



Etiopathogenesis of Calcium–Phosphorus Metabolism in Rabbits

Karshiev U.T.¹, Eshburiev S.B.², Yusupova Z.M.³

¹ Independent researcher, Samarkand State University of Veterinary Medicine, Livestock and Biotechnology

² Professor, Samarkand State University of Veterinary Medicine, Livestock and Biotechnology

³ Student, Samarkand State University of Veterinary Medicine, Livestock and Biotechnology

ABSTRACT: In this article clinical signs, hematological indicators and photo morphological changes in bones of the etiopathogenesis of calcium–phosphorus metabolism in rabbits are described. Low–nutrition, poor–quality feeding of mother rabbits during the estrus period means that the needs of the mother rabbits’ body for vitamins and macro–microelements are not fully met. Disorders of calcium and phosphorus metabolism in rabbits are on average 53,3% during the gestation period and on average 73,3% during the postpartum period. It is accompanied by symptoms such as a decrease in response to external influences, swelling of the skin, a decrease in gloss, strong whitening of the mucous membranes, a decrease in body weight, accompanied by symptoms such as a change in appetite.

KEYWORDS: Acidosis, Anemia, Bone, Calcium, Dystrophy, Hypotrophics, Hypohemoglobinemia, Hypoglycemia and Hypophosphatemia, Phosphorus, Hemoglobin, Glucose, Rabbit, Total Protein.

THE RELEVANCE OF THE RESEARCH

In recent years, in our country, special attention has been paid to the development of agriculture, especially rabbit farming, which is considered one of its important branches. For this, special programs are being developed and a number of conveniences are being created for representatives of the industry.

The creation of the Association of Rabbit Breeding Farms of Uzbekistan has become one of the important steps in further development of the industry.

A number of decisions on the development of animal husbandry, especially rabbit breeding, have been made in our republic. In particular, in the decision of the President of the Republic of Uzbekistan dated March 3, 2021 OP (order of the president) No. 5717 “On additional measures – activities for further support of livestock industries by the state”, the rabbit breeding industry to strengthen the feed base of the country, to establish new production facilities for the production of full–value, high–protein feed for rabbits and to modernize the existing ones, to rapidly develop rabbit breeding, to carry out scientific and research work on existing problems, to put into practice the developed new modern innovative technologies wide implementation is envisaged.

Rabbit breeding is an important branch of animal husbandry, providing meat and valuable fur for humans. Rabbit meat is not inferior to poultry meat in terms of fast digestibility, softness and taste, and in terms of digestibility it is superior to beef and mutton. Therefore, it is recommended as a diet food for people suffering from blood pressure, liver and stomach diseases. In addition to providing meat products, they also provide light industry with fur. Therefore, it is important to develop and implement methods for early diagnosis and prevention of mineral metabolism disorders in rabbits [2, 14].

Calcium and phosphorus are important in the body of rabbits, and 65–70% are accumulated in bones. Vitamin D is necessary for good absorption of calcium and phosphorus in the body, and its deficiency causes stunted growth and stillbirth in rabbits [2, 3, 4].

Hypotrophics born from minks with calcium–phosphorus metabolism disorder (rickets) have stunted growth (deafness), anemia of mucous membranes, rapid aging and death. In the body of such animals a violation of the ratio of calcium and phosphorus, metabolic acidosis, a decrease in the alkaline reserve of the blood and an increase in the activity of the alkaline phosphatase enzyme were observed.

In order to prevent mineral metabolism disorders of mink children, when using succinic acid in their diet in a dose of 1,0–5,0–10,0 mg/kg, mineral metabolism was normalized, body weight increased, and fur quality improved [9, 7, 6].

Calcium is used primarily as a plastic material: 97–99% of the calcium in the animal’s body is included in bone tissue. Calcium ions increase the tone of the parasympathetic nervous system. This leads to an increase in the tone of cardiac smooth muscle



fibers, blood cells, and a change in the permeability of cell membranes. In addition, calcium ions take part in enzymatic processes (blood coagulation, etc.), help the growth and development of young animals [8, 13].

During rickets, the skeleton and muscles undergo dystrophy, the process of ossification is disturbed, the function of the cardiovascular and nervous system is disturbed [11, 10, 1].

PLACE, OBJECT AND METHODS OF RESEARCH

The experimental part of the research was conducted at the “Nurniyaz ota” rabbit breeding farm in the Okdarya district of the Samarkand region. The condition of 15 4,5–month–old rabbits belonging to the khikoll breed at the farm during the estrus, feeding ration, clinical signs, and hematological parameters were studied. The birth weight of the children was determined and the signs of development of rickets during growth were studied.

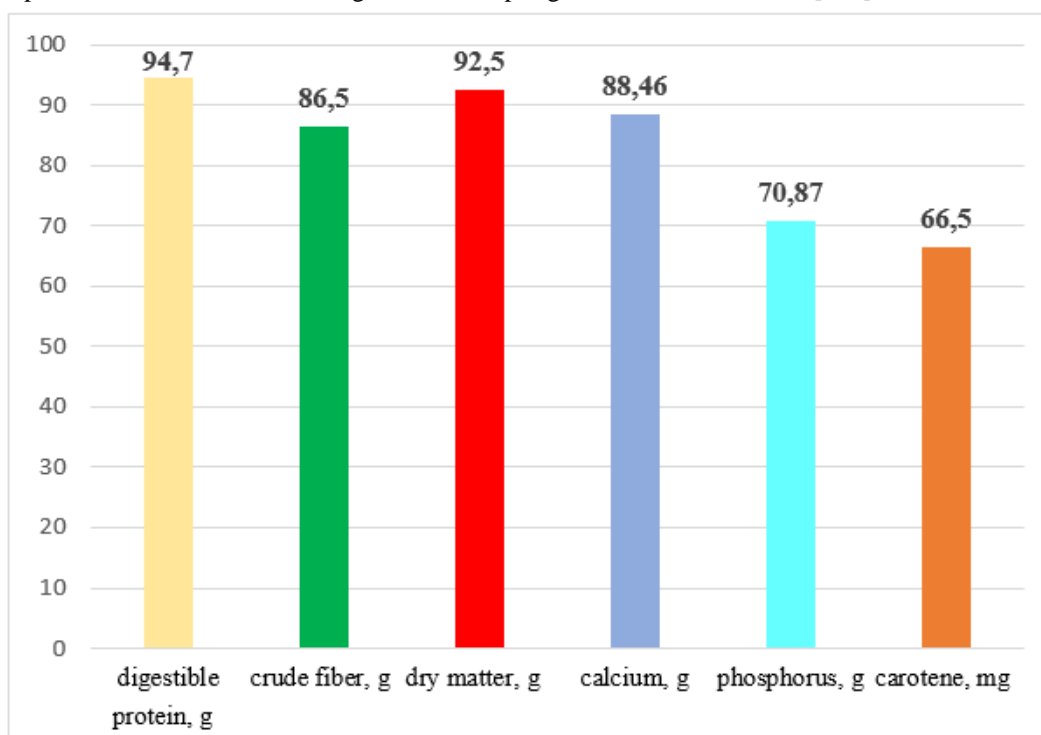
Laboratory tests on blood samples taken from rabbits in the “ORTA–TECH” interdepartmental laboratory of the “Poultry, fish, bee and fur animal diseases” department of Samarkand Institute of Veterinary Medicine some biochemical indicators of blood in the city polyclinic No. 2 in the express method on the “Genru GS300 Plus and CYANSmart” devices was determined.

Blood samples were analyzed by generally accepted methods [7]. General condition, appetite, degree of obesity, response to external influences, mucous membranes, skin covering, condition of skin and organs of movement, body temperature, breath in 1 minute with generally accepted clinical examination methods by clinical examination of mothers.

ANALYSIS OF THE OBTAINED RESULTS

Rough feeds made up 36,48%, juicy feeds made up 19,80%, concentrated feeds made up 43,11% in the structure of mother rabbits’ diet. The ratio of calcium to phosphorus (standard ratio should be 1,16:1) was 1,96:1 (Figure 1). Disturbance of the ratio of calcium and phosphorus in the diet of rabbits leads to a violation of the metabolism of calcium and phosphorus in their body. Because the body cannot cover the amount of calcium that comes out of milk during breastfeeding.

The reduction of the nutritional unit by 0,938 mg, digestible protein by 1,78 g, calcium by 0,376 g, phosphorus by 0,466 g, carotene by 0,67 mg, dry matter by 17,1 g, and roughage by 34 g in the ration of rabbits caused metabolic disorders in them. This caused the development of rickets and clinical signs in the offspring of such mother rabbits [4, 5].



Picture 1. Nutrient supply of mother rabbits (%)



The nutritional content of rabbits in the diet is calcium 88,46%, phosphorus 70,87%, carotene 66,5%, crude fiber 86,5%, dry matter 92,56%, digestible protein was 94,7%.

At the beginning of the examination, almost all rabbits had a decrease in appetite, mucous membranes were pale, the level of obesity was lower than average, and by the 30th day of pregnancy, 8 rabbits (53,3%) had a decrease in the response to external influences, a decrease in the skin coating, and a decrease in gloss. By the 10th day after birth, 11 rabbits (73,3%) were characterized by signs such as strong whiteness of the mucous membranes, a decrease in body weight, and a change in appetite. As it can be seen, with the end of the period in rabbits, it is characteristic that the disorders of mineral metabolism deepen in them.

The study of the clinical parameters of rabbits shows that their body temperature on the 20th day of gestation was $38,4 \pm 0,02^{\circ}\text{C}$ on average, and on the 30th day it was $37,7 \pm 0,03^{\circ}\text{C}$, on the 10th day after birth, it was found to decrease by an average of $38,1 \pm 0,04^{\circ}\text{C}$ times.

The number of pulses in 1 minute was $115,5 \pm 4,2$ beats on average on the 20th day of pregnancy, on the 30th day it was $129,5 \pm 4,1$ beats, on the 10th day after birth It was characteristic that it increased by $156,4 \pm 3,9$ times. Accordingly, the number of breaths per minute was $55,3 \pm 0,04$, $57,5 \pm 0,09$ and $63,1 \pm 0,04$ on average.

Graphic 1.

Clinical parameters of rabbits (n=15)

Time of checks	Body temperature °C	in 1 minute Number of pulses	in 1 minute Number of breaths
in the norm			
20 days	38,5–39,5 $38,4 \pm 0,02$	120–200 $115,5 \pm 4,2$	50–60 $55,3 \pm 0,04$
30 days	$37,7 \pm 0,03$	$129,5 \pm 4,1$	$57,5 \pm 0,09$
10 days after birth	$38,1 \pm 0,04$	$156,4 \pm 3,9$	$63,1 \pm 0,04$

According to the analysis of hematological indicators in strait rabbits, the amount of hemoglobin on the 20th day of strait was $11,6 \pm 3,2$ g/l on average, on the 30th day it was $10,8 \pm 4,2$, reached 2, this indicator decreased to $9,5 \pm 2,2$ g/l on average on the 10th day after birth.

The amount of total protein in the blood serum was $52,71 \pm 1,86$ g/l on average on the 20th day of the rabbit’s diet, and $51,60 \pm 1,80$ on the 30th day. It was found that the index decreases to $50,56 \pm 1,68$ g/l on average on the 10th day after birth.

The amount of glucose in the blood of rabbits reached an average of $3,26 \pm 0,561$ mmol/L on the 20th day of gestation, and an average of $3,28 \pm 0,542$ mmol/L on the 30th day, on the next 10th day up to an average of $2,98 \pm 0,502$ mmol/l, the total calcium content on the 20th day of the strait is on average $2,22 \pm 0,210$ mmol/l, on the 30th day an average of 2,16. If it was $\pm 0,190$ mmol/l, this indicator decreased to $1,88 \pm 0,046$ mmol/l on average on the 10th day after birth.

The amount of inorganic phosphorus was $1,3 \pm 0,071$ mmol/l on average on the 20th day of gestation, $1,2 \pm 0,052$ mmol/l on the 30th day, and on the 10th day after birth it was observed that it decreased to $1,1 \pm 0,039$ mmol/l on average (table 2). Such a situation can be explained by the fact that with the development of embryos in the body of mother rabbits, the demand for mineral substances increases, and hypo-hemoglobinemia, hypoglycemia, hypocalcemia, and hypophosphorusemia are observed in their body.

Graphic 2.

Hematological parameters of rabbits (n=15)

Time of checks	Hemoglobin g/%	Total protein, g/l	Glucose, mmol/l	Total calcium, mmol/l	Inorganic phosphorus, mmol/l
Norm	10,05–16 g/%	65–75 g/l	3,85–8,32 mmol/l	2,4–4,2 mmol/l	1,3–2,2 mmol/l
20 days	$11,6 \pm 3,2$	$52,71 \pm 1,86$	$3,26 \pm 0,561$	$2,22 \pm 0,210$	$1,3 \pm 0,071$
30 days	$10,8 \pm 4,2$	$51,60 \pm 1,80$	$3,28 \pm 0,542$	$2,16 \pm 0,190$	$1,2 \pm 0,052$
10 days after birth	$9,5 \pm 2,2$	$50,56 \pm 1,68$	$2,98 \pm 0,502$	$1,88 \pm 0,046$	$1,1 \pm 0,039$



The study of the body weight of mother rabbits showed that there was no significant difference in the body weight of rabbits of different periods. However, the average body weight of rabbits was $4,40 \pm 0,62$ kg on the 20th day of fasting, and on the 30th day of fasting, it increased to $4,65 \pm 0,72$ kg on average. It was observed that it decreased by $4,25 \pm 0,40$ kg by the 10th day after birth.

When the body weight of khikoll breed rabbits were studied, the average body weight of rabbits at birth was 38,8 g (normal 40–90 g), and the average weight of rabbits at 10 days was 120,3 grams (normal 130-260 g), on average 222,4 grams (average 250–500 g) at 20 days old, 371,9 grams (average 400–900 g) at 30 days old (2–picture).

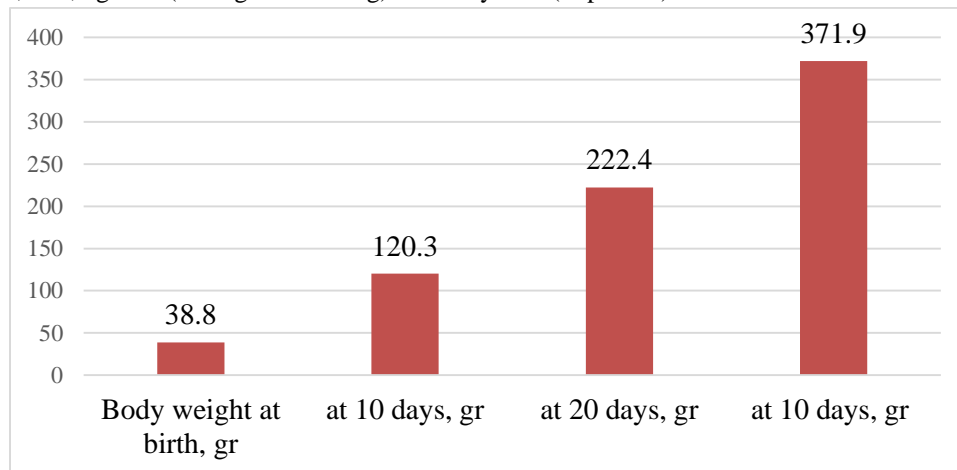


Diagram 2. Body weight indicators of khikoll breed rabbits

The fact that the body weight of rabbits at birth is 1,2 grams less than the normal values, 80,3 grams at 10 days, 182,4 grams at 20 days, and 333,9 grams at 30 days is their hypotrophy. It indicates insufficient growth and development during lactation. On average, 50–60% of rabbits born from tested rabbits showed bone deformation, bumps and pain symptoms when palpating the ribs at 2 months of age.

CONCLUSION

1. The imbalance of the ratio of calcium and phosphorus in the diet of rabbits, whose supply level is 88,46% for calcium and 70,87% for phosphorus are the main causes of calcium–phosphorus metabolism disorders in them.
2. Violations of phosphorus–calcium metabolism in rabbits are characterized by such signs as a decrease in the reaction to external influences, thickening of the skin, a decrease in luster, a strong whitening of the mucous membranes, a decrease in body weight, a change in appetite, an average of 5,5% of hemoglobin in the blood of the norm, total protein 22,3%, glucose 22,6%, total calcium 21,7%, inorganic phosphorus 15,4%.

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