Causes and prevention of disorder of calcium-phosphorus exchange in rabbits

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Abstract. Disorders of calcium and phosphorus metabolism in rabbits are caused by a violation of the ratio of calcium and phosphorus in their ration, and it was found that the supply rate of rabbits with nutritious substances in the diet is 85.46% calcium, 63.25% phosphorus, 64.0% carotene, 86.15% raw kletchatka, 91.17% dry matter, 91.2% digestible protein. Calcium-phosphorus metabolism disorders in rabbits are accompanied by sympto ms such as altered appetite (coprophagia), pale mucous membranes, hoarseness of the skin coating, loss of glare, the appearance of bulges in the ribs, as well as hypogemoglobinemia, hypocalcemia, hypophosphoremia. As a result of this pathology, abortions can be observed in mother rabbits, or their children born from them will be hypotrophic. Methods have been developed to prevent calcium and phosphorus exchange disorders in rabbits by giving granular lobster baits enriched with Nova Marks (vitamin-mineral premix) premix, mixing the Innoprovet probiotic in water. Granule feed (enriched with 1 kg of Nova Marx premix per 1tonna feed) + innoprovet 1 ml with 1 liter of water (for 7 days) in the period from the 10th day of calving to the 10th day after childbirth is more effective, ensuring an increase in hemoglobin in the blood by an average of 12.7 g/l, total protein in the blood serum-14.06 g/l, total calcium - 1.04 mmol/L and inorganic phosphorus. Vitamin-mineral premix, given in combination with probiotics, improves food digestion in the body of rabbits. This method of prophylaxis prevents calcium-phosphorus exchange disorders in rabbits, in which the increase in body weight is on average 0.51 kg higher than the control.

1 Introduction

Today, there are many cases of metabolic disorders among purebred rabbits, including diseases of calcium and phosphorus metabolism, as a result of which there are many cases of birth of rabbits with low vitality and low vitality. This, in turn, is one of the biggest obstacles to rapid development of the industry, profitability in rabbit farming, and obtaining high-quality rabbit meat and fur. In the cultivation of environmentally friendly dietbop rabbit meat, ensuring food safety and meeting the population's demand for rabbit products,

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it is important to diagnose, effectively treat and develop methods for the Prevention of substance exchange Disorders found in rabbits, in particular disorders of calcium and phosphorus metabolism. Identifying the causes of disorders of calcium and phosphorus metabolism in rabbits, studying their symptoms and syndromes, and developing methods for early diagnosis of this pathology and group preventive measures are urgent tasks.

In the countries of the world, the disorders of mineral metabolism of rabbits, as well as the lack of calcium and phosphorus macroelements, cause them to stop growing, reduce productivity and fertility. less offspring are being produced. Taking into account the biological characteristics of rabbits, conditions of storage and feeding, as well as the needs of the organism, research aimed at the development of group preventive measures of calcium and phosphorus metabolism disorders by enriching the diet with minerals and biologically active substances is important.

Calcium and phosphorus elements play an important role in the body of rabbits. They make up about 65-70% of all mineral substances in the animal body.

A number of scientists emphasize the important role of phosphorus and calcium in all metabolic processes. It is very important to have these substances in the diet in moderation, because these substances participate in the formation of skeletons and metabolism in animals. These mineral substances are closely related to each other in the body. The ratio of calcium and phosphorus in the body of rabbits should be 1.5-2:1, as in bone tissue [1, 7, 14, 22].

Mineral substances play an important role in all physiological processes: digestion, absorption and assimilation of nutrients. They are part of many enzymes and serve as their activators. One of the most important functions is maintaining the osmotic pressure in the body at a certain level [9, 12, 16, 18].

Osteoblasts of bone synthesize and produce intercellular substances, participate in its limification, control the exchange of calcium and phosphorus in bones. Collagens make up 90% of all the proteins produced. As a result of mineralization, 90-95% of calcium salt compounds are included in collagen and hydrooxyapatite [2, 15, 17].

99% of calcium is in bones, the rest is in fluids. Calcium is in the blood in 3 different forms: 1. 45-50% in the ionized state; 2. 40-45% is bound to protein; 3. The rest is in the form of anions with small molecules. It performs tasks such as narrowing blood vessels, increasing blood pressure, and accelerating blood clotting. 80-85% of phosphorus is in the skeleton and is a structural element for the body. Phosphorus exists in the body in 2 different forms (inorganic and organic). In addition, it is included in DNA and RNA, participates in the metabolism of proteins, lipids, amino acid transport [4, 6, 8, 21].

Calcium and phosphorus make up 65-70% of all minerals in the rabbit's body and make up about 2% of body weight. The main part of these substances is in bones, under the influence of vitamin D, they are absorbed from the intestines and accumulate in bones [1, 5, 10, 13, 19].

When the effects of specific vitamin and mineral premixes on rabbit growth and maturation were found, body weight was 2,630±0.012 kg in the experimental group at an average of 77 days, and 2,520±0.020 kg in the control group. Similar results were obtained in the influence of morphobiochemical indicators of blood, the amount of hemoglobin was 8.13±0.49 g/l in the control group, and 9.16±0.44 g/l in the experimental group organized [9,22]

The total protein content was 42.83±1.11 g/l in the control group, and an average of 44.89±0.78 g/l in the experimental group, with the total Ca correspondingly (2.4-4.2 mmol/l in Ca norm) averaging 3.31±0.35 mmol/l, 3.85±0.24 mmol/l, inorganic phosphorus averaging 2.48±0.06 mmol/l and 2.45±0.02 mmol/l. 60.82±2.34 t in the control group of alkaline phosphotase enzyme activity.b. In the experimental group, on average, 61.32±3.22 t.b. Norm P has been found to be 0.6-2.7 mmol/l, with a total protein of 32.0-58.0 g/L.

The introduction of vitamin-mineral premixes into the diet improves the metabolism of rabbits, prevents dystrophic changes in organs.

The use of specially developed granular soft feed for rabbits ensures the nutrition of the ration (energy-protein ratio, essential amino acid complex, vitamins and minerals) depending on the physiological characteristics, nature and level of productivity of rabbits [4, 9, 11]

Vitamin D3, Mikrovit-D3, Introvit and Reksvital amino acid preparations are used in winter and spring to prevent and treat rickets in rabbits [3, 7].

The composition of the rabbit feed contains a complex of vitamins and minerals saturated with necessary macroelements, it consists of tricalcium phosphate, chalk, sodium chloride, and also includes a premix for rabbits. Also, meat or fish meal should be included in the mixed feed for rabbits up to 5% of the total feed mass. The amount of mixed feed consumed per day depends on the live weight of the rabbit, its gender and age. 110 g for adults, -50 g for young animals [8, 17]

Soft feed, prepared according to a special recipe, is recommended to be given for the purpose of feeding young rabbits from 30 to 135 days. The composition of Omuxta feed is as follows (%): vegetable flour - 30, oat or wheat grain flour -19, barley or corn grain -19, wheat bran -15, sunflower or soy Kunjara or shroti -13, fish or meat flour -2, hydrolyzed yeast -1, table salt -0,5, bone meal -0,5. 100 g of omuxta feed contains: 83.6 g of feed unit, 13.2-14.1 g of digestible protein, 0.96 g of calcium, 0.59 g of phosphorus, 300 N.B. Vitamin A, 8 N.B. Contains vitamin D, 0.75 mg vitamin E, 2.5 mg manganese carbonate, 10 mg ferrous sulfate, 1.4 mg zinc carbonate, and 0.3 mg copper carbonate.

Probiotics based on Bacillus Subtilis have a positive effect on reducing the amount of toxic biogenic amines produced as a result of the decomposition of proteins in the gastrointestinal tract and clean the inflammatory foci from necrotic tissue, and normalize metabolism in rabbits [5, 11]

2 Materials and methods

The experimental part of the scientific work was carried out on the farms “Tarnov-vegetables” and “Silverkent-Khumo bird”, “Nurniyoz Ota” in the Jomboy district, located in the Oqdarya District of the Samarkand region.

General condition, appetite, fatness level, reaction to external influences, color of mucous membranes, skin coating by clinical examination of 10 head of examined female rabbits in the farms. , condition of skin and movement organs, body temperature, number of breaths and pulse in 1 minute were determined.

In order to conduct laboratory tests on blood taken from rabbits during the experiments, the Samarkand State Veterinary Medicine, the University of livestock and biotechnologies was held at the OPTATECH intercultural Laboratory of the Department of diseases of poultry, fish, bees and fur animals and the Hematology Laboratory of the Department of internal non-infectious diseases. Hemoglobin content in blood was determined using a Sali hemometer, erythrocyte count using a Goryayev counting grid (MB200 microscope), glucose content using a Contour plus glucometer, and total protein content in blood serum (using a RNC-portable refractometer) was determined using a refractometric method.

Biochemical parameters of rabbit blood (total calcium, inorganic phosphorus, activity of alkaline phosphatase enzyme) were determined by the express method in biochemical devices "Genru GS300 Plus and CYANSmart" in city polyclinic No. 2.

Scientific and practical laboratory experiments were carried out in order to select means for the Prevention of CA and P metabolic disorders in rabbits, to study their effect on the body and productivity of rabbits, and to determine the economic effectiveness of the preventive method.

3 Results

The causes of Ca and P exchange disorders in rabbits largely depend on the conditions of their storage, the type of feeding, the satiety of rations, the degree to which the body of rabbits is supplied with biologically active substances macro and microelements.

Therefore, the ration of 4-4.5-month-old rabbits of the Khikol breed in rabbit farms with a body weight of 3-3.5 kg was zootechnically analyzed and their composition and nutritional level were studied.

In the ration structure of hares at the "Tarnov Vegetables" rabbit farm, coarse food made up 30%, juicy food 20%, and concentrated food 50%. The calcium-phosphorus ratio (the norm should be 1.6:1) was 2.1:1. The mutual violation of the ratio of Ca and P in the diet of rabbits leads to a violation of the absorption of these minerals in the digestive system and a violation of the metabolism of Ca and P in the body is reported in the scientific literature. One of the main reasons for this is that the amount of Ca and P released in conjunction with milk during breastfeeding cannot be compensated by the body's diet.

The level of nutrition of rabbits in the diet is calcium 85.46%, phosphorus 63.25%, carotene 64.0%, crude fiber 86.15%, dry matter 91.17%, digestible protein 91.2% was found to be organized.

It was found that the supply of rabbit organism is 14.54% less calcium, 36.75% phosphorus, 36% carotene, 13.85% crude fiber, 8.83% dry matter, 8.8% less digestible protein. It was determined that the main alimentary factors in the origin of Ca and P metabolism disorders in rabbits are not fully satisfying the needs of the body in terms of the type, composition, and nutritional value of the rations, the lack of biologically active substances in the composition, and the low calcium-phosphorus (2.1:1) ratio.

It was found that the rabbits kept in the rabbit farms are not fed according to the standard rations. It was concluded that the ration of rabbits has the same composition in all physiological conditions, their age and body weight are not taken into account, and it leads to different levels of metabolic disorders in their bodies. Based on the study and analysis of the level of metabolism in the body and the composition and nutritional level of the rabbit diet, the amount of hemoglobin, glucose, total protein, carotene, inorganic phosphorus, total calcium in the rabbit's body was determined.6-month-old artificially inseminated pigs of the "Tarnov-vegetables" rabbit farm in the Okdarya district of Samarkand region in order to choose the means of prevention of calcium-phosphorus metabolism disorders in rabbits and to study their effect on the rabbits' organism. Experiments were conducted in four groups of 5 rabbits each.

The first experimental group received granulated soft feed enriched with bactovit probiotic (1 kg of powder per 1 ton of feed), the 2nd experimental group received granulated feed (enriched with 1 kg of Nova Marks premix per 1 ton of feed), the 3rd group received granular feed (1 kg of Nova Marks premix per 1 ton of feed enriched with) + Innoprovet 1 ml with 1 l of water (for 7 days), the control group was fed with farm ration. Clinical and hematological tests were performed on experimental rabbits. With the general clinical examination methods adopted through the general examination of Mother rabbits, the general physiological condition, appetite, obesity rate, response to effects, ummical mucous membranes, wool-skin coating, skin and movement organ condition, body temperature, heart rate of 1 minute duration and breath count were determined.

The body weight of their children was determined at birth, 10 days, 20 days and 30 days. The experiments lasted 30 days.

According to the results of clinical examinations of rabbits in the experiment, which were carried out every 10 days from the 10 th day of estrus and until the 10th day after birth, the body temperature of the rabbits in all experimental groups was within the limits of physiological norms at the beginning of the experiments, decreased appetite, paleness of

mucous membranes, obesity level is lower than average, decrease of response reaction to external influences in rabbits, increase of skin coating, decrease of gloss was observed.

During the experiments, these changes were observed to change for the better in experimental groups, while rabbits in the control group were observed to repeat the clinical signs identified at the beginning of the experiment. It became known from this that with the end of the Strait in rabbits, it was observed that mineral exchange disorders were in full swing in them.

Clinical data from experimental rabbits showed that the body temperature of rabbits in Experiment 1 averaged 38.4±0.02 ◦C at the beginning of the experiment, while in the middle of the experiment it rose to 39.0±0.01 ◦C, while by the end of the experiment it decreased to 38.2±0.01 ◦C. The temperature of Group 2 rabbits was 38.8±0.010 c, 37.7±0.03◦C and 38.6±0.03±C respectively, and 38.3±0.02 ◦C, 38.2±0.03 ± C and 38.1 ± 0.04 ± C respectively. The control group had 39.0±0.01 ◦C, 38.2±0.01 ◦C, and 38.1±0.03 ± C ($P<0.05$). As a result, indicators were better in experimental group Rabbits 3 compared to all groups.

The number of pulses in 1 minute in group 1 was 130.9±4.5 times at the beginning of the experiment (normally 120-200 times per minute), 128.6±4.2 in the middle of the experiment, and 124.3±1 at the end. Organized 2 events. 132.2±4.0, 128.7±3.1 and 120.3±4.7 times in the 2nd group, and 128.6±4.3, 120.2±4, 128.6±4.3, 120.2±4, 8 and 115.1±4.9 times, in the control group it was 115.1±4.9, 119.1±4.8 and 124.2±3.9 times ($P<0.01$). It was found that the number of pulses in experimental group 3 was better compared to other groups.

The number of breaths in 1 minute (average 50-60 times in 1 minute) in group 1 averaged 55.1±0.4 at the beginning of the experiment, 53.4±0.2 in the middle and 51.2±0 at the end , organized 3 events. In the 2nd group, the average was 58.6±0.10, 57.5±0.09 and 54.3±0.03, in the 3rd group the average was 55.4±0.6, 54.2 ±0.05 and 53.2±0.04 times, the control group averaged 52.5±0.05, 50.2±0.06 and 51.3±0.02 ($P<0.05$) organized.

Hematological parametres in experimental rabbits were as follows, with the hemoglobin indicator averaging 122.4±3.1 g/l in Experimental Group 1 by the end of experiments, up to 124.8±3.3 g/l in Experimental Group 2, and hemoglobin in Experimental Group 3 averaging 115.5±3.6 g/L at the beginning of experiments, increasing to 128.2±4.1 g/L at the end of 0.001) decrease was observed (Figure 1).

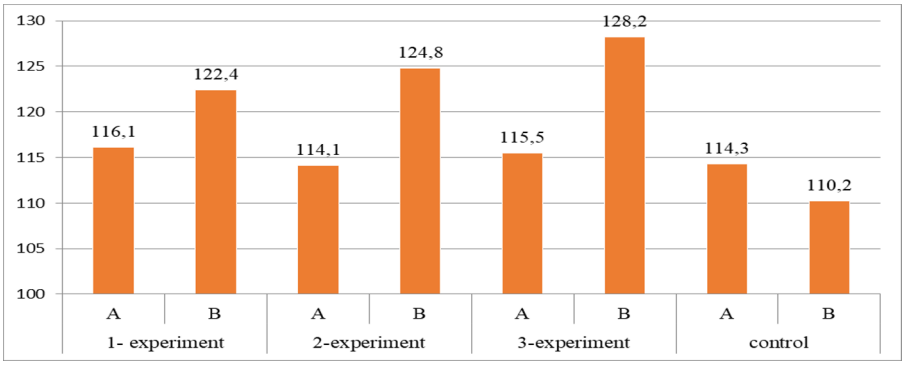

Fig. 1. The dynamics of change in the indicator of hemoglobin in the blood of rabbits in the experiment.

The total blood serum protein indicator averaged 52.71±1.85 g/L in Experimental Group 1 at the beginning of the experiments, 64.20±1.50 g/l at the end of the experiment, while in Experimental Group 2 it was found that it increased to 53.84±1.92 and 62.6±1.48 g/l, respectively, with experimental group 3 averaging 52.18±1.74 g/L and 66.24±1.58 g/L

by the experimental end of the indicator, it was found that the average decreased from 54.26±1.96 g/l to 53.86±1.68 g/l ($p<0.05$) (Figure 2).

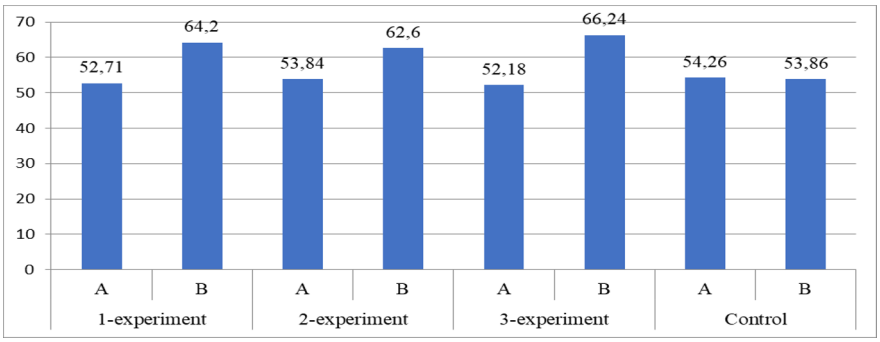

Fig. 2. The dynamics of changes in the amount of total protein in the blood serum of experimental rabbits.

The total amount of calcium in group 1 was on average 2.22±0.561 mmol/l at the beginning of the tests and at the end it was 2.68±0.261 mmol/l, in group 2 it was from 2.16±0.190 mmol/l to 2.86±0.080 mmol/l, increasing to 2.38±0.361 mmol/l and 3.42±0.292 mmol/l in group 3, from 2.26±0.148 mmol/l to 1.88±0.046 mmol/l in the control group decrease was observed, the amount of inorganic phosphorus increased from 1.2±0.071 mmol/l at the beginning of the experiment to 1.8±0.068 mmol/l at the end, correspondingly in 2 groups from 1.3±0.052 mmol/l to 1.8±0.082 mmol/l , increased from 1.4±0.062 mmol/l to 2.2±0.092 mmol/l in group 3, from 1.4±0.028 mmol/l to 1.2±0.039 mmol/l in the control group ($P<0$ .01) was observed to decrease.

According to an analysis of blood glucose levels from rabbits in the experiment, from an average of 3.26±0.561 mmol/l at the beginning of experiments to 3.58±0.622 mmol/l at the end of the experiment, corresponding to 3.28±0.542 mmol/l and 3.76±0.422 mmol/L at the 2nd experimental group, 3.30±0.544 mmol/L and 3.98±0.020 mmol an increase to/L was observed, with a decrease in the control group from 3.24±0.574 mmol/l to 2.98±0.502 mmol/l ($p<0.001$).

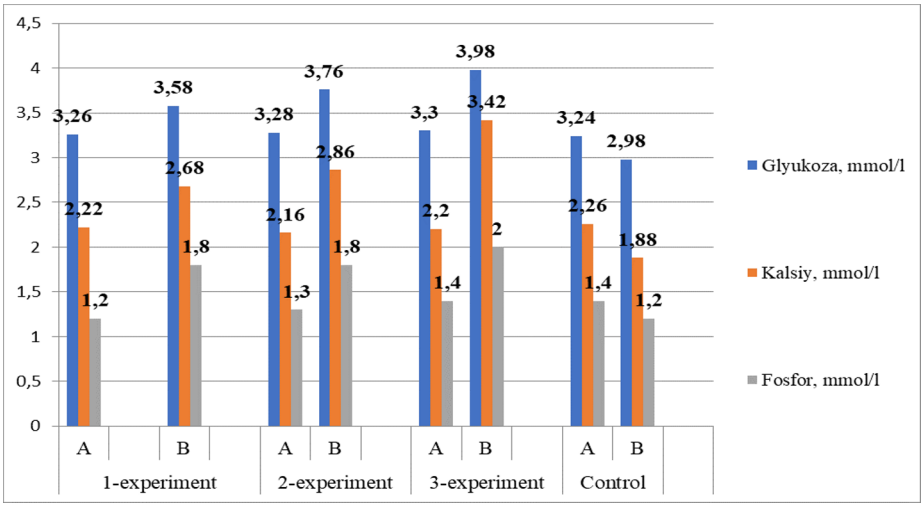

Fig. 3. Hematological indicators of experimental rabbits.

4 Discussion

The study of the body weight of the mother rabbits in the experiment showed that there was no significant difference in the live weight of the rabbits at the beginning of the experiment, but by the 20-day gestation period, the average body weight of the rabbits of the 3rd group was 5.16±1 .76 kg and it was found that it prevailed over other groups. This indicator was on average 4.72±0.76 kg in group 1, 4.74±0.82 kg in group 2, and 4.65±0.42 kg on average in the control group. It was found that the rabbits in the 3rd experimental group were fed granulated feed enriched with Nova Marks premix and drinking water with Innoprovet probiotic due to the improvement of gastrointestinal activity and digestive processes in their organism compared to other experimental groups (Table 1).

Table 1. Changes in body weight (kg) of female rabbits in the experiment. (n=20). M±m.

Groups of the experiment	At the beginning of the experiment	20 th day
1 - experiment	4.10±0.62	4.72±0.76
2 - experiment	4.05±0.69	4.74±0.82
3 - experiment	4.04±1.12	5.16±1.76
Control	4.12±0.53	4.65±0.42

The body weight of the children born from the experimental Khikol breed rabbits was determined to be 40-90 g, the average body weight of the rabbits in the 1st experimental group was 55.6±10.2 grams, average was 56.8±12.2, 78.4±15.4 in the 3rd group and 56.5±12.8 grams in the control group. The birth weight of rabbits born from rabbits in the 3rd experimental group was higher than that of other groups. In 10 days (130-260 g according to the norm), the average for the groups was 190.8±18.5, 182.4±22.4, 206.8±16.6 and 178, It was 7±15.7 grams, and the body weight of group 3 rabbits was also found to be superior here.

In 20 days (standard 250-500 gr) on average 275.7±25.4, 288.5±22.8, 450.2±35.4 and 250.3±22.4 grams, 30 per day (the norm is 400-900 gr) averaged 450.6±35.5, 460.8±28.9, 650.4±38.2 and 392.6±26.8 grams. Live weight of rabbits born from experimental group 3 fed granulated feed enriched with Nova Marks premix and Innoprovet probiotic increased compared to other experiments and controls.

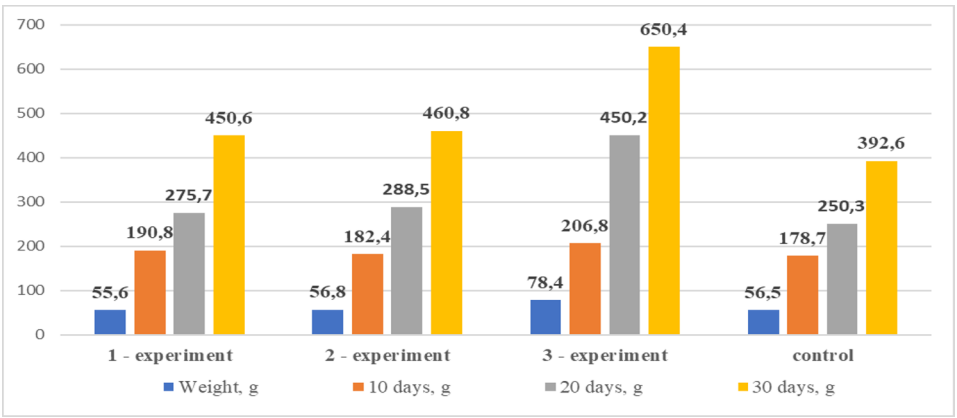

Fig. 4. Body weight of offspring born from experimental rabbits (n=20).

The use of granulated feed enriched with Nova Marks premix and Innoprovet probiotic is effective in preventing calcium and phosphorus metabolism disorders in rabbits from the 10th day of gestation to the 10th day after birth. improves metabolism, improves clinical

and hematological indicators to the standard level, ensures that the birth weight of their children is 21.9 grams higher than that of the control group.

5 Conclusion

- The use of granular feed and innoprovet probiotic in the period from the 10th day of gestation to the 10th day after birth is highly effective in preventing calcium and phosphorus metabolism disorders in rabbits, it improves the metabolism in rabbits, clinical and hematological ensures that the indicators are at the standard level, and the birth weight of their children is 21.9 g higher than that of the control group.
- Granular feed (enriched with 1 kg of Nova Marks premix per 1 ton of feed) + innoprovet 1 ml in 1 liter of water from the 10th day of pregnancy to the 10th day after giving birth to prevent calcium and phosphorus metabolism disorders in mother rabbits with (for 7 days) the effect of use is high, the amount of hemoglobin in the blood is on average 12.7 g/l, the total protein in the blood serum - 14.06 g/l, the total calcium - 1.04 mmol/l and increases inorganic phosphorus by 0.6 mmol/l.

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