Assessment of the morphological status of blood in the treatment of diarrhea in calves

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Abstract: According to the results of the research, it was found that the complex use of medicinal plants together with chemicals in the treatment and prevention of gastrointestinal disorders accompanied by diarrhea in calves led to a reduction in the recovery period of calves with diarrhea. , increasing the mass increase of animals and eliminating the case.

Keywords: indicate, treatment, variation, calves, hemoglobin.

Introduction

Various endogenous and exogenous factors can lead to economic losses by disrupting metabolic processes in the bodies of newborn calves, subsequently affecting their functions such as productivity, development, growth, and reproduction. Diarrhea, which is frequently observed in calves, is characterized by impaired gastrointestinal tract motor function, autoimmune processes, dysbiosis, and intoxication. According to modern concepts, the etiology of digestive organ diseases in newborn calves is considered a multifactorial process. Many authors indicate that the cause of diarrhea in newborn calves is pathogens that naturally reside in the animal's body and only cause disease when certain factors are present [1, p.50575056; 2, pp. 265-266].

Dyspepsia in newborn calves can also be attributed to the influence of the mother's colostrum, depending on the physiological state of the calves' gastrointestinal tract during the postnatal period. In the first hours of life, immunoglobulins present in the colostrum are actively absorbed from the digestive organs, facilitated by the intestinal mucosa's high absorptive properties and the inactive state of gastric glands during the initial days of a calfs life. Untimely consumption of colostrum can lead to secondary immunodeficiency, increasing the risk of infectious diseases in the digestive system [3, p.151-159; 4, pp. 1243-1248; 5, pp. 609-620].

Changes in the composition of blood can occur depending on the course of biochemical processes in the body, resulting from the enhanced or diminished activity of internal organs. Hematological parameters in animals vary depending on their housing conditions, age, feeding, and the presence of pathological and metabolic processes. Valuable information can be obtained about the physiological and pathological states of the body through blood parameters. These parameters can significantly differ in animals depending on the nature of the specific pathology [6, p.28-29; 7, pp. 1049-1051].

Based on biochemical processes in the body, the morphological composition of

blood, and its physicochemical properties, one can assess the productivity of animals by evaluating the intensity of their metabolic processes. The analysis of the blood profile enables the monitoring of subtle changes that may arise due to various factors.

The influence of various factors on the hematopoietic system can lead to alterations in the morphological composition of the blood even prior to the manifestation of clinical symptoms. Therefore, conducting a morphological examination of the blood holds diagnostic value and enables the assessment of treatment effectiveness, as well as the prediction of the disease progression [8, p.8094].

Methods and techniques

The research was conducted in two farms: Kapanly in the Shamkir region and Suliddinoglu in the Samukh region. The study involved 20 crossbred (Cuban zebu x Caucasian brown) meat-oriented calves from the Gapanly farm and 25 dairy calves from the Suliddinoglu farm.

In the treatment of calves registered against diarrhea in these farms, infusions from medicinal plants, and culinary and chemical preparations were tested according to the following scheme. On the Suliddinoglu farm, black-and-white calves of group I were treated with cooking oak bark (Quercus L.) + willow (Salix L.) using oletethrin and ceftriaxone, and calves of group II were treated with cranberries (Cornus L.). mas L.) + sage (Salvia L.) infusion with oleterin and ceftriaxone, calves included in group III, with horsetail infusion (Rumex confferus) + sedges of sedge (Polygonum carneum) with oleterin and ceftriaxone, calves included in group IV, with infusion of St. John's wort (Hypericum perforatum) + mullefolium (Achillea mullefolium) with oleterin and ceftriaxone, calves included in group V were treated with oletethrin and ceftriaxone. The first group of hybrid calves, raised on a closed farm, received a combination of oak bark and willow boil with tetracycline and ceftriaxone. The calves in the second group were treated with a cranberry and sage infusion along with tetracycline and ceftriaxone. The third group of calves received treatment with a horseradish infusion and sorghum, along with tetracycline and ceftriaxone. The fourth group, called Group IV, received dazyet and boymadaran infusion along with tetracycline and ceftriaxone. The fifth group of calves was treated with tetracycline and ceftriaxone alone. Decoctions and infusions prepared from medicinal plants were given to all groups of animals 15 minutes before feeding, twice a day with a 12-hour interval. The dosage was 150 ml for each calf in the first group and 100 ml for each calf in the other groups. Intramuscular administration of oletethrin 2 g, ceftriaxone 1 g, and tetracycline 1 g was performed twice with a 12 hour interval.

During the study, the calves' body temperature, respiratory rate, and pulse were monitored. The Saly method was used to determine the amount of hemoglobin in the blood, and erythrocytes and leukocytes were counted using a Goryaev chamber under a

microscope. The total protein level in the blood was measured using refractometry. The activity of aminotransferases, such as alanine aminotransferase (ALT-KF.2.6.1.2.) and aspartate aminotransferase (AST-KF.2.6.1.1.), was determined using the dinitrophenylhydrazine method (according to Reitman and Frenkel). The glucose level in the blood was measured using a color reaction with orthotoluidine.

All quantitative data obtained from the study were subjected to statistical analysis, and average statistical values (M) as well as deviations from these values (m) were calculated.

The results obtained were analyzed and discussed

After treating the calves on both farms, the morphological parameters of their blood were monitored for up to 6 months [9, p.942-994; 10, pp. 213-214]. Blood samples were taken from 1-month-old and 6-month-old calves on the Suliddinoglu farm to analyze the changes in the morphological parameters of their blood after treatment. The number of erythrocytes and leukocytes, the amount of hemoglobin, and the color index were counted. In the control group, changes in the number of erythrocytes in calves were observed depending on their age. It was found that the number of erythrocytes in the blood of 1-month-old calves was 8.97x1012/l. By the age of 6 months, the number of erythrocytes decreased by 0.95x1012/l to 8.02x1012/l compared to the indicators of 1-month-old calves. An increase in the number of leukocytes in the blood of 6-month-old calves compared to 1-month-old calves was noted. In the control group of healthy 6-month-old calves, the number of leukocytes increased by 0.79x109/l, reaching 8.11x109/l compared to the corresponding indicator in 1-month-old calves. It was established that the number of erythrocytes in the blood of calves decreases with age, while the number of leukocytes increases. The increase in the amount of hemoglobin in the control group, depending on age, was not statistically significant. In the control group, 6-month- old calves showed a decrease in the color index by 0.09 units to 0.89 compared to 1- month-old calves.

It was found that the coefficient of variation of hemoglobin in the blood is 2.13%, in 6-month-old calves this indicator is 2.11%, and the coefficient of variation of erythrocytes is 3.19%, in 6-month-old calves this indicator is 3.63%, and the

corresponding indicators of leukocytes in 1-month-old calves are 0.42%, at 6 months of age this figure is 0.89% [10, p.213-214; 11, pp. 398-401].

Table 1. Dynamics of morphological blood parameters of calves after treatment at the Suliddinoglu farm

Blood Parameters	Co ntrol	Experimental Groups				
		I group	II group	II I group	IV group	V group
1 month						
Red Blood Cells, 10^{12}L	8,97 ±0,02	8,32 ±0,27	8,31 ±0,20	8,1 7±0,18	8,10 ±0,25	8,0 3±0,22
Leukocytes x10^{9}L	7,32 ±0,03	7,81 ±2,66	7,82 ±4,99	7,9 1±4,83	7,76 ±2,58	7,7 6±3,25
Hemoglobin, q%	9,89 ±0,21	8,63 ±0,18	8,72 ±0,17	8,7 8±0,18	8,50 ±0,18	8,2 0±0,17
Color Index	0,98	0,94	0,95	0,97	0,95	0,93
6 months						
Red Blood Cells, x10^{12}L	8,02 ±0,03	8,43 ±0,31	8,30 ±0,41	8,2 0±0,20	8,07 ±0,29	8,0 5±0,30
Leukocytes, 10^{9}L	8,11 ±0,08	8,20 ±7,49	8,23 ±4,99	8,1 7±57,16	8,19 ±57,16	8,1 8±5,25
Hemoglobin q%	10,0 1±0,07	8,72 ±0,18	8,80 ±0,12	8,9 0±0,25	8,58 ±0,31	8,4 3±0,30
Color Index	0,89	0,83	0,85	0,87	0,85	0,84

It was found that the number of erythrocytes in the treated groups was lower than in the control group, and the number of leukocytes was higher. An intergroup comparison of the indicators of one-month-old calves treated in different combinations shows that the lowest erythrocyte count (8.03 x 10^{A}12/L) was observed in group V. The lowest leukocyte count was observed in groups IV and V, with both groups having a count of 7.76 x 10^{A}9/L.

In the blood of 6-month-old calves, the number of erythrocytes was higher compared to the indicators of the control group of this age. It was established that the number of erythrocytes was 8.28 x 10^{A}12/L in group I, 8.28 x 10^{A}12/L in group II, 8.18 x 10^{A}12/L in group III, 8.05 x 10^{A}12/L in group IV, and 8.03 x 10^{A}12/L in group V.

The number of leukocytes in the blood of treated 1 -month-old and 6-month-old calves was higher than that of the control group. The number of leukocytes in the blood of 1-month-old calves in group I was 0.51x109l, in group II 0.52x109l, in group III 0.59x109l, in both groups IV and V 0.44x109l, and the number of leukocytes in the blood of 6-month-old calves, starting from this age, compared with the corresponding indicators of the control group, in group I - 0.09x109l, in group II - 0.12x109l, in group III - 0.06x109l, in group IV - 0.08x109l, in group IV - 0 ,07x1091. in group B.

After treatment at the Suliddinoglu farm, on days 1 and 6, the levels of hemoglobin, one of the main indicators of the body, were determined in the blood of 1-month-old calves. The hemoglobin level in the control group was 1.26% higher compared to group I, 1.17% higher compared to group II, 1.11% higher compared to group III, 1.39% higher compared to group IV, and 1.39% higher compared to group V. It was lower by 1.69%.

If the hemoglobin level in the blood of control, 1-month-old calves is 9.89 g/dL, then in 6-month-old calves, this value increases to 10.01 g/dL. The hemoglobin level in group I of 6-month-old calves was 1.29% lower than in the control group, in group II it was 1.21% lower, in group III it was 1.11% lower, in group IV it was 1.43% lower, and in group V it was 1.58% lower.

A comparative analysis of the obtained data shows that as the age of the animals increases, the hemoglobin level in the blood also increases. However, the changes observed in the hemoglobin level in the blood of calves treated for diarrhea are not statistically significant ($P > 0.05$).

Additionally, the analysis of blood color indicators in calves shows that in both 1-month-old and 6-month-old calves, the corresponding indicator is higher in 1- month-old calves regardless of the treatment regimen.

It is worth noting that the leukocyte formula calculation is of great importance in disease diagnosis, predicting the course of the disease, and assessing the immune status of the body [12, p.42-46.].

Data on the dynamics of blood morphological parameters of hybrid calves from 1 to 6 months after treatment in a closed farm are shown in the table below. The analysis of the data reveals that the number of erythrocytes in the blood of 30-day- old calves increases compared to the indices of 10-day-old calves. However, in 180-

day-old animals, this indicator decreases by 0.17 x 10^{A}12/L and amounts to 9.11 x 10^{A}12/L compared to 30-day-old calves.

Table 2. Dynamics of morphological parameters of blood in calves 1-6 months of age in a closed farm

Blood parameters	Control	Experience groups				
		I group	II group	III group	IV group	V group
1 month						
Red Blood Cells x10^{12}L	9,28±0,22	8,84±0,05	9,12±0,13	8,65±0,15	8,42±0,10	8,56±0,10
Leukocytes, x10^{9}L	8,10±0,71	8,11±0,90	7,89±0,62*	8,05±0,22	8,17±0,52	8,12±0,35
Hemoglobin, q%	9,93±0,58	9,51±0,61	9,86±0,50	9,30±0,38	9,10±0,28	9,43±0,25
Color Index	0,99	1,01	1,01	1,00	1,01	1,03
6 months						
Red Blood Cells, x10^{12}L	9,11±0,21	8,35±0,30	8,25+0,20	8,80±0,22	8,05±0,26	8,76±0,22
Leukocytesx10^{9}L	8,02±0,03	8,50±0,30	8,11±0,19	8,05±0,20	7,98±0,21	8,43±0,30
Hemoglobin, q%	10,03±0,61	8,80±0,30**	8,95±0,28*	8,68±0,31*	8,25±0,27*	9,55±0,21*
Color Index	0,97	0,96	0,99	0,94	0,94	0,99

When comparing the results obtained between groups, it is known that the maximum number of erythrocytes among treated 1-month-old calves is recorded in group II. The number of erythrocytes in this group is 0.16 x 10^{A}12/L lower compared to the control group and 0.28 x 10A12/L, 0.47 x 10A12/L, 0.70 x 10A12/L, and 0.56 x 10A12/L higher than in groups I, III, IV, and V, respectively.

In the control group, the number of leukocytes in the blood of 1 -month-old calves was 8.10 x 10A9/L. Among the experimental groups, the lowest indicator recorded in

group II was 0.21 x 10^{A}9/L lower than that of the control group. The number of leukocytes in groups I, III, IV, and V of the experimental groups was at the level of the control group. Although the number of leukocytes in the blood of animals in all these groups is within the physiological range, this indicator is 0.01 x 10^{A}9/L higher in group I, 0.05 x 10^{A}9/L higher in group III, 0.07 x 10^{A}9/L higher in group IV, and 0.02 x 10A9/L higher in group V compared to the control group.

Although the amount of hemoglobin in groups I-V was lower than in the control group after treatment in a closed facility, the identified changes were not statistically significant (P > 0.05).

Based on the data presented in the table, when comparing the morphological parameters of the blood of 1 -month-old and 6-month-old calves, it is known that the number of erythrocytes in the blood of calves in the control group is 9.28 x 10A12/L, while in 6-month-old calves this indicator decreases to 9.11 x 10A12/L. In all groups treated for diarrhea, regardless of the treatment regimens used, there was a decrease in the number of red blood cells in the blood of both 1-month-old and 6-month-old animals compared to the control group.

The number of erythrocytes in the blood of treated 1 -month-old calves in group I was 0.49 x 10A12/L higher than the corresponding indicator of 6-month-old animals. It was found that the number of erythrocytes in the blood of 1-month-old calves was 0.87 x 10A12/L higher in group II, 0.37 x 10A12/L higher in group IV, 0.15 x 10A12/L higher in group III, and 0.20 x 10A12/L lower in group V compared to the number of erythrocytes in the blood of 6-month-old calves. In an intergroup comparison of this indicator, the largest increase in the number of erythrocytes was observed in the blood of 1-month-old calves in group II (9.12 x 10A12/L), and among 6-month-old animals in group III (8.80 x 10A12/L) (P > 0.05).

In the blood of 6-month-old calves, an increase in the number of leukocytes was recorded compared to the indicators of 1-month-old calves. As a result of comparing the indicators of treated 6-month-old calves between groups, it is known that the smallest number of leukocytes was in group III (8.05x109 l), and the largest - in group I (8.50x109 l). It was found that the number of lymphocytes in this group was 0.48x109 l higher than in the control group.

One of the studied indicators in the blood of treated calves is the amount of hemoglobin. It was determined that the amount of hemoglobin in the 6-month control group was 10.03 g%. In the experimental groups treated according to different schemes, the amount of hemoglobin in the blood of animals of this age is lower than the corresponding indicator of healthy animals (P<0.05).

One of the indicators used in assessing anemia is the blood color index. Generally,

an excess of the normal color indicator indicates the occurrence of hyperchromic anemia due to the toxic effect of the disease on the hematopoietic process in the bone marrow. According to the literature, in the hyperchromic form of anemia, the number of healthy erythrocytes decreases, resulting in the appearance of defective erythrocytes with excess iron. As a result, red blood cells become saturated with hemoglobin. If the color indicator in healthy animals is 0.99 in 1- month-old calves and 0.97 in 6-month-old animals, then in treated 1-month-old animals, this indicator increases and ranges from 1.0-1.03. In the blood of 6-month- old animals, the color index was 0.01 lower than that of the control group in group I, 0.3 lower in groups III and IV, and 0.02 higher in groups II and V.

It has been established that the number of erythrocytes and the amount of hemoglobin in the blood of animals raised in both farms tend to increase. This increase was more pronounced in calves of the experimental groups at the age of 1 month. Among the experimental groups, the number of erythrocytes and leukocytes in the blood of cherno-ala hybrid calves kept at the Suliddinoglu farm and hybrid calves kept at the Gapanly farm and treated for diarrhea were similar, and the amount of hemoglobin was high in the blood of hybrid calves in the Gapanly farm. In the control group of 1-month-old calves at the Suliddinoglu farm, the number of erythrocytes and leukocytes in the blood of black-red calves and the amount of hemoglobin were lower than the corresponding indicators of control calves of the same age kept at the Gapanly farm. In both farms, it was found that the indicators registered in all experimental groups were lower than in the control group. Similar results were recorded when studying the corresponding blood parameters of 6- month-old calves. The differences recorded in the number of erythrocytes and leukocytes and the amount of hemoglobin in the blood of black and hybrid calves in the control groups were 0.31x1012/L, 0.78x109/L, and 0.04g% in 1-month-old calves, and 0.04x1012/L, 0.09x109/L, and 0.02g% in 6-month-old calves,
respectively. At the end of the experiment, an increase in the amount of hemoglobin in the blood was recorded after the animals treated in different schemes were transferred to a common group.

Result

In the control groups, the increase in the number of erythrocytes in the first day of life of calves reflects the physiological processes occurring in their body. According to the treatment regimens used during the treatment period, metabolic processes in the body are accelerated, while the process of adaptation to the drugs used for treatment is underway. According to the morphological parameters of the blood of calves of both farms, the number of erythrocytes and leukocytes, the amount of hemoglobin, the leukocyte formula, show that the dosage of medicinal plants and drugs used for the purpose of treatment is safe and has a positive effect on the process of hematopoiesis in

early ontogenesis. At the end of the experiment, as in the control groups, the trend towards an increase in the number of erythrocytes in the experimental groups indicates the activation of redox processes in the body of calves.

Complex treatment of calves with grass mixtures and drugs causes an increase in their appetite. After the introduction of infusions and decoctions of plant mixtures to sick calves and the simultaneous introduction of drugs into the muscles in different doses, the clinical symptoms of the disease begin to disappear, the sucking reflex increases, and diarrhea stops.

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