



**Scientific Conference on Multidisciplinary Studies**

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11<sup>th</sup> August, 2025

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## **HEMATOLOGICAL INDICATORS OF MINERAL METABOLISM DISORDERS IN CALVES**

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### **Abstract**

Mineral metabolism disorders in calves are observed during their lactation period due to a deficiency of macro- and microelements in milk, and are accompanied by a decrease in the amount of total protein, hemoglobin, inorganic phosphorus, total calcium, magnesium, and iron in the blood during the period up to 6 months of age.

**Keywords:** Calves, vitamins, minerals, hypovitaminosis, rickets, hypotrophic calves, hemoglobin, glucose, total protein, total calcium, inorganic phosphorus.

### **Relevance of the topic**

In our republic, metabolic disorders among livestock, in particular, disorders of mineral and vitamin metabolism in young calves, are one of the main obstacles to the implementation of agrarian reforms aimed at providing the population with affordable and high-quality food products.

Non-communicable diseases of young animals, which are considered one of the main obstacles to achieving economic efficiency in livestock farming, account for more than 50 percent of veterinary pathology and cause significant economic damage to livestock farms due to the frequent occurrence of diseases accompanied by vitamin and mineral metabolism disorders in calves (hypovitaminosis, rickets), stunted growth, death of infected calves, costs for treatment, and a decrease in reproductive characteristics.



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With the establishment of livestock farms, animal husbandry technologies have also changed. Also, zooveterinary rules are not always observed in the construction of livestock facilities, care and feeding of animals. There is a lack of active mass, sunlight, high-quality and nutritious food for animals. Although feeding standards have been developed taking into account the age, productivity and physiological condition of animals, they are not followed everywhere. These factors have a negative impact on the physiological condition of the body, especially young animals.

To date, the prevalence, etiology, diagnostics, treatment and prevention of vitamin and mineral deficiency diseases in calves born from cows imported to our republic have not been fully studied. Therefore, there is a need to improve the treatment and prevention of vitamin and mineral deficiency diseases in calves on farms.

The incidence of digestive system diseases and mineral deficiencies in calves during the growth period is associated with the biochemical composition of cow's milk and its timely provision. Cow's milk contains up to 20% proteins, the main part of which is immunoglobulins. It has been determined that the dry matter content of cow's milk is up to 32.5%, minerals are up to 1.21-1.22%, and the norm of vitamin A is 25-30 times higher than in ordinary milk. Researchers have determined that the deficiency of these biologically active substances in cow's milk leads to rickets and stunted growth in calves [6,7].

The complete lack of nutrients provided to beef cows, the lack of vitamins and minerals in the diet, pathological childbirth in cows and, as a result, retained placenta, the occurrence of diseases of the reproductive organs such as endometrium, mastitis, metabolic disorders in them, decreased appetite, hypotension, anemia, hypoglycemia and symptoms characteristic of hypovitaminosis, as well as the birth of hypotrophic calves from them [1,4].

Milk is superior to all foods found in nature in terms of digestibility and biological value. Milk is a complex biological fluid, containing neutral fats, phosphatides, sterols, various proteins, carbohydrates, vitamins, enzymes, minerals and water. Milk contains more than 200 different components, namely more than 60 fatty acids, about 40 minerals, about 20 amino acids, 17 different vitamins, many enzymes and hormones [2,3,4].



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Milk protein is very quickly digestible and contains amino acids that cannot be replaced by any other substance. Casein is the main protein of milk, accounting for 82% of the total protein. Milk contains lipase, proteinase, xanthine oxidase, alkaline phosphatase, catalase, aldolase and other enzymes. The main carbohydrate found in milk is the disaccharide lactose  $C_{12}H_{22}O_{11}$ , which makes up 5% of cow's milk [3,5,8].

Milk fat consists of various lipids - triglycerides, diglycerides, monoglycerides. Milk contains fat-soluble vitamins A, D, E, and provitamin carotene. Water-soluble vitamins include B vitamins ( $B_1$ ,  $B_2$ ,  $B_3$ ,  $B_6$ ,  $B_{12}$ ) and C (ascorbic acid). Scientists have determined that cow's milk contains almost all of the chemical elements in the periodic table of D.I. Mendeleev [3].

### Results and their analysis

In order to study the causes, clinical signs and hematological changes of mineral metabolism disorders in calves, dispensary studies were conducted on 1-6-month-old Simmental calves at the Hikmatov Bunyod MCHJ located in the Bo'ston MFY, Parkent district, Tashkent region.

Clinical examinations of the calves in the experiment were carried out, including their appetite, general condition, color of the mucous membranes of the eyes, condition of the skin, integument and locomotor organs, gloss of the hooves and wool, shape of the chest, movement of the incisors, heart rate and respiratory rate per 1 minute, body temperature °C.

Laboratory analysis of blood samples taken from the calves was carried out in the "Biological blood" veterinary diagnostic laboratory using generally accepted methods. Hemoglobin in the blood of calves, blood glucose were determined using a Contour plus glucometer, and the amount of total protein (Refractometric method), total calcium, and inorganic phosphorus in the blood serum was determined.

The research was carried out in two stages, the first stage in the autumn-winter season, and the second stage in the spring-summer season. For this, reference groups were separated from Simmental calves at the Hikmatov Bunyod farm, and 5 of them were examined for clinical-physiological and hematological indicators

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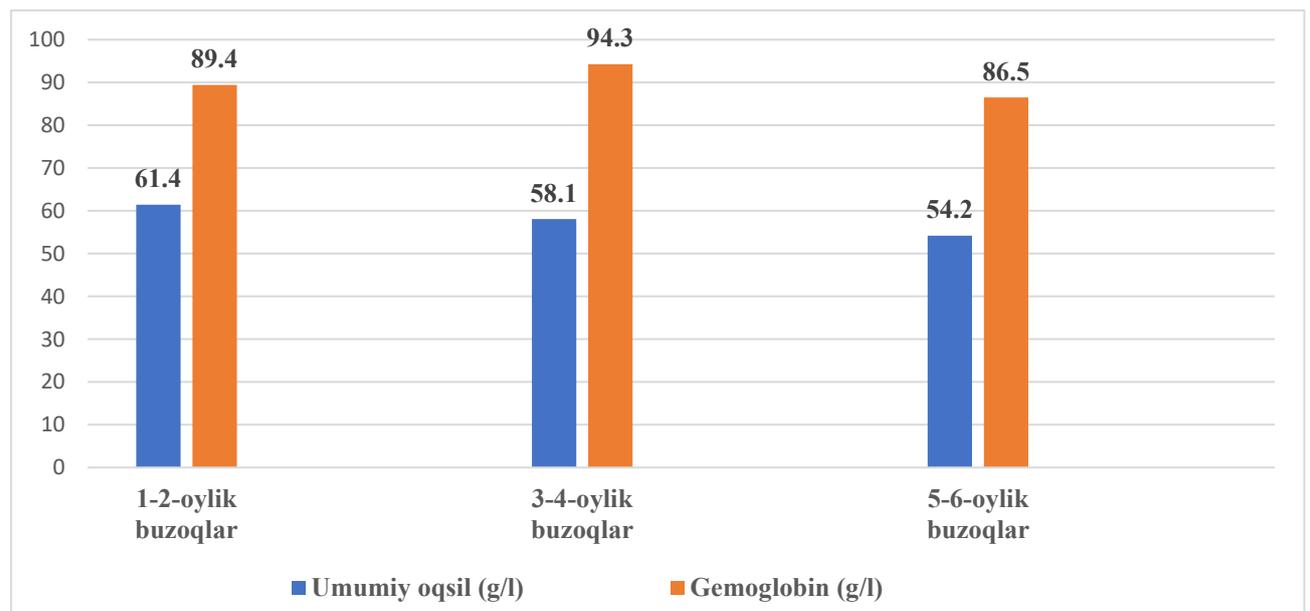
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at the ages of 1-2 months (43 heads), 3-4 months (37 heads), and 5-6 months (47 heads).

Analysis of the feeding of calves kept on the farm revealed that 1-2-month-old calves were given 7-7.5 liters of milk per day, 2-3-month-old calves 7-8 liters, and 5-6-month-old calves 7 liters, and starting from 2-3 months, they were fed with additional silage, bran, and mixed feed.

Clinical examinations of calves revealed that 3-6 percent of 1-2-month-old calves, 8-12 percent of 2-3-month-old calves, and 14-18 percent of calves over 5 months of age had pale mucous membranes, low mobility (hypodynamia), decreased response to external influences, decreased skin elasticity, increased skin roughness, decreased gloss, and calves licking each other and feed troughs (lizukha). It has also been reported in the literature that such clinical signs are characteristic of mineral metabolism disorders in calves.

Samples taken from one- and two-month-old calves showed an average total protein of  $61.4 \pm 1.3$  g/l, hemoglobin of  $89.4 \pm 1.3$  g/l, glucose of  $2.6 \pm 0.2$  mmol/l, total calcium of  $1.9 \pm 0.3$  mmol/l, inorganic phosphorus of  $1.2 \pm 0.2$  mmol/l, alkaline phosphatase activity of  $72 \pm 1.3$  u/l, iron of  $16.8 \pm 1.2$  mkmol/l, and magnesium of  $0.7 \pm 0.01$  mmol/l.



**Figure 1. Hematological parameters of calves**

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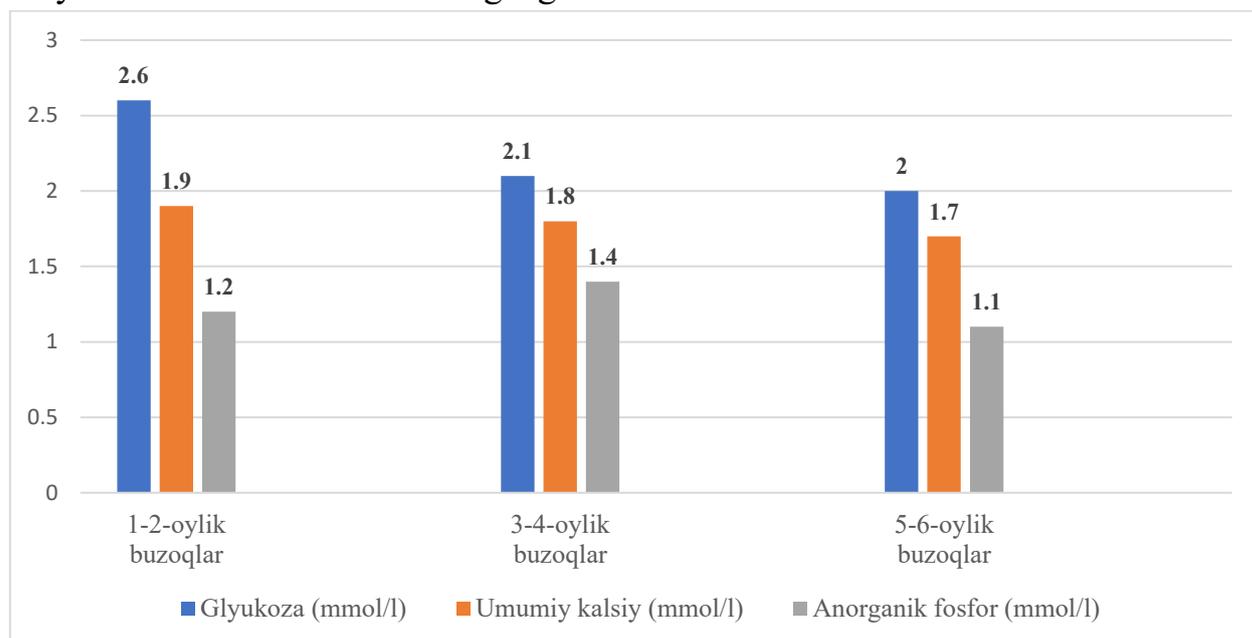
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Samples taken from three to four-month-old calves showed an average total protein of  $58.1 \pm 1.2$  g/l, hemoglobin of  $94.3 \pm 1.5$  g/l, glucose of  $2.1 \pm 0.1$  mmol/l, total calcium of  $1.8 \pm 0.1$  mmol/l, inorganic phosphorus of  $1.4 \pm 0.3$  mmol/l, alkaline phosphatase activity of  $78 \pm 1.1$  u/l, iron of  $15.9 \pm 1.1$  mkmol/l, and magnesium of  $0.6 \pm 0.02$  mmol/l.

Samples taken from five to six-month-old calves showed an average total protein of  $54.2 \pm 1.4$  g/l, hemoglobin of  $86.5 \pm 1.1$  g/l, glucose of  $2.0 \pm 0.2$  mmol/l, total calcium of  $1.7 \pm 0.1$  mmol/l, inorganic phosphorus of  $1.1 \pm 0.4$  mmol/l, alkaline phosphatase activity of  $87 \pm 1.2$  u/l, iron of  $16.1 \pm 1.3$  mkmol/l, and magnesium of  $0.6 \pm 0.02$  mmol/l. It was found that as calves age, their demand for mineral substances increases, and they become more susceptible to mineral deficiencies as they transition from milk to roughage.



**Figure 2. Hematological parameters of calves**

It was found that mineral deficiency in calves is accompanied by a decrease in the amount of hemoglobin, glucose, iron, magnesium and total protein in the blood, and by monitoring the age-related changes in mineral metabolism in calves, mineral deficiency was observed in 4.6% of 1-2-month-old calves, 10.8% of 3-4-month-old calves, and 14.8% of 5-6-month-old calves.



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Mineral metabolism disorders in calves were characterized by changes in appetite, anemia of the mucous membranes, increased skin color, decreased gloss, and a dynamic increase in pulse and respiratory rate.

### Conclusions

It was found that mineral deficiency in calves is accompanied by a decrease in the amount of hemoglobin, glucose, iron, magnesium and total protein in the blood. With increasing age of calves, mineral metabolism disorders increase, that is, in an average of 14-18% of them, pale mucous membranes, hypodynamia, decreased response to external influences, decreased skin elasticity, increased skin roughness, and calves licking each other and the feed troughs were clearly manifested.

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