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EKSEXPERIMENTAL DYNAMICS OF QUANTITATIVE CHANGES OF SOME MACROELEMENTS IN THE BLOOD OF KARAKUL LAMBS WITH HELMINTHIASIS

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Abstract
This article studies the effects and consequences of marshallagiosis, nematodirosis, and habertiosis helminthiases on the dynamics of quantitative changes of some macroelements (K, Na, Ca) in the blood composition of Karakul lambs.

Keywords: Karakul lambs, helminthiasis, preimaginal, postimaginal period, marshallagiosis, nematodirosis, habertiosis, macroelementiosis.

Introduction

Objective: To assess the impact of helminthiases on the dynamics of quantitative changes of some macroelements (K, Na, Ca) in the blood of Karakul lambs.

Relevance of the topic: In addition to nutrients, macroelements play an important role in the diet of agricultural animals. The deficiency of macroelements leads to a decrease in appetite and increases the risk of serious diseases due to reduced productivity. Macroelements have a significant impact on the growth and development of animals, ensuring the proper functioning of the digestive tract, hematopoiesis, and reproductive processes. The most important macroelements for organisms are calcium, phosphorus, magnesium, potassium, sodium, sulfur, and chlorine. During our research on experimental helminthiasis in Karakul lambs, we observed signs of mineral starvation during the postimaginal period of parasite development, such as loss of appetite, discoloration and dullness of the wool, eating each other's wool, and chewing on walls and boards. Therefore, in our studies, we identified and analyzed the dynamics of some macro- and microelements that are crucial for the homeostasis of the organism in the blood of experimental helminthiasis-infected lambs.

Materials and methods of research: Experiments were conducted on Karakul lambs at the "Qarnab" factory. For experimental studies on marshallagiosis, nematodirosis, and habertiosis, 20 Karakul lambs aged 3-4 months were selected and divided into 4 groups.

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Research Results: Potassium Dynamics in Blood

The concentration of potassium in the blood of lambs infected with marshallagiosis significantly decreased to 352.2±0.8 mg/l by the 5th day of invasion. Subsequently, this indicator increased, reaching a maximum level of 745.3±2.0 mg/l on the 15th day of invasion, which is 1.5 times higher than the initial level. Starting from the 30th day of invasion, the potassium level in the blood of the lambs gradually began to decrease but remained higher than the initial value until the 70th day of invasion (473.6±0.4 mg/l).

The changes in potassium levels in the blood of lambs with nematodirosis were very similar to those observed with marshallagiosis. In nematodirosis, a similar decrease in potassium concentration was observed in the first 5 days post-invasion, followed by an increase to 645.8±1.8 mg/l on the 15th day. This high level of potassium in the blood was observed throughout the entire period of invasion when compared to the control group

(Figure 1).

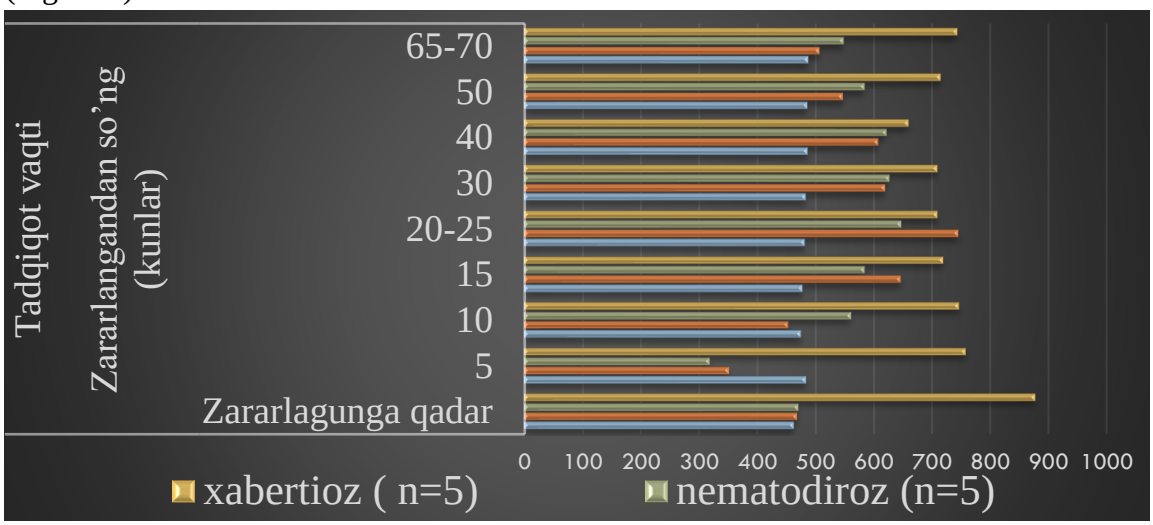

Figure 1. Potassium Levels in the Blood of Karakul Lambs (mg/l), M±m

On the 5th day, this value was 1780.2±2.4 mg/l, which is 144 mg/l lower than the initial value and 58 mg/l lower on the 10th day of invasion. By the 15th day of invasion, the sodium content in the blood decreased to 1725.5±0.6 mg/l, differing from the initial level by 212 mg/l. From the 20th to the 30th day of invasion, this indicator began to increase and continued to do so until the end of the experiment (P≤0.01).

In nematodirosis, a sharp decrease in the sodium content in the blood of lambs was observed after experimental infection (down to 1429.8±9.1 mg/l by the 5th day of invasion, or 528 mg/l lower than the initial level), and this condition persisted until the 15th day (P≤0.01). Subsequently, there was a significant increase (up to 1921.6±0 mg/l on the 25th day), and by the end of our study, it almost reached the initial and control values (1954.0±0.5mg/l)

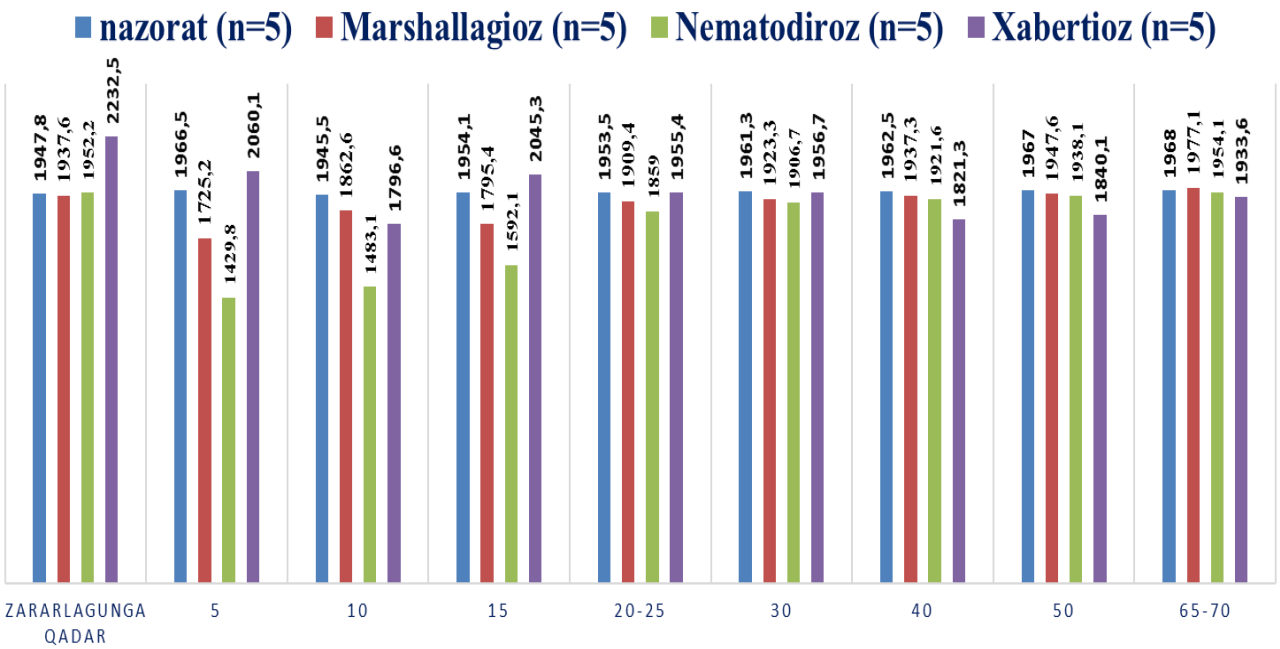

Figure 2. Sodium Levels in the Blood of Karakul Lambs (mg/l), M±m

The sodium content in the blood of the lambs allocated for the 4th group was 1963.5±48.1 mg/l before being infected with the invasive larvae of Habertia. On the very first day of invasion, the sodium concentration in the blood of the experimental lambs began to decrease. By the 5th day of invasion, it decreased to 1857.1±40.7 mg/l, and by the 10th day, it was 1640.1±71.7 mg/l, a decrease of 323 mg/l from the initial value. The sodium content in the blood increased slightly by the 20th day of Habertia invasion, reaching 2045.33±40.1 mg/l, but later began to decrease again, dropping to 1796.6±62.0 mg/l by the 25th day, 1789.65±63.5 mg/l by the 40th day, and rising to 1933.6±15.8 mg/l by the 70th day of the study. However, these levels were still significantly different from the initial and control values (Figure 2).

Thus, during the periods of experimental marshallagiosis, nematodirosis, and habertiosis invasions, the sodium content in the blood of Karakul lambs decreased. However, this decrease was most pronounced during the 5th day of experimental marshallagiosis when invasive larvae entered the abomasum wall and during the 15th day of reverse migration of preimaginal marshallagia from the abomasum wall to its cavity.

Similarly, a decrease in the sodium content in the blood was observed in lambs infected with experimental nematodirosis, but the decrease was most evident on the 5th, 10th, and 15th days. By the imaginal development period of the parasite, the sodium concentration in the blood of the lambs began to rise, approaching the initial levels.

Unlike other helminthiases, in experimental habertiosis, the sodium content decreased during almost all periods of invasion, with a particularly noticeable decrease on the 10th day.

Calcium Dynamics in Blood

Before experimental infection with marshallagiosis, the calcium level in the blood of the experimental lambs averaged 27.8 ± 0.55 mg/l . On the 5th day of invasion, the calcium level in the blood decreased to 20.5 ± 0.4 mg/l, and by the 10th day, it further dropped to 19.4 ± 0.3 mg/l,

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which is 9 mg/l lower than the initial value. On the 15th day, the calcium level was 21.5 ± 0.36 mg/l. Starting from the 20th day of invasion, the calcium level in the blood increased and reached the initial and control levels by the 25th day (P≤0.01). Subsequently, from the 40th day until the end of the experiments, the calcium level in the blood continued to rise, reaching 31.3 ± 0.18 mg/l on the 65th day of invasion.

In nematodirosis, the dynamics of calcium level changes in the blood of the experimental lambs were almost identical to those observed in experimental marshallagiosis (Figure 3). The decrease in calcium levels was observed during the preimaginal period of parasite development, and with the beginning of the imaginal period, these levels quantitatively increased, significantly exceeding the initial values.

In lambs with habertiosis, the calcium level in the blood was 26.9 ± 0.4 mg/l before the infection (Figure 3). From the very beginning, the calcium level started to decrease, reaching 21.9 ± 0.4 mg/l by the 25th day. Unlike marshallagiosis and nematodirosis, a significant increase in calcium levels was observed in the blood of lambs with habertiosis (20.0 ± 0.53 mg/l), and this level was maintained until the 25th day. Starting from the 25th day of invasion, the calcium level in the blood significantly decreased and by the 70th day of invasion, it almost reached its initial value (18.0 ± 0.60 mg/l), but remained higher compared to the control group.

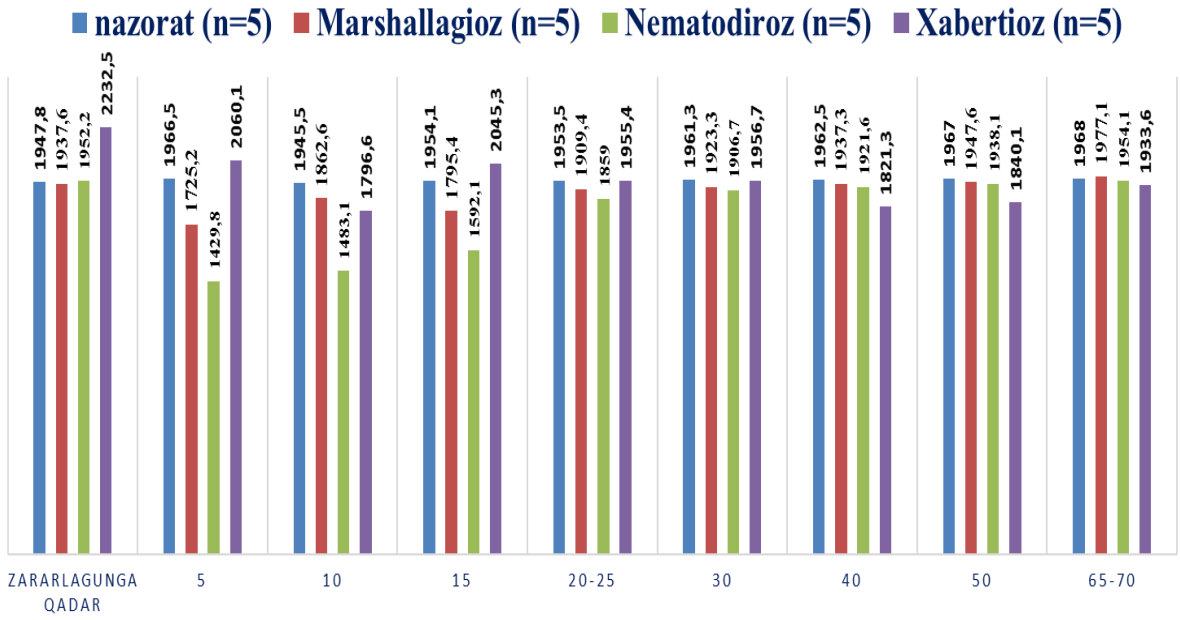

Figure 3. Calcium Levels in the Blood of Karakul Lambs (mg/l), M±m. (n=5)

Thus, the analysis of our research results shows that the calcium level, along with other macroelements, changes in the blood of lambs with experimental helminthiasis. The decrease in calcium levels in the blood during experimental helminthiases does not occur uniformly. For example, during the preimaginal development of parasites in marshallagiosis, the calcium level significantly decreases compared to the initial values and the control group, reaching 19.4±0.3 mg/l by the 10th day. During the imaginal development period (30-60 days), the calcium level in the blood of the lambs significantly increases, reaching 31.3±0.3 mg/l. Similar changes were observed in experimental nematodirosis.

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In contrast, in experimental habertiosis, we observed the opposite situation. From the initial days of the preimaginal development of parasites, the calcium level decreased compared to the initial values and remained lower during the imaginal development period compared to the control and initial values.

In experimental marshallagiosis, nematodirosis, and habertiosis, the levels of macroelements in the blood of Karakul lambs decreased during the preimaginal development of helminths by an average of Na -19%, Ca -26%, and K -23%, and slowly recovered during the imaginal period.

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