiotic feed additives [5]. In practice, feed additives with various biological properties are used, such as biostimulants, modifiers, antioxidants, enzymes, phytobiotics, when fed to ruminants, an optimal rumen environment is created for microbial activity and digestion of food substrates of the diet [6]. Taking into account the above, an urgent problem is the creation and introduction into production of biostimulants intended for inclusion in mixed feeds and diets that have a beneficial effect on metabolism, animal productivity, the quality and safety of products of animal origin [7].

Today, modern approaches have been introduced into the normalized nutrition system for ruminant animals, in which the quality of nutrition should be optimized in accordance with the number of degradable and non-degradable parts [8]. In this regard, one of the directions for solving this problem is the targeted effect of probiotic drugs on the microflora of the stomach of animals [9].

The mineral feed regulator and the probiotic additive "Profort" help create anaerobic conditions in the rumen, prevent metabolic disorders in animals, create prerequisites for the most complete disclosure of genetic productivity potential by animals, rational use of diet feed, and improve the quality characteristics of milk obtained from animals [10]. However, there is little information in the literature available to us about the use of mineral feed regulators and biostimulants in feeding dairy cows.

Due to the insufficiency of protein and mineral nutrition of animals in agriculture, the need arose to create new feed additives that would combine the role of protein biostimulants and microelements. Taking this into account, there is a need to develop new drugs and feed additives of

complex action in order to improve metabolic processes and safety, as well as determine the range of effectiveness of their use.

2. Purpose and Objectives of the Research

The main goal of the study conducted by the authors was to study the effect of biostimulants on milk production and the state of the immune system in cattle.

To achieve the goal, the following tasks were set:

1. Determine the influence of feed tissue biostimulant on the milk productivity of cows and the quality of raw milk.
2. Study the biochemical parameters of the blood of cows when using a tissue biostimulator.
3. Assess the economic efficiency of introducing biostimulants into the diets of highly productive cows.

3. Research Methods

Research was carried out using clinical-physiological, microbiological, veterinary-sanitary, zootechnical and mathematical methods. The effect of biostimulants in different doses on metabolic processes, productivity and quality of milk of cows was studied [12].

The research was carried out on 32 dairy cows in the Zangiota district of the Tashkent region in 2021. Animals in the control and experimental groups received a diet consisting of wheat straw (0.6 kg), corn silage (23.0 kg), wheat haylage (50.0 kg), complete feed (14.58 kg), antigen (0.05 kg) and alfalfa haylage (6.50 kg). The animals of the experimental groups received a mineral feed regulator in a dose of 300 g daily in addition to the main diet (BR) as part of a complete feed.

4. Results and Discussion

In accordance with the accepted scheme for zootechnical analysis of feed, dry matter (DM) of feed is the carrier of the nutritional value of feed. The higher the dry matter content of the feed, the higher its nutritional value. It is known that the DM consumption of bulky feeds depends on the concentration of metabolic energy in them and the level of productivity. Biostimulants were administered to animals for 30 days, 10 ml. intramuscularly. As a result, dairy cows received an increase of 2 liters of milk every ten days, which in composition and fat content became 1.5 times higher than the control group. The animals were divided into 3 groups of 10 animals. I – group is a regular corva. II – control group. Group III received tissue biostimulants. As a result, the data obtained shows that the tissue biostimulator increases the amount of milk and affects the quality of milk.

Hematological blood parameters of experimental cows are presented in Table 1. During the entire period of the experiment, the concentration of leukocytes in the control

and experimental groups was within physiological norms and had an average value of 9.5 10⁹/l in the control group and 9.9 10⁹/l in the experimental groups groups. The content of lymphocytes at the beginning and at the end of the experiment in the control and experimental groups was within physiological norms and no significant changes were observed. Control group - average content for the entire period - 33.9%. Experienced groups: I – 27.4%; II – 27.8%; III – 29.01%.

The ratio of basophils at the beginning of the experiment and at the end tended to decrease, namely in the control group it decreased by 15.9%. In the experimental groups this figure was 0.99%, 23.4 and 8.3%, respectively. All indicators were within physiological norms and no significant changes were observed. The content of granulocytes over the entire period of the experiment was determined in comparison with the control in the experimental groups, decreased by 11.2%, 10.5 and 11.9%, respectively, while being within physiological

norms. At the beginning of the experiment, the content of the number of erythrocytes was within the limits of the maximum values of physiological norms (5-10 * 10¹² / l), at the end of the experiment it dropped to average values, namely in the control group - 8.66 (10¹² / l), in the experimental group group – 8.12 (10¹² / l). The hemoglobin level of the experimental groups at the beginning of the experiment was lower than the values of the control group: in I – by 25.7%; in II – by 26.3%; in III – by 2.9%. The indicators of the control group and experimental group III were higher than physiological norms at the beginning of the experiment. At the end of the experiment, all indicators were within physiological norms and the average indicator was determined: control group - 10.41 g/l and experimental groups - 10.37 g/l. Hematocrit values for the entire period of the experiment were within physiological norms (35-45%) and no significant changes were observed. The average value was: control group – 39.48%; I – 35.5%; II – 40.38%; III – 38.72%.

Table 1. Hematological blood parameters of experimental cows

Index	Unit.	Group			
		Control	Experienced		
			I	II	III
Beginning of the experiment on the 1st day (n = 12).					
1	2	3	4	5	6
Leukocytes	10 ⁹ /l	9.27±0.54	9.91±0.61	10.94±0.85	9.77±0.60
Lymphocytes	%	28.39±2.20	27.05±2.58	25.87±2.77	28.41±2.19
Basophils	%	10.57±0.67	9.17±0.57	11.18±1.75	9.41±0.82
Granulocytes	%	51.15±2.72	49.57±2.36	51.77±3.24	50.12±2.94
Red blood cells	10 ¹² /l	9.45±0.58	8.70±0.30	9.65±0.62	9.16±0.60
Hemoglobin	g/ dl	13.79±1.60	10.25±0.23*	10.16*±0.21	13.39±1.67
Platelets	109/l	478.83±73.28	317.58±45.01	359.92±54.26	376.92±80.15
End of the experiment, day 60 (n =12)					
Leukocytes	109/l	9.84±0.58	9.02±0.43	9.93±0.57	9.78±0.56
Lymphocytes	%	29.51±2.02	27.84±1.96	29.80±2.07	29.62±2.14
Basophils	%	8.89±0.65	9.08±0.33	8.56±0.50	8.63±0.51
Granulocytes	%	50.13±2.34	44.56±1.74	44.87±1.76	44.15±1.68*
Red blood cells	1012/l	8.66±0.28	8.08±0.25	8.16±0.22	8.12±0.22
Hemoglobin	g/ dl	10.41±0.24	11.14±0.45	10.03±0.23	9.95±0.23
Platelets	109/l	293.25±41.72	340.46±46	295.42±38.76	286.17±36.30

Note: * p< 0.05; ** p<0.01; compared to control

Table 2. Indicators of rumen fluid of cows

Indicators	Control group	Experienced group		
		I	II	III
pH	6.30±0.21	6.07±0.17	6.02±0.1	6.05±0.1
OMC, 10 ⁶	15.54±0.94	13.79±0.77	13.12±0.64	13.64±0.52
Bacillary m\o, 10 ⁶	90.72±10.51	68.24±13.47	78.12±12.14	85.27±11.63
Lactic acid m\o, 10 ⁴	0.32±0.15	0.14±0.07	0.16±0.14	0.24±0.09
Yeast-like m\o, 10 ⁴	1.40±0.61	1.94±1.02	1.82±0.96	1.89±1.01
Mold\fungi, 10 ⁴	1.75±0.65	0.18±0.07	1.25±0.24	0.67±0.19

Note: p≤0.05

The number of platelets at the beginning of the experiment in the experimental groups was within physiological norms (250-450 1012/l), and the indicators in the control were higher. At the end of the experiment, all indicators were within physiological norms and no significant changes were observed. Data on the milk production of animals for 100 days of lactation were obtained based on daily records during each milking. The study period was divided into 5 additional periods of 20 days each. In general, the research results showed that the trend in the level of milk productivity is increasing; the subsequent increase is probably associated with the stabilization of the energy balance in the body of dairy cows. With the introduction of biostimulants, this indicator in milk increases, however, the authors did not observe an excess of the upper limit of normal. In addition, the authors found that, in accordance with the selected analysis criteria, in the studied population of animals, in 17.05% of cows the biostimulant corresponded to optimal values. Fabric b The stimulant tended to decrease as the milk productivity of animals increased, and increased as soon as the milk productivity of animals began to decline in the dynamics of milking days. The effectiveness of feeding a biostimulant feed regulator in the diet of cows is the calculation of the economic feasibility of its use. The main indicators in the economic assessment were: the cost of feed, average daily milk yield and the market price of milk [14,23].

In general, the results of research conducted by the authors showed that the trends in changes in the introduction of a biostimulant and the level of milk productivity are opposite, and the turning point in the decrease in the effectiveness of the biostimulant and its subsequent increase is probably associated with the stabilization of the energy balance in the body of dairy cows. When the biostimulant acts in accordance with the physiological norm, the content of active substances in milk is the lowest. When the action of the biostimulator shifts downward, the concentration of lactose in milk increases, however, the authors did not observe an excess of the upper limit of normal [9,14,19].

When the concentration of the biostimulant deviates downwards, an average negative significant relationship with the level of acetone occurs, and average positive reliable relationships were established between the content of the biostimulant, regardless of the concentration of the biostimulant. In addition, it was found that, in accordance with the selected analysis criteria, in the studied population of animals, in 17.05% of cows the effect of the biostimulant corresponded to optimal values, and in 82.95% it deviated downward and amounted to 1.10 or less. The effect of the biostimulant tended to decrease as the milk productivity of animals increased, and increased as soon as the milk productivity of animals began to decline in the dynamics of milking days. In the group of animals with a biostimulant effect of 1.10 or less, the lactose content in milk was significantly (80.0%, $p \leq 0.01$) higher than the content in animals with normal biostimulant values. In cows with a normal value of lactose in milk, the content was higher than the threshold value by 28.57%, and in animals with low

values of the biostimulant, the established reliable excess was 141.43% ($p \leq 0.05$).

When the level of biostimulant deviates downward, an average negative significant relationship of this indicator with the level of acetone was revealed ($r = -0.572$, $p \leq 0.01$). Average positive reliable relationships were established between the lactose content when the biostimulant was less than 1.10 and when the biostimulant was from 1.11-1.50, and in the first case the relationship was more pronounced.

Analysis of the activity of ruminal microflora showed that the pH did not change significantly during the experiment, but in the experimental group it decreased compared to the control by 3.66%, 4.45 and 3.97% and met the requirements of physiological standards. Also, the total microbial number in the experimental group decreased by 11.27%, 15.58 and 12.23%, respectively (Table 2).

The greatest increase was observed when assessing yeast-like microorganisms, namely in the experimental group there was an increase of 38.5%, 30 and 35%, respectively. Moreover, all indicators were within normal limits.

5. Conclusions

According to the task, further research conducted by the authors was aimed at studying the effect of tissue biostimulants on productivity and metabolism in dairy cows. It is known that feeding, and as a consequence, the introduction of tissue biostimulants, is one of the leading factors in ensuring high productivity of dairy livestock. This is explained by the fact that during lactation the animal's body is in a state of increased functional activity; complex processes of fermentation of feed through a huge number of bacteria, fungi, protozoa, as well as the absorption of nutrients and the synthesis of new ones, take place in the forestomach. As a result, the data obtained shows that the tissue biostimulator increases the amount of milk and affects the quality of milk.

All this provides the animal with the necessary energy and nutrients, affects the physiological processes occurring in the body, which in turn helps to enhance metabolic processes, productive and reproductive phenomena. An important point in these processes is the ability to control rumen digestion by adjusting the diet through the use of various biostimulants.

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