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Use of Permasol-500 mineral to improve morpho-biochemical parameters of blood of local rabbits and increase their natural resistance

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Abstract

The experiments were conducted on 45 30-day-old rabbits of the local breed. 3 groups were formed for the experiment. Group 1 rabbits were the control group and were fed with mixed feed used on the farm until the end of the experiment. Groups 2-3 were the experimental group rabbits, which were given different amounts of Permasol - 500 mineral with their diet from day 30 to day 70 for 40 days. In particular: rabbits of the 2nd experimental group were given 6g/kg, and rabbits of the 3rd experimental group were given 10g/kg. At the end of the experiment, the best results were observed in rabbits of the second experimental group. In particular, compared to their peers in the control group, erythrocytes were 19.53%, hemoglobin 10.08%, leukocytes 8.06%, total protein 13.55%, albumin 10.70%, calcium 9.73%, phosphorus 23.91%, AST 27.17%, ALT 12.94%. Natural resistance was also found to be higher in group 2 rabbits.

Keywords:

Introduction. One of the most pressing issues facing our country today is providing the population with high-quality livestock products. In the conditions of Uzbekistan, one of the promising sectors of agriculture is rabbit breeding, the main products of which are high-quality dietary meat, as well as raw materials for fur products: skins and furs. The nutritional and dietary properties of rabbit meat are much higher than those of many other types of meat. Rabbits are very productive and early maturing, which allows you to obtain a large amount of meat products in a short time.

Mineral substances in the body of rabbits perform very important functions such as digestion, absorption and assimilation of food. They are part of various enzymes and serve as their activators. One of the main functions of minerals is to maintain osmotic pressure in the body at a certain level.

The body of rabbits is able to reach a high level of development in a short period of time. This allows for early exploitation of rabbits, that is, reproduction and production. At this time, their mineral supply should be at the level of regulatory requirements. In our experiments, we studied the effects of the mineral Permasol - 500 on the morpho-biochemical and natural resistance indicators of rabbit blood.

Materials and methods. Scientific research was conducted on 1-month-old rabbits of local breed from the rabbit breeding enterprise "Aslkhozha darghom agro velikan" M.Ch.J., Pastdarghom district, Samarkand region. Laboratory and clinical examinations were carried out on the farm itself. Taking into account the body weight of the rabbits, 3 groups were formed according to the principle of analogues. The conditions for feeding rabbits and fulfilling zootechnical requirements were analyzed. Scientific research was conducted on the effect of different amounts of Permasol - 500 mineral on the organism to increase productivity in rabbits.

45 1-month-old rabbits of local breed were selected from the rabbit breeding enterprise "Aslkhozha darghom agro velikan" M.Ch.J., 3 groups of 15 rabbits each were formed and placed in wire cages. The conditions of keeping the rabbits were the same. The first group of rabbits was a control group and was fed on a farm diet. Groups 2-3 were experimental group rabbits, which were given different amounts of Permasol – 500 mineral with their feed ration from day 30 to day 70 for 40 days. In

particular: rabbits of the 2nd experimental group were given 6g/kg, rabbits of the 3rd experimental group were given 10g/kg.

Morphological parameters of blood were determined at the beginning and last day of the experiment in the ARSYMED medical laboratory of the Samarkand city hospital using the CS-T180 and BIOBACK devices.

Bactericidal activity of blood serum was determined using the Staphylococcus aureus test culture of P.A. Emelianenko (1980). Lysozyme activity of blood serum was determined using the V.G. Dorofeychuk method. As an indicator of lysozyme activity, a daily culture of Micrococcus Lysodeicticus grown in MPA was used. The phagocytic activity of blood neutrophils was determined by the method of A. I. Ivanov and B. A. Chukhlovin (1967).

The numbers obtained during the experiment were subjected to variational statistical processing according to S.I. Lyutinsky, V.S. Stepin (1989). The level of significance between the numbers was determined according to the Student's table at $P \leq 0.05$.

Results. All vital functions of the organism are carried out mainly by blood and its components. Blood provides communication between parts and organs of the body, delivers nutrients and oxygen to cells, and removes waste products, facilitating metabolism (E.V. Eidrigevich, V.V. Raevskaya, 1978).

The composition of the blood is significantly affected by the diet of the animal, its age and sex, breed, living conditions, season, etc. Based on this, we studied the morphological and biochemical parameters of the blood of laboratory rabbits.

The data obtained and their analysis show changes in the morphological composition of the blood when the mineral Permasol - 500 is included in the diet (Table 1).

It should be noted that at the beginning of the experiment, the studied parameters in rabbits of all experimental groups differed slightly and were within the physiological norm.

The results of the study show that the addition of Permasol – 500 mineral to the diet of rabbits has a significant effect on hematological parameters, which is mainly associated with changes in growth rates. The level of red blood cells and hemoglobin is closely related to the productivity of animals.

It was found that at the end of the experiment, rabbits from the experimental groups had a high concentration of erythrocytes and leukocytes, as well as a high level of hemoglobin. This is associated with a high level of metabolism in the body, an increase in live weight and increased resistance. Thus, it was found that rabbits from the II experimental group had a higher erythrocyte count than their peers from the control group by 1.1 x1012 / l (21.48%; P < 0.001), and group III - by 0.88 x 1012 / l (17.18%; P < 0.01).

At the end of the experiment, the level of leukocytes in the blood of experimental animals was higher than that of control group counterparts by 0.7x109/l (8.06%; P<0.01) and 0.50x109/l (7.20%; P<0.01) for groups II and III, respectively.

The hemoglobin content in the blood of rabbits in the experimental groups was higher than that of their peers in the first control group. Thus, in group II - 11.28 g/l (10.08%; P < 0.01) and in group III - 9.52 g/l (8.51%; P < 0.01).

In addition, an increase in the content of erythrocytes, leukocytes and hemoglobin in the blood was observed in all groups of rabbits at the end of the experiment compared to the beginning of the study.

Table 1.

Morphological parameters of the blood of experimental rabbits

Indicators	Groups		
	I	II	III
At the beginning of the experiment (30 days)			
Erythrocyte 10^{12}/l	4.74±0.12	4.78±0.14	4.70±0.12
Leukocyte 10^{9}/l	6.78±0.14	6.72±0.11	6.68±0.14
Hemoglobin g/l	106.92±1.30	107.92±1.20	108.08±1.33
At the end of the experiment (70 days)			
Erythrocyte 10^{12}/l	5.12±0.12	6,22±0.06***	6.00±0.09**
Leukocyte 10^{9}/l	6.94±0.07	7.64±0.08**	7.55±0.07**

Hemoglobin g/l	111.82±0.91	123.10±2.00**	121.34±1.91**

Note: * – P<0.05; ** – P<0.01; *** – P<0.001

It should be noted that all quantitative changes in the blood, which increased the productivity of rabbits and the natural resistance of rabbits in the experimental groups, were due to the effect of the mineral Permasol - 500. As a result of our research, at the beginning of the experiment, the amount of total protein, albumin, calcium, phosphorus, ALT and AST in the blood serum did not differ significantly. At the end of the experiment, several changes were observed in the obtained indicators. The results are shown in the table below (Table 2).

Table 2.

Biochemical parameters of blood serum of experimental rabbits

Indicators	Experience days	Groups		
		I	II	III
Total protein	30- day	68.20±0.37	66.84±0.80	67.28±0.52
	70- day	71.32±0.42	75.90±0.44***	75.30±0.52***
Albumin	30- day	32.68±0.68	31.94±0.76	32.36±0.72
	70- day	34.94±0.22	38.92±0.52***	38.68±0.34***
Calcium	30- day	2.34±0.08	2.26±0.06	2.38±0.09
	70- day	2.46±0.05	2.48±0.05	2.54±0.05
Phosphorus	30- day	0.90±0.04	0.92±0.04	1.00±0.06
	70- day	0.98±0.03	1.14±0.05*	1.12±0.03**
ALT	30- day	45.68±0.91	44.96±0.55	45.84±0.87
	70- day	48.96±1.02	50.78±1.11	50.82±0.84
AST	30- day	24.54±0.43	24.88±0.69	23.92±0.27
	70- day	29.98±0.67	31.64±0.64	31.24±0.95

Note: * – P<0.05; ** – P<0.01; *** – P<0.001

At the end of the experiment, the increase in the total protein content in the blood of rabbits in the control group compared to the control group was 4.58 g/l (6.42%; P < 0.001) in the second experimental group and 3.98 g/l (5.58%; P < 0.001) in the third experimental group.

Analysis of the data obtained shows that at the beginning of the experiment, no differences in the amount of albumin were observed in rabbits of all groups. This indicator varied in the range of 31.94-32.68 g/l. At the end of the experiment, the amount of albumin in the blood serum

of rabbits in the control group was lower than in group II - 3.98 g/l (11.39%; P < 0.001) and group III - 3.74 g/l (10.70%; P < 0.001). This dynamics of albumin content confirms the idea that a high level of albumin in the blood serum of animals corresponds to an average daily increase in live weight.

Thus, at the end of the experiment, the calcium level in the blood of rabbits increased by 0.02 mmol/l (0.81%) in group II and by 0.08 mmol/l (3.25%) in group III compared to the control group.

A similar situation was observed with the phosphorus content. It increased by 0.16 mmol/l (16.32%; P<0.05) in group II and by –0.14 mmol/l (14.28%; P<0.01) in group III.

At the end of the experiment, an increase in the levels of AST and ALT was observed in the blood serum of rabbits in all experimental groups. Thus, the concentration of AST in the blood serum of rabbits in group I increased by 5.44 mmol/l (22.16%; P<0.001), in group II – by 6.76 mmol/l (27.17%; P<0.001), and in group III – by 7.32 mmol/l (30.60%; P<0.001).

A similar situation was observed for the amount of ALT. Thus, the level of ALT in the blood serum of rabbits in group I increased by 3.28 mmol/l (7.18%; P<0.05), in group II – by 5.82 mmol/l (12.94%; P<0.01), in group III – by 4.98 mmol/l (10.86%; P<0.01).

One of the most important factors for increasing the productivity of rabbits is the evaluation, selection and breeding of animals with high adaptability. Therefore, the study of the adaptive potential of rabbits is of great scientific and practical importance.

The level of natural resistance characterizes the level of resistance of the organism to diseases, which is influenced by factors such as the age of the animal, season, feeding and care conditions (I.R. Selivanova, 2007).

Some of the most important indicators characterizing the adaptive capacity of the animal, its vitality and health status are indicators of natural resistance, such as the phagocytic activity of neutrophils, bactericidal activity of blood serum (BAS) and lysozyme activity of blood serum (LAS).

Analysis of the data obtained shows that the activity of protective and adaptive reactions in rabbits of all experimental groups increased by the end of the experiment, which, in our opinion, is associated with the activation of the immune system due to the positive effect of the probiotic "Biogumitel" when it was introduced into the diet of rabbits (Table 17).

At the beginning of the experiment, the phagocytic activity of neutrophils in the blood of rabbits of all experimental groups ranged from 35.62% to 37.06%. At the end of the experiment, an increase in phagocytic activity was observed in the blood of rabbits of all groups. Thus, the value of this parameter in the blood of rabbits of group I was 4.88%, in group II - 9.20%, and in group III - 7.64%.

Analysis of intergroup differences showed the predominance of neutrophil phagocytic activity in the blood of rabbits of the experimental groups at the end of the experiment. Thus, the value of this indicator in the blood of animals of group II exceeded that of their peers in group I by 3.42% ($P < 0.01$), group III by 4.00% ($P < 0.01$), and group IV by 3.10% ($P < 0.05$).

Our data show that in animals of all experimental groups, the bactericidal activity of serum increased at the end of the experiment compared to the beginning. For rabbits of group I, this increase was 4.26%, group II - 10.72%, and group III - 9.54%.

Changes in serum lysozyme activity were similar to changes in neutrophil phagocytic activity and serum bactericidal activity. In rabbits of group I, this indicator increased by 4.98%, in group II - 9.84%, and in group III - 9.54%.

Table 3.

Natural resistance indicators of rabbits in the experiment, %

Indicators	Trial period	Guruhlar		
		I	II	III
Phagocytic activity	30-day	35.94±0.80	35.62±1.21	36.28±0.66
	70-day	40.82±0.55	44.82±1.02**	43.92±1.13*
Bactericidal activity	30-day	45.16±1.20	44.40±0.99	44.94±1.11
	70-day	49.42±0.98	55.12±0.83**	54.48±1.14**
Lysozyme activity	30-day	40.98±0.98	40.26±0.48	41.08±0.81

	70-day	45.96±0.73	50.10±1.04**	50.62±0.67**

Note: * – P<0.05; ** – P<0.01; *** – P<0.001

Thus, the results of the immunological study show that rabbits in all experimental groups were highly protected. It should be noted that the introduction of Permasol-500 mineral into the diet of rabbits had a positive effect on the indicators of natural resistance and maintained them within physiological norms. All this led to high growth rates and an increase in live weight.

Discussion. At the present stage of development of animal husbandry, the use of various probiotic additives is becoming increasingly important. The widespread use of probiotics in animal husbandry and veterinary medicine is associated with their safety and harmlessness (V.M. Bondarenko, N.M. Gracheva, 2003).

The purpose of our study is to study the biological and productivity characteristics of rabbits, as well as the composition and properties of meat when adding Permasol - 500 mineral to their diet.

In our studies, optimal feeding and housing conditions were created for rabbits in all experimental groups, which contributed to the normal growth and development of animals. During the 90-day experiment, the advantage of rabbits in experimental group II in terms of feed unit consumption over their peers in control group I was 1.59%, metabolizable energy - 3.12 MJ (1.61%), dry matter - 0.25 kg (1.61%), crude protein - 0.05 kg (1.63%), the advantage of rabbits in group III was 0.74 units (3.57%); 7.00 MJ (3.61%); 0.56 kg (3.61%); 0.11 kg (3.59%) and group IV - 0.57 units (2.75%); 5.38 MJ (2.78%); 0.43 kg (2.78%) and 0.08 kg (2.61%).

Conclusion. When local breed rabbits were supplemented with 0.6g/kg of Permasol-500 mineral from 30 to 70 days of age, erythrocytes were 19.53%, hemoglobin 10.08%, leukocytes 8.06%, total protein 13.55%, albumin 10.70%, calcium 9.73%, phosphorus 23.91%, AST 27.17%, ALT 12.94%, compared to their peers in the control group. Natural resistance was also found to be higher in group 2 rabbits.

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