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## **Effect of the Applied Agents on Clinical-Physiological and Hematological Parameters in the Prevention of Alimentary Anemia in Calves**

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**Abstract:** The article demonstrates the high effectiveness of “Novamix” and “Ferran” preparations in the prevention of alimentary anemia in calves. It was found that, compared to the control group, calves in the experimental group showed an increase in average daily weight gain by 58.1 kg, while the number of erythrocytes increased by 39.9%, hemoglobin level by 36.4%, and hematocrit value by 27.3%. In addition, an increase in the concentration of microelements in the blood was observed.

**Keywords:** alimentary anemia, calves, prevention, Novamix, Ferran, erythrocytes, hemoglobin, hematocrit, microelements, iron, copper, zinc.

### **Introduction**

At present, great attention is being paid in our republic to the rapid development of livestock farming and its transformation into one of the most profitable sectors, as well as to improving the living standards of the population and ensuring a stable supply of essential food products such as meat and milk to the domestic market. In addition, providing livestock farms with pedigree animals, necessary machinery and equipment, improving livestock production culture, and developing the sector into a highly profitable field are considered among the main priorities of the

national agrarian policy. However, non-infectious diseases of young animals, including alimentary anemia, significantly hinder the effective solution of these problems.

The authors report that in the prevention of microelementoses in calves, the use of microelement chelates (complexonates) and the inclusion of premixes containing essential trace elements (iron, copper, and cobalt) in the diet have high economic efficiency [1,2].

In the prevention of alimentary anemia in young calves, the use of a mineral solution containing iron sulfate, copper sulfate, and cobalt chloride, administered for 30 days at a dose of 50–100 ml per day mixed with compound feed, gives good results. To prepare the solution, 10.0 g of iron sulfate, 5.0 g of copper sulfate, and 0.5 g of cobalt chloride are dissolved in 1 liter of water. The solution should be thoroughly shaken before use.

For the purpose of stimulating hematopoiesis, iron preparations (iron glycerophosphate, lactate, sulfate, and carbonate) are administered at a dose of 10 mg/kg, copper sulfate at 0.4–0.6 mg/kg, and cobalt chloride at 0.04–0.08 mg/kg for 2–3 weeks with feed during treatment. For this purpose, “Hemosimulin” tablets containing blood components, copper sulfate, and iron lactate may also be used. In cases of digestive system disorders, ferroglycine and other iron-containing preparations are administered parenterally. Vitamin B<sub>12</sub> is administered at a dose of 3–5 mg/kg, ascorbic acid at 3–5 mg/kg, and folic acid at 0.05–0.1 mg/kg intramuscularly [4].

For the prevention of aplastic anemia and stimulation of hematopoiesis, iron-containing preparations are used orally, such as iron glycerophosphate, lactate, sulfate, or ferramide, ferrocals, and hematostimulin. These are administered orally to horses and cattle at a dose of 2–5 mg/kg, and to dogs, cats, and rabbits at a dose of 6–10 mg/kg, three times a day. In addition, ferroplex, cobalt and copper preparations are used, while ferroglycine, ascorbic acid, and vitamin B<sub>12</sub> are administered parenterally [3].

**Methods and Materials.** During the study, the number of erythrocytes, hemoglobin concentration, and hematocrit values in blood were examined using an automatic hematological analyzer (Mindray BC-5000). The levels of glucose, total protein, copper, zinc, iron, calcium, and phosphorus in the blood were determined using an automatic biochemical analyzer (Mindray BS-200).

In order to improve the prevention of alimentary anemia in calves, to select effective means, and to study the effect of drug preparations on the calf organism, two groups were formed from weaned calves, each consisting of 10 animals.

In the first experimental group, in addition to the basic diet, the feed additive “Novamix” was administered at a dose of 5 g per animal once daily for 30 days, mixed with compound feed. The preparation “Ferran” was injected intramuscularly at a dose of 4 ml per animal every 10 days, for a total of three administrations.

The second control group calves were maintained only on the standard farm feeding regimen.

## **Results and Analysis**

In calves affected by alimentary anemia in the experimental study, clinical examinations were carried out to assess their general condition, response to external stimuli, appetite, degree of body condition, color of mucous membranes, heart rate and respiratory rate per minute, condition of the skin and hair coat, posture, and daily weight gain determined by individual weighing.

In the experimental calves, clinical examinations were carried out at the beginning and at the end of the experiment to assess their general condition, response to external stimuli, appetite, degree of body condition, color of mucous membranes, heart rate and respiratory rate per minute, condition of the skin and hair coat, and the state of the locomotor system. Individual weighing was used to

determine the body weight of the calves at the beginning and at the end of the experiment, and their growth performance was subsequently evaluated [5].

At the beginning of the experiment, the average body weight of calves in the first group was  $63.970 \pm 1.98$  kg, while in the control group it was  $64.380 \pm 1.90$  kg. At the end of the experiment, the average body weight in the first group increased to  $72.02 \pm 2.34$  kg, with a total average weight gain of  $8.05 \pm 1.12$  kg and a daily weight gain of  $0.268 \pm 0.54$  kg. In the control group, the average body weight was  $67.06 \pm 2.22$  kg, with a total weight gain of  $4.68 \pm 0.47$  kg and a daily weight gain of  $0.156 \pm 0.23$  kg.

Compared with the initial values of the experiment, in calves of the first experimental group an increase in blood parameters was observed: erythrocyte count increased from  $5.51 \pm 0.20$  to  $7.93 \pm 0.20$  million/ $\mu$ L, hemoglobin concentration from an average of  $84.0 \pm 2.93$  to  $113.5 \pm 2.85$  g/L, hematocrit from  $33.0 \pm 1.17$  to  $38.2 \pm 1.44\%$ , glucose from  $2.76 \pm 0.10$  to  $3.28 \pm 0.12$  mmol/L, and total protein from  $53.0 \pm 1.69$  to  $63.0 \pm 2.17$  g/L. In the control group calves, erythrocyte count showed a minimal change from  $5.66 \pm 0.16$  to  $5.67 \pm 0.14$  million/ $\mu$ L, hemoglobin decreased from  $85.0 \pm 2.15$  to  $83.2 \pm 2.05$  g/L, hematocrit decreased from  $33.2 \pm 1.10$  to  $30.0 \pm 1.17\%$ , glucose decreased from  $2.72 \pm 0.09$  to  $2.44 \pm 0.08$  mmol/L, and total protein decreased from  $52.7 \pm 2.03$  to  $48.2 \pm 1.61$  g/L.

At the beginning of the experiment, the average level of copper in the blood serum of calves in the first experimental group was  $9.05 \pm 0.35$ , while by the end of the experiment it increased to  $12.70 \pm 0.49$   $\mu$ mol/L. Zinc levels increased from  $38.0 \pm 0.93$  to  $49.8 \pm 1.10$   $\mu$ mol/L, iron from  $13.6 \pm 0.39$  to  $16.79 \pm 0.46$   $\mu$ mol/L, phosphorus from  $1.41 \pm 0.03$  to  $1.48 \pm 0.03$  mmol/L, and calcium from  $1.94 \pm 0.07$  to  $2.84 \pm 0.10$  mmol/L. These results indicate that the applied preparations in this group had a positive effect, leading to a significant increase in the levels of micro- and macroelements in the blood.

In the control group, a characteristic change was observed: the level of copper in the blood decreased from an average of  $9.33 \pm 0.31$  to  $9.87 \pm 0.38$   $\mu$ mol/L, zinc increased from  $38.1 \pm 1.43$  to  $40.11 \pm 1.22$   $\mu$ mol/L, iron decreased from  $13.6 \pm 0.47$  to  $12.9 \pm 0.25$   $\mu$ mol/L, phosphorus remained unchanged at  $1.41 \pm 0.05$  to  $1.41 \pm 0.03$  mmol/L, and calcium decreased from  $2.0 \pm 0.07$  to  $1.92 \pm 0.05$  mmol/L. These findings indicate that, in the absence of additional micro- and macroelement supplementation in the diet, disturbances in hematopoiesis may occur, leading to the development of alimentary anemia.

During the experiment, the improvement of biochemical blood parameters and the micro- and macroelement composition in calves of the first experimental group demonstrates that the applied preparations stimulated hematopoietic processes.

## Conclusion

The results of the conducted studies showed that the combined use of the nutritional supplement "Novamix" and the preparation "Ferran" is highly effective in the prevention of alimentary anemia in calves. In the experimental group, it ensured an increase in both daily and total body weight gain, as well as an increase in the number of erythrocytes by 39.9%, hemoglobin concentration by 36.4%, hematocrit value by 27.3%, and a higher level of microelements in the blood.

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