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Research Article

Use of Natural Minerals for Effective Increase in Biological Value of Milk in Animal Industry

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ABSTRACT

Experimental results of use efficiency study for a complex of organic-mineral compounds from local raw materials (medicine) are presented in the cow milk production technology. Animals of the I (control) group received the main diet accepted in economy. To cows of the II test group we added medicine volume of 0,75 g/kg per live weight per head in days to the main diet. To cows of the III test group we added medicine volume of 0,95 g/kg per live weight per head in days to the main diet. The complex was set in mix with the concentrated forage during morning feeding within 15 days. Introduction to a diet of a complex was carried out in the specified sequence three times with an interval of 15 days in between. We have defined the impact of the experimental medicine on the indicators of ruminal digestion, dairy efficiency, nutrition and biological value of cow milk. It is revealed that enrichment of the cow diet with medicine during the milk yield increasing period promoted increase in the general content of volatile fatty acids and quantities of microorganisms in meat, exerted beneficial effect on productive qualities of cattle. Increase in concentration acetic and propionic, decrease in a share oil acids, reduction of ammonia amount and increase in microbial weight in ruminal liquid, increase in level of dairy efficiency, content of fat and protein in cow milk is established. Introduction of medicine to the cow diet to the milk yield increasing period will allow improving a quantitative ratio of amino-acid composition of proteins, biological and nutritional value of milk.

Keywords: dairy efficiency, ruminal digestion, milk fat and protein, casein, serumal proteins, amino acids, a complex of organic-mineral compounds from local raw materials.

1. INTRODUCTION

In the concept of the food program of the country special attention is paid to increasing domestic livestock production [14, 15, 20]. In modern conditions of agriculture development in Russia the cattle breeding is in crisis state that is followed by decrease in milk production, as well as its quality [16, 17]. Successful development of cattle breeding, as well as increase in dairy efficiency, considerably depends on the organization of the full balanced feeding. Productive potential of the cattle is rather high in the presence of the strong food supply based not only on quantitative, but

also on high-quality providing animals with all types of forages and feed additives, batteries containing full set necessary for an organism. By intensive production of livestock products the problem of providing diets with protein, biologically active and mineral agents, vitamins most is particularly acute. Only in the presence in a stern of their necessary quantity the organism most absolutely acquires substances of a forage and the animal is able to show the maximum efficiency [6,7,8,9,10,11,18].

For diet rationing of farm animals on the main indicators there is a large amount of various additives which owing to high price cannot be used by the enterprises in modern conditions of low public financing. It demands research of the new local natural raw material inventories capable to substantially eliminate deficiency of mineral elements, vitamins and a number of organic compounds in diets. To replace expensive feed additives of industrial production with perhaps organic-mineral compounds of a natural origin containing the substances capable to normalize a metabolism in an organism in the structure, and having low cost. It is possible to carry sapropel, bentonite, vermiculite and their derivatives to such substances [1,2,3,4,5].

Natural minerals from local raw materials represent a valuable natural complex of the organic and mineral substances formed in lakes due to transformation of water flora, hydrobionts and compounds of metals. The complex of organic-mineral compounds from local raw materials represents the effective sorbent having high ion-exchange properties that allow using it as prophylactic at digestive tract diseases as well as a source of mineral elements for an organism. The separate researches conducted by scientists of the different countries demonstrate that organic compounds of natural minerals are fodder product, multiple-factor on impact on an animal organism. Its productive effect is caused by the regulating influence on intensity of processes of digestion and the best use of nutrients of forages that, in turn, provides increase in dairy efficiency of cattle and quality of milk. Therefore into the forefront there is a system, integrated approach to studying of organic-mineral compounds from local raw materials as source of nutritious and biologically active agents, a difficult a lot of ingredient component for production of feed additives for cattle [4,7,12, 13].

2. USE OF NATURAL MINERALS IN MILK PRODUCTION

Providing the population with high-quality milk and beef with the most rational and effective is represented when using a big share of breeds of cattle of the combined direction of efficiency. For the purpose of carrying out scientific experience were have created three groups of cows, analogs of Simmenthal breed of the Austrian selection. During the registration period animals were in identical conditions of feeding. Animal I group (control) received the main diet accepted in economy.

To cows of the II test group we added a complex of organic-mineral compounds from local raw materials to the main diet (medicine) volume of 0,75 g/kg per live weight per head. To cows of the III test group we have added medicine volume of 0,95 g/kg per live weight per head to the main diet. 30% of a natural sorbent were a part of a complex in the III test group. Medicines set in mix with the concentrated forage during morning feeding within 15 days. Introduction of medicines to a diet was carried out in the specified sequence three times with a 15 days interval in between.

Estimated dairy efficiency, structure and biological value of milk. Control of dairy efficiency of cows was exercised during lactation by results of control milking by 3 times a month. The milk research on the content of fat was conducted on the device the Clover 1M.

Content in milk of the general protein, casein and serumal proteins was determined by method of formal titration. The analysis of amino-acid composition of milk was carried out on the amino-acid T-339 analyzer by an ion-exchange chromatography.

3. RUMINAL METABOLISM CONDITION OF CATTLE

One of the major physiological processes proceeding in an organism of farm animals is digestion. It displays transformations of complex organic compounds of forages to high-quality food for the person. Not only digestion of a forage in the subsequent departments of a digestive tract, but also a current of a metabolism in an organism, and, therefore, efficiency and health of animals depends on a condition of processes in prestomachs [1,2,3,10,11].

On the normal course of processes of ruminal digestion considerable impact is exerted by structure of a diet of cattle. Activity of ruminal micro flora is supported by certain conditions, the corresponding set of forages and their quality. Because of a weak food supply and poor quality of forages there is a violation of exchange processes in an organism and decrease in efficiency of animals. The important reserve of increase in efficiency of animals represents feed additives from local sources of mineral raw materials as have low prime cost and high comprehensibility of organic and mineral substances, as well as contribute to normalization of ruminal digestion of ruminants [7,8,9]. Therefore application natural mineral supplementary feeding has great economic value.

Indicator	Group		
	I	II	III
Pн	6,61±0,04	6,52±0,01**	6,44±0,02***
Concentration of ammonia, mg/%	10,34±0,05	9,99±0,06**	9,70±0,09***
General maintenance of VFA, mmol/l	93,8±0,80	106,2±1,56***	114,07±2,37***
Including. Acetic, %	66,16±0,61	69,74±0,58**	71,59±0,65***
Propionic, %	19,55±0,23	19,34±0,26	18,14±0,23**
Oil, %	14,29±0,09	10,92±0,17***	10,27±0,29***
Bacteria, one billion/ml	10,21±0,20	11,05±0,12**	11,73±0,23**
Infusoria, one thousand/ml	538,00±14,36	647,34±16,25**	689,17±17,42***

Table 1: Indicators of a ruminal metabolism of animals

Note hereinafter: * P <0,05; ** P <0,01; *** P <0,001

Proceeding from results of researches, during an experiment the hydrogen indicator of ruminal contents in all groups of cows was within physiological norm, and reaction of the environment was subacidic (tab. 1). At the beginning of the researches the size of this indicator was in all groups practically at one level (6,63 - 6,69) and a reliable difference between control and is not established by test groups. At the end of researches reaction of the environment in all groups is displaced in the sour party, and size pH decreases. However in test groups this shift is expressed much more. The reliable difference is established between control and II (0,09 units at P <0,01), control and III (0,17 units at P <0,001) test groups.

Ammonia is one of the main products of bacterial deamination of amino acids of forages, and its concentration characterizes use efficiency of nitrogen by an organism of animals. The quantity and quality of fodder protein, intensity of fermentative processes in a hem, extent of use of ammonia microorganisms and the speed of its absorption in blood exert impact on the content of ammonia in ruminal liquid. Therefore the level of content of ammonia in a hem gives an idea of total action of all above the listed factors [1].

Concentration of ammonia in ruminal contents of cows of all groups was within physiological norm (tab. 1). At the beginning of the researches its contents was practically at one level and significant distinctions between groups it is not revealed.

By the end of researches ammonia level in a hem of cows of all groups decreased. It is explained by active use of ammonia for synthesis of microbic protein as during the milk yield increasing period the need for protein considerably increases in

connection with strengthening of a lactation performance. And more changes are noticeable at the animals receiving in addition to the main diet medicine with a sorbent. The reliable difference on this indicator is established between control and II (3,5% at P <0,01), control and III (6,6% at P <0,001) test groups. It proves positive influence of the organic-mineral complex used by us on processes of digestion and increase in use efficiency of a fodder protein hem micro flora.

The most important indicator of intensity of carbohydrate exchange is concentration of VFA. The quantity and a ratio of three main low-molecular acids in prestomachs - acetic, propionic and oil - depends on structure of a diet and a ratio in it of nutrients which create more or less favorable conditions for development of bacteria [2,15].

The general content of volatile fatty acids in ruminal liquid of cows of all groups varied within optimum sizes (tab. 1). At the beginning of the researches the size of this indicator at control and experimental animals fluctuated from 85,1 to 85,8 mmol/l. A reliable difference between groups it is not established. The ratio of low-molecular carbonic acids also speaks about the normal course of digestive processes in prestomachs of cows of all groups. The mass fraction of acetic acid changed ranging from 67,69 to 67,78%, propionic acid - from 19,42 to 19,45%, oleic acid - from 12,80 to 12,86%. Distinctions between groups were not reliable.

By the end of researches there was an increase of nutrients fermentation intensity of forages at animal all groups that is confirmed by increase in content of volatile fatty acids in ruminal contents. In test groups reliable increase in concentration of VFA in comparison with control is established. Vo to the II test group the difference with control contemporaries made 13,2% at P <0,001. Animal the III test group, receiving in addition to the main diet an organic-mineral complex with a sorbent, had superiority over control analogs on this indicator (21,6%) at high degree of reliability (P <0,001). It means that in a hem of cows of test groups the best conditions for activity of micro flora are created that is expressed by activation of fermentative processes and increase in concentration of its products.

VFA ratio in ruminal liquid of cows of all groups also changed within standard sizes. However these changes in control and test groups had various character. In control group there was an obvious increase in a mass fraction of oleic acid (11,1punkta), insignificant increase in a share of propionic acid (0,5 points) and reduction of content of acetic acid by 2,3 points. In test groups concentration of oil and propionic acids decreased, and concentration of acetic acid increased. Content of acetic acid when feeding by an animal of medicine without sorbent (69,74%, P <0,01) was above control value on 5 points. At introduction to the cow diet of medicine with a sorbent the difference with control made 8,2 points P <0,001. The mass fraction of oleic acid in the II test group was below control value on 23,6 points. When feeding by an animal of medicine with a sorbent the content of oleic acid continued to decrease and reached the minimum value in the III group (10,27%, P <0,001). The difference with control made 28,1 points. Level of content of propionic acid in ruminal liquid of cows control and test groups had much smaller distinctions. The reliable difference with control is established only in the III group of animals which at P <0,01 made 7,2 points.

The most optimum ratio of VFA in a hem is established at animal test groups. Therefore we can draw a conclusion on positive influence for a complex of organic-mineral compounds from local sources on processes of ruminal digestion.

Ruminant metabolism of nitrogenous substances in a digestive tract proceeds under the influence of microorganisms. At the beginning of the researches the quantity of bacteria was in ruminal contents of cows of all groups approximately at one level, a reliable difference between control and test groups is not established. By the end of researches the quantity of bacteria in prestomachs of cows increased in all groups. However the size

of this indicator was authentically higher concerning control in the II group for 8,2% at P <0,01, in the III group - for 14,9% at P <0,01. It follows from this that the most optimum conditions of the environment for micro flora were in a hem of cows of the III group as there the maximum quantity of bacteria is established. Increase in level of microbic weight in ruminal liquid confirms improvement of fermentative processes in prestomachs of cows of test groups.

Infusoria turn starch of forages into a glycogen which is used then an organism. They mechanically crush cellulose, promoting its best fermentation by microbes and to fuller digestion. Existence in a hem of a large number of infusoria speaks about the normal course of processes of fermentation and splitting of nutrients of forages. The deviation from norms of feeding affects quantity and structure of infusoria much earlier, than there are clinical symptoms of a disease or efficiency decreases [3].

At the beginning of our researches the quantity of infusoria occupied average value and reliable distinctions between controls and is not established by test groups. By the end of researches the quantity of protozoan micro flora increased in all groups (tab. 1). It should be noted that in test groups of infusoria there was more in comparison with control value. The reliable difference is established between control and II test group at P <0,01 that made 20,3%. At animals who received in addition to the main diet medicine with a sorbent of infusoria in ruminal contents was more in comparison with control analogs for 28,1% at high degree of reliability (P <0,001).

Proceeding from results of researches, introduction to the cow diet of medicines from local sources of raw materials promoted increase in level of microbial weight in a hem, amounts of volatile fatty acids and to improvement of their ratio. As a result there was an improvement of enzymatic processes in a hem of animal test groups that is a prerequisite to increase in dairy efficiency and increase in biological and nutritional value of milk.

4. DAIRY EFFICIENCY AND NUTRITION VALUE OF MILK

The correct feeding of animals when providing with necessary mineral substances remains the main condition of receiving high yields of milk. Introduction to the cow diet in the first three months of a lactation of medicines from local sources of raw materials promoted increase in average daily yields of milk at animal test groups concerning their control contemporaries that speaks about milk yield efficiency higher degree.

The maximum average daily yield of milk on average for a lactation is established at animals of the III test group which was higher, than in control for 25,7%. At introduction to a diet of the lactating cows of medicine without sorbent average daily yields of milk of animals were lower, than in the III group on 6,4 but above, than in control group for 18,2%. This regularity is traced on all months of lactation. Throughout lactation intensity of processes of formation of milk significantly changes. The size of a yield of milk for lactation depends also on constancy of a lactation curve. Till 100th day of a lactation on which the maximum yield of milk (the 4th month) fell in all groups of animals, except control, increase in dairy efficiency is established. Further lactations are gone by natural decrease in average daily yields of milk all the way. Such regularity is caused by a physiological condition of animals during the different periods of lactation. However intensity of change of average daily yields of milk on months of lactation in control and test groups was various. Proceeding from our researches, in the first 100 days of a lactation there is a natural increase in average daily yields of milk at animal all test groups. Cows of the group I had low steady, III - high steady, II - also high, but unstable lactation curve.

One of indicators of the account and assessment of dairy efficiency is the yield of milk in 305 days of lactation (tab. 2). Feeding by an animal for a complex of organic-mineral compounds from local raw materials in mix with the concentrated sterns allowed increasing the size of this indicator

at cows of test groups. The greatest number of milk in general for lactation is received from cows of the III group. The yield of milk these animals made 5238,3 kg that exceeded control value for 25,9%. At introduction to the cow diet of medicine without sorbent it was received from animals of the II group - 4903,8 kg of milk that is 17,9% more, than in control and 6,8% less, than in the III group.

Table 2: Cows' Dairy efficiency in 305 days of lactation

Indicator	Group		
	I	II	III
Yield of milk, kg	4159,2 ±125,67	4903,8 ±74,19***	5238,3 ±78,84***
Mass fraction of fat, %	3,85 ±0,03	4,35 ±0,07***	4,42 ±0,07***
Mass fraction of protein, %	3,21 ±0,03	3,33 ±0,03*	3,38 ±0,02***
Quantity of dairy fat, kg	160,31 ±1,25	213,35 ±3,17***	231,72 ±4,40***
Quantity of dairy protein, kg	133,52 ±1,06	163,79 ±2,16***	177,16 ±3,19***

The main quality indicators of milk are the content of fat and protein in it. The Fat-protein of cows – is the most important sign of animal assessment on dairy efficiency. With increase in concentration of fat the nutritional and energy value of milk increases and its prime cost decreases.

The highest mass fraction of fat is established in milk of the cows of the III test group (4,42%) receiving with a forage medicine with a sorbent that it was higher, than in control group on 14,8 points. Introduction to the cow diet of medicine without sorbent promoted a little smaller increase in content of fat in cow milk of the II group. However, the size of this indicator was higher, than at control analogs on 13,0 points. The difference on a fat-protein of cows between II and III groups made 1,6 points. Increase in fat content of cow milk of test groups is connected with increase in intensity of acetic fermentation in a hem and as the investigation, increase of concentration of acetic acid in ruminal contents. There is it due to introduction of the missing mineral substances as a part of an organic-mineral complex from local raw materials possessing microporous structure and buffer properties. There are stabilization pH hem contents, optimization of conditions of activity of digestive enzymes, activation of functioning of microfibers, improves a condition of a mucous membrane and advance of chyme in intestines is slowed down. In the course of digestion of forage from additives the ammonium ions absorbed by their crystal lattice from hem contents are slowly allocated. Alignment of concentration of ammonia in a hem, activation of processes of fermentation in a hem, and, as a result, increase in quantity of bacteria and content of volatile fatty acids in ruminal contents is result of it.

It should be noted that carrying out researches took place in a zone of South Ural which is the iodine lack geochemical province. The lack of iodine intake in an organism leads to reduction of concentration of the thyroglobulin possessing function of transformation of carotene into vitamin A in an intestines wall. Iodine participates in regulation of a metabolism, including fatty, through thyroid hormones. Its shortcoming causes decrease in level of dairy efficiency and fat content of milk in cows. Animals during the milk yield increasing period as the metabolism in their organism proceeds at the high level are especially sensitive to a lack of iodine of a diet and with milk a large amount of this halogen is allocated. In a complex of organic-mineral compounds the content of iodine makes 1,5-2,5 mg on 1 kg of solid of local raw materials that exceeds its contents in green, juicy and grain sterns by 5-8 times. All this also led to increase in a mass fraction of fat in cow milk of test groups.

Along with milk fat the most valuable component of milk is protein. Use when feeding cows for a complex of organic-mineral compounds from local raw materials exerted positive impact and on quantitative protein content in milk. The maximum size of this indicator is established in

the III test group (3,38%) that it was higher, than at control contemporaries on 5,3 points. Against the background of use of medicine without sorbent the mass fraction of protein in cow milk was lower, than in the III group on 1,5; but above control value on 3,7 points.

At assessment of economic efficiency of production of milk the determination of amount of milk fat and protein received from cows with milk in general for lactation is important. Monthly monitoring of content of fat and protein in milk allowed calculating these indicators. Introduction to the cow diet of the III group of medicine with a sorbent allowed to receive the greatest exit of milk fat that made 231,72 kg and was on 71,4 kg (or 44,5%) more, than at control analogs. The amount of dairy fat in the II group made 213,35 kg and exceeded this indicator in control group on 53,04 kg or 33,09%.

Similar changes are established also on an exit of milk protein: its smallest contents were in control group - 133,52 kg. In the II group of milk protein received on 30,27 kg, or 22,67%, it is more. The most large amount of milk protein is received in the III group that exceeded the size of this indicator in the II group on 13,37 kg (8,16%), in control group - on 43,64 kg or 32,7%.

The protein of milk is non-uniform and presented by casein and serumal proteins. The largest specific weight, 75-85% of total of proteins, has casein. Its biological value is defined by contents in the composition of irreplaceable amino acids. Serumal proteins have great physiological value. Their quantity is a marker of various metabolic disorders and, in general, the states of health of animals.

The analysis of fractional composition of proteins of milk showed that feeding exerted animals for a complex of organic-mineral compounds from local raw materials positive impact on composition of protein and led to increase in content of casein and some decrease in concentration of serumal proteins in cow milk of test groups. Dynamics of concentration of these components is similar to change of content of the general protein.

At introduction to a diet of animals of medicine without sorbent the content of casein as a part of milk protein of cows of the II group was higher, than at control contemporaries on 6,6 points, and - is 5,4 points lower than serumal proteins. The highest content of casein (2,66%) and the lowest concentration of serumal proteins (0,72%) are established in cow milk of the III group. This value was higher on casein and is lower on serumal proteins, than in the II group on 2,7 and 2,8 points; than in control - on 9,5 and 8,3 points. It should be noted that concentration of serumal proteins was in cow milk of all groups approximately at one level. Increase them is caused by increase in concentration of the general protein in milk. At the same time the ratio of casein and serumal proteins was in limits of standard values. It speaks about positive influence of the entered additives on health and efficiency of cows.

5. AMINO-ACID COMPOSITION OF COW MILK PROTEINS

Proteins of milk represent high-molecular organic substances which molecules are constructed of amino acids. Proteins are a structural and functional basis of activity of an organism, they provide growth, development and normal course of exchange processes in an organism. Proteins cannot be replaced with other substances. In a human body of protein food is being split to amino acids and keto acids which in turn take part in synthesis of new amino acids and proteins necessary for an organism. These amino acids are replaceable. However 8 amino acids: the isoleucine, leucine, lysine, methionine, threonine, phenylalanine, tryptophane and valine, are not synthesized in an organism of animals or formed too slowly and in the quantities insufficient for satisfaction of need of animals in them. These amino acids call irreplaceable. Protein is considered full if all 8 irreplaceable amino acids are its part. It has almost absolute comprehensibility. Normal activity of an

organism substantially depends on satisfaction of need for full-fledged protein.

Irreplaceable amino acids during biochemical processes are exposed to irreversible deamination therefore it is very important that they continuously came to an organism with food.

During our researches for assessment of full value of protein the analysis of amino-acid composition of cow milk was carried out.

Results of researches demonstrate that cow milk of test groups was fuller based on the ratio of amino acids. So, introduction to a diet of animals of medicine without sorbent promoted increase in content of irreplaceable amino acids as a part of milk protein of cows of test groups in 30 days of researches for 2,8-4,2%, in 60 days of researches for 5,5-7,2%, in 90 days of researches - for 7,4-9,6% in comparison with control. The animals receiving with a forage medicine with a sorbent surpassed the control contemporaries in the content of irreplaceable amino acids as a part of milk protein in 30 days of researches for 5,3 - 6,8%; in 60 days of researches for 8,6 - 10,5%; in 90 days of researches for 11,6-13,6%. At the same time the general content and mass of separate replaceable amino acids in 100 g of protein in these groups during researches fell. At the same time also their ratio changed. Content of glutamic, aspartate amino transferase, glycine, arginin, alanin and histidine increased, but contents of serine and tyrosine in comparison with the content of these amino acids as a part of milk protein of cows of control group fell. Such dynamics of change of a ratio of replaceable and irreplaceable amino acids and their certain representatives in groups is traced during the entire period of researches. Change of a ratio of replaceable amino acids can be connected with their contents as a part of the entered additives.

6. BIOLOGICAL VALUE OF MILK PROTEINS

During our researches for assessment of full value of protein the analysis of amino-acid composition of cow milk was carried out [19].

Results of researches demonstrate that cow milk of test groups was fuller based on the ratio of amino acids. So, introduction to a diet of animals of medicine without sorbent promoted increase in the general content of irreplaceable amino acids as a part of milk protein of cows of test groups in 30 days of researches for 4,2%, in 60 days of researches for 7,2%, in 90 days of researches - for 9,6% in comparison with control. The animals receiving with a forage medicine with a sorbent surpassed the control contemporaries in the content of irreplaceable amino acids as a part of milk protein in 30 days of researches for 6,8%; in 60 days of researches for 10,5%; in 90 days of researches for 13,6%. At the same time the general content and mass of separate replaceable amino acids in 100 g of protein in these groups during researches fell. At the same time also their ratio changed. Content of glutamic, aspartate amino transferase, glycine, arginin, alanin and histidine increased, but contents serine and tyrosine in comparison with the content of these amino acids as a part of milk protein of cows of control group fell. Such dynamics of change of a ratio of replaceable and irreplaceable amino acids and their certain representatives in groups is traced during the entire period of researches. Change of a ratio of replaceable amino acids can be connected with their contents as a part of the injected drugs.

The complex of organic-mineral compounds from local raw materials contains a significant amount of glutamic and aspartate amino transferase, histidine, it is slightly less than glycine, an alanin and arginin, a certain quantity Serine and tyrosine.

During the entire period of researches in all groups of animals glutamic acid had the greatest mass fraction among replaceable amino acids (13,65 - 15,04 g / 100 of protein), histidine - the smallest (2,79 - 2,96 / 100 of protein). The highest indicator of the sum of replaceable amino acids during the entire periods of researches is noted in control group, and by 90th day of researches their quantity in control group gradually increases, and in test groups decreases a little. It, perhaps, is

connected with a bigger share of assimilation by animals of test groups of irreplaceable amino acids of forages and the injected drugs in comparison with replaceable amino acids.

The biological value of proteins is determined by modern representations by efficiency of transformation of proteins of food to proteins of a human body, or maintenance of nitrogenous balance in it. It depends on balance of amino-acid structure on irreplaceable amino acids. Synthesis of the most part of proteins of a human body requires not only enough each of irreplaceable amino acids, but also their ratio which has to be brought closer ideally to that in proteins of a body of the person. Violation of balance of amino-acid composition of proteins of food leads to violation of synthesis of own proteins and prevalence of processes of disintegration of own proteins of an organism. The lack of any irreplaceable amino acid limits use of other amino acids in the course of protein biosynthesis. Considerable surplus leads to formation of highly toxic products of exchange of amino acids, unused for synthesis.

The biological value of proteins is determined by calculation amino-acid it is fast. As "ideal" use protein of egg, or the hypothetical protein offered FAO/WHO. In the practical purposes calculation is sufficient it is fast for the scarcest amino acids: tryptophane, lysine and sum of sulfur-containing methionine and cystine. The amino acid determining the biological value of protein (limiting) consider that which it is fast has the smallest value.

Proceeding from results of researches, the limiting amino acid in control group was tryptophane. Besides, its quantity as a part of milk protein by 90th day of researches decreased, and it is fast decreased by 4%. In test groups the smallest is fast during the entire period of an experiment had threonine therefore it was the limiting amino acid. It should be noted that in control group it was fast it is also small concerning other amino acids.

The highest is fast in all groups had a lysine and an isoleucine. However, in control group its size by 90th day of researches decreased at a lysine on 1, an isoleucine by 2% whereas in test groups increased at a lysine on 6-8, an isoleucine of 5-9%. In test groups it is fast a lysine and an isoleucine was higher, than in control group, by 90th day of researches for 14-18%.

It is fast sulfur-containing methionine and cystine in control group by 90th day of researches decreased 5%, in test groups increased by 7-10%. Relative content of methionine and cystine in groups of the animals receiving in addition to the main diet a complex of organic-mineral compounds from local raw materials in comparison with control analogs was 16-22% higher.

Introduction to a diet for a complex of natural minerals promoted increase in relative content of tryptophane as a part of milk protein by 90th day of researches in comparison with control contemporaries for 24 - 64%.

Thus, introduction to a diet for a complex of organic-mineral compounds from local raw materials promoted improvement of a quantitative ratio of amino-acid composition of milk, its biological and nutritional value.

Judging from the received results it is possible to note that more expressed action which is favorably influencing ruminal digestion, a metabolism, dairy efficiency, biological and nutritional value of cow milk the complex of organic-mineral compounds from local raw materials with the 30% maintenance of a sorbent possesses.

7. CONCLUSIONS

1. Inclusion in a diet of cattle for a complex of organic-mineral compounds from local raw materials promoted increase in content of volatile fatty acids and the number of microbial weight in a hem of cows of test groups of rather control analogs.

2. Use of natural organic-mineral compounds in feeding of milk cows allowed to receive in 305 days of a lactation in addition 744,6 - 913,5 kg of milk on each animal.

3. There was an increase in a mass fraction of fat and protein in cow milk of test groups in comparison with animals of control group on 12,9-14,8 and 3,7 - 5,3 points that allowed to receive in addition from each cow 53 - 71 kg of milk fat and 30 - 44 kg of milk protein.
4. It is fast a lysine, methionine and cystine, tryptophane in test groups was above control value on 14; 16-18, 22% and by 1,7-1,8 times.

8. SUMMARY

Thus use for a complex of organic-mineral compounds from local raw materials in feeding of cows during the first 100 days of a lactation is represented perspective for animal industry as provides the expressed effect of increase in dairy efficiency at increase as a part of milk of concentration of fat and protein, as well as increase in biological value of milk by means of increase as a part of protein of amount of irreplaceable amino acids.

The advantage of the used natural minerals is existence in their structure of the balanced complex of biologically active agents in available to assimilation by an organism to a form. Also use for a complex of organic-mineral compounds from local raw materials in feeding of cattle of other technological groups during the periods of cultivation, growing or sagination is obviously possible.

9. CONFLICT OF INTERESTS

Authors confirm that the submitted data do not contain the conflict of interests.

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