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Original Research Article

The Number of General Leukocytes in the Blood of Karakul Sheep Farmed in Different Climate and Nutritional Conditions Depends on the Seasons of the Immune System

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ABSTRACT:
The article describes the dynamics of changes in the blood of leukocytes and the immune system depending on the seasons in the blood of karakul sheep fed in different climates and feeding conditions. The amount of many biochemical components in the blood of Karakul sheep varies depending on the seasons, feeding conditions and physiological conditions. This condition is especially evident in the changes in metabolism in winter and spring, as these conditions occur as a result of poor nutrition and lack of nutrients. Leukocyte formula or the percentage of leukocytes in the blood to each other called a leukogram. Determining the percentage of leukocytes in the blood is important in making a diagnosis and predicting the consequences that can be observed. Determination of the leukocyte formula in Karakul sheep allows a perfect calculation of the amount of basophils, eosinophils, neutrophils, lymphocytes and monocytes among the 100 leukocytes listed in the sample. Lymphocytes play a key role in the body's special protective reactions, ie the formation of cellular and humoral immunity.

Keywords: Karakul Sheep, Immune System, Leukocytes, Leukoformula, Climatic Factors, Seasons, Pastures.

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INTODUCTION

Today, sheep breeding in Uzbekistan is second only to cattle breeding. Sheep produce a variety of products - wool, astrakhan skin, meat, fat and, in some cases, milk. One of the most important biological characteristics of sheep is that they can walk long distances and use grassy pastures. The sharp teeth of sheep with thin lips are extremely mobile, allowing them to cut through the grass and eat the delicate leaves of rough plants. Therefore, sheep make better use

of steppe, semi-steppe and sandy pastures, which are abundant in Uzbekistan, than other animals. Black sheep are better suited for year-round grazing in steppe, semi-arid and sandy pastures than all other breeds of sheep (Bazarov, Rajamuradov, 2015). The degree of resistance of lambs from ewes is determined by a number of factors, among which the study of the condition of the mother (ewe) organism is one of the most important. According to the results of our research, it was found that the total amount of leukocytes in the blood of ewes fed in different climatic and nutritional conditions during the year and there are significant differences between some of them (Antsibor, 2006; Agadzhanyan, 2001).This is important in the study of how the immune system in the body of astrakhan sheep changes with the seasons (Georgievsky, 1990; Ermakova, 2001; Shindyalova, 2001).

MATERIALS AND METHODS

According to the results of our research, changes in the amount of total leukocytes in the blood of ewes were also observed in accordance with the seasons and changes in the amount of nutrients in natural pastures. In our study, data on the total amount of leukocytes in the blood and its variation by type according to the seasons are given in the relevant tables. Changes in the amount of leukocytes in the blood of Karakul sheep during the year under the influence of various climatic and nutritional factors were studied in a generally accepted physiological method on the mindray - BC - 5000 hematological analyzer.

The blood-forming element, leukocytes and their types (Sysmex XS 1000i) were determined using a collorometric method on an automated hematological analyzer.

Immunological parameters in the blood (COBAS e 411 (HITACHI)) were determined on an automated immunochemical analyzer by the Mancheni method.

RESULTS AND DISCUSSION

The experiments of our research were based on determining the amount and population of leukocytes in the blood at different seasons. According to the study , the total number of leukocytes in the blood of ewes was 7.68 ± 0.56 mm ^{3} thousand the spring and 9.18-0.98mm thousand in the summer when ewes were grazed in mountain pastures . There was an increase of 19.5%. This change is primarily due to the fact that the amount of nutrients in the food consumed corresponds to the time when the needs of the animals are almost completely met. we need to take into account that there is also a factor of change in external environmental conditions.

In summer, when the herds graze on natural pastures in high mountain conditions, we must take into account that the atmospheric pressure of this region is much lower than the atmospheric pressure in the desert areas. This is because in areas with low atmospheric pressure, we need to take into account that not only changes in feeding conditions result in changes in the metabolism of animals, but also due to complications of the process of adaptation of animals to lower atmospheric pressure.

This is because the total number of leukocytes in the body of humans and animals around the Arctic Ocean, as well as in people who spend more time in cold water, was found to be 12-15% higher than in warm climates, ie near the equator [2,9]. In the autumn, the total leukocyte count in the blood of ewes (7.66 ± 1.01) was practically the same as in the spring (7.68 ± 0.56), but due to a sharp decrease in the amount of nutrients in the ration in the winter , the total leukocyte count, increased by 4.6%, or (8.01 ± 0.95) compared to the fall, which we believe was due to a sharp drop in air temperature in the winter.

In our experiments on inpatient large-scale digestion in the fall and winter , we found that the total amount of leukocytes in the blood of winter-fed ewes was 13.4% lower than in the autumn-fed group of ewes, or 8.12, respectively. ± 1.14 mm ^{3} / thousand compared to 7.03 ± 2.06 mm ^{3} / thousand. The data obtained from our experiments are consistent with the data obtained by a number of authors

[1,3,5] on normative and non-normative feeding of cattle and calves .

Hence, the lack of nutrients in the diet leads to a decrease in the total number of leukocytes, which indicates a decrease in the body's resistance to them. It should be noted that not only depends on the amount of nutrients consumed by animals, but also under the influence of climatic factors in addition to the above nutritional factors; - With changes in air temperature and atmospheric pressure, the total number of leukocytes deviates more or less than normal. We have studied the structural change of total leukocytes, i.e. the change in leukogram, depending on the amount of nutrients entering the body. The total number and types of leukocytes listed in Table 1 The ratio to each other decreased from summer to spring in accordance with the seasons and the level of satisfaction of the body's need for nutrients.

In the spring, due to global warming and the rapid growth of blue-green algae, the number of phagocytosis-causing cells in the blood of sheep - leukocytes (7.58 ± 0.56) and lymphocytes (4.59 ± 0.04) ± 0.03) if we observe that the total amount increased in comparison with the winter season, and in the winter season they are correspondingly; - 7.01 ± 0.95; 0.18 ± 0.2; 3.75 ± 0.06 and 0.28 ±0.04 gaobserved a decrease. It should be noted that, except in winter, neutrophils with rod nuclei and segment nuclei are almost unchanged. The available changes were only 0.16 to 1.84%. The data in Table 1 show that during the year, the total number of leukocytes in the blood of ewes fed with pasture food in the field and the percentage of some of its constituent species did not change significantly, ie remained within the physiological norm, despite differences in feeding conditions. According to the physiological norm, the total amount of leukocytes in the blood of astrakhan sheep varies from 6 to 11 thousand per 1 mm ^{3}.

Table 1: The total amount of leukocytes in the blood of ewes and the change of its types according to the seasons (on average favorable years)

Leukogram indicators	**The seasons**			
	Spring	**Summer**	**Autumn**	**Winter**
Total leukocytes, mm ^{3} / min	7.58±0.56	9.18±0.98	7.68±1.01	7.01±0.95
Eosinophils, mm ^{3} / min	0.33±0.04	0.32±0.032	0.19±0.07	0.18±0.23
%	4.4±0.22	3.50±0.45	3.30±0.21	2.50±0.13
Basophils, mm ^{3} / min	0.02±0.01	0.01±0.00	0.01±0.01	0.01±0.00
%	0.3±0.01	0.1±00	0.15±00	0.13±00
Rod nuclear, mm ^{3} / min	0.19±0.01	0.22±0.02	0.24±0.02	0.28±0.05
%	2.60±0.04	2.40±0.03	3.15±0.05	4.05±0.07
Segment nuclear, mm ^{3} / min	2.09±0.05	2.58±0.07	2.18±0.05	2.54±0.09
%	27.70±1.17	28.2±1.21	28.4±1.21	36.3±1.24
Lymphocytes, mm ^{3} / min	4.59±0.08	5.70±0.08	4.70±0.07	3.75±0.06
%	60.6±1.02	62.2±1.04	61.2±1.04	53.1±1.03
Monocites, mm ^{3} / min	0.34±0.03	0.33±0.03	0.29±0.04	0.28±0.04
%	4.50±0.09	3.60±0.08	3.8±1.09	4.1±0.91

Similar analogous differences and changes were detected in absolute indicators. However, it was found that the total amount of monocytes between leukocytes tends to decrease from spring to winter. Comparing the results of studies on ruminants in this regard, studies on karakul sheep in Europe and South Africa, on the contrary, noted a tendency to increase the number of monocytes from spring to winter (Vinnikov, 2003). Based on the information we have received, we explain that the regions being compared are radically different from our

conditions in terms of nutritional and climatic conditions, and are probably adapted to these conditions and related to the individual characteristics of real karakul sheep breeds. Analysis of the neutrophil index (the sum of myelocytes, young cells, and rod-nucleated neutrophils divided by the amount of segment-nucleated neutrophils) showed that in early spring and winter slightly higher than in spring and autumn. According to the data, a decrease in the total number of leukocytes and a slight increase in the number of immature neutrophils indicate a decrease in the ability of the body to resist the adverse environmental factors during the unfavorable seasons. From the above, we can conclude that when fed with natural pasture foods throughout the year, their body is not provided with enough nutrients to meet the needs of the organism in early spring and winter, which affects the metabolism in the body and leads to a decrease in natural resistance of ewes. Due to the lack of nutrients in the diet, the changes in the total number and types of leukocytes in the blood of marmots correspond to the low immune status of mice. During the year, in order to assess the state of specific immune systems of ewes fed with natural pasture foods, we conducted tests to determine the total number of leukocytes and lymphocytes in the blood and some indicators of the immune T-and B-lymphocyte system. Studies have shown that the total number of leukocytes in the blood of ewes is lower than in winter and early spring, summer and autumn (see Table 2).

Table 2: Change in the total number of leukocytes, lymphocytes in the blood of ewes by the seasons of the year

Indicators	**The seasons**			
	Spring	**Summer**	**Autumn**	**Winter**
Total amount of leukocytes, mm ^{3} / min	7.58±0.56	9.18±0.98	7.68±1.01	7.01±0.95
Total amount of lymphocytes, mm ^{3} / min	4.59±0.08	5.70±0.08	4.70±0.07	3.75±0.06
%	60.6±1.02	62.2±1.04	61.2±1.04	53.1±1.03
Total amount of V-lymphocyte, mm ^{3} / min	1.62±1.04	2.02±1.45	1.67±1.08	1.47±1.02
%	21.33±0.33	22.00±0.45	21.80±0.58	21.00±0.45

In spring and autumn, the total number of leukocytes in the blood of ewes did not change, while in winter and early spring there was a tendency to decrease in the blood. The data in Table 2 are the average of the entire spring season, although they are data from years with moderate climatic conditions. If, in early spring, that is, after the winter, in the second half of pregnancy, the proportion of V-lymphocytes between total leukocytes does not exceed 14 - 15%, and, accordingly (1.09 ± 0.04 mm ^{3} / thousand), also quantitatively we note that it has a low index.

We also acknowledge that the amount of B-lymphocytes did not change significantly during the year, in line with changes in the amount of nutrients in the diet. However, throughout the season, due to the lack of easily digestible proteins and carbohydrates in the body of animals, there was a decrease in the total number of leukocytes and lymphocytes in the blood of ewes, as well as the amount of B-lymphocytes. It is important to note that the amount of lymphocytes in the blood of barren karakul sheep grazed on natural pastures without additional nutrients throughout the year did not change significantly. Similar differences were also found in the percentages. It is known that the functions of different types of leukocytes in humans and animals different The main function of granulocytes and monocytes is to perform the process of phagocytosis, while that

of lymphocytes is to form a special or specific immunity. Hence, in the early spring and winter seasons, when the amount of nutrients and easily digestible proteins and carbohydrates in pasture foods decreases sharply, the total amount of leukocytes and lymphocytes in the blood of ewes fed without supplements decreases, indicating a decrease in their resistance. As a result of the study of cellular immunity during the seasons, differences in the amount of T-lymphocytes in the blood of ewes were identified. The data in Table 3 show that the amount of T-lymphocytes in the blood of ewes grazed in natural pastures during the year varies to a certain extent in accordance with the seasons and the amount of nutrients consumed. In the spring, the number of T-lymphocytes was 57.17% of the total leukocytes. The average was 62-63%, or about 6.0% more than in the spring.

Table 3: Changes in the number of T-lymphocytes in the blood of ewes and their subpopulations in accordance with food and climatic conditions

Indicators	**Seasons**			
	Spring	**Summer**	**Autumn**	**Winter**
Total leukocytes mm ^{3} / min	7.58±0.56	9.18±0.98	7.68±1.01	7.01±0.95
T - lymphocytlar mm ^{3} / min	4.33±0.08	5.78±0.05	4.82±0.04	3.90±0.07
%	57.17±0.60	63.00±0.45	62.80±0.49	55.7±0.58
T - helperlar, mm ^{3} / min	3.62±0.04	4.77±0.05	3.96±0.04	3.21±0.03
%	47.83±0.17	52.00±0.55	51.60±0.68	45.83±0.21
T - suppressorlar, mm ^{3} min	0.70±0.03	1.00±0.03	0.86±0.01	0.61±0.04
%	9.34±0.56	11.00±0.45	11.20±0.37	8.74±0.53
T - active, mm ^{3} / min	3.41±0.05	4.82±0.07	4.09±0.02	3.06±0.05
%	45.00±0.85	52.50±0.24	53.20±0.20	43.70±0.73
T_x / T_s	5.17	4.77	4.60	5.26
L / $T_л$	2.22	1.90	1.87	2.29

In addition, data were obtained on differences in subpopulations of T-lymphocytes with changes in the composition of easily digestible components in the diet, in line with changes in the seasons and the physical condition of the food consumed. We found that the amount of helper and suppressor fractions of T-lymphocytes in the spring increased from 57.17 and 9.34%, respectively, to 52.00 and 11.00% in the spring. In the autumn, these figures remained almost unchanged, but in the winter they decreased significantly. Determining the ratio of helper and suppressor fractions to each other plays an important role in assessing the functional state of a particular immune system, as this indicator reflects the functional activity of the process of immunogenesis in the body.

In spring and autumn, the ratio of T-lymphocyte helper and suppressor fractions in the blood of ewes, which meet the body's need for nutrients due to pasture nutrients in the field, is about 2.6 times the ratio of 4.65 and 2.9, respectively was determined. The change in the ratio of T-lymphocyte subpopulations to each other can be explained by the restructuring of immune response management (decreased or complete cessation of immune response) and hyperfunction of T-suppressors in the second half of winter (winter) and post-lambing (winter). According to the analysis of the leukocyte-T-lymphocyte index, the nutrient content of pasture feeds was 1.2-1.3 times higher in winter and early spring, especially in the two weeks after lambing, than in other periods. At other times, no significant changes in the ratio of leukocytes and T-lymphocytes were detected.

CONCLUSIONS

Thus, in conclusion, it can be said that the low level of T- and B-lymphocytes and their subpopulations in the blood of ewes, which are not provided with insufficient nutrients in winter and spring, is due to the low level of specific immune system, incomplete functioning of cellular and humoral immunity. Reflects, which means that the organism has a low level of immune status. Due to the fact that in the autumn and autumn, the birds eat enough nutrients from their natural pastures, and their specific immune system status and function are quite high. In this case, the total amount of leukocytes in the land, high levels of T- and B-lymphocytes and their subpopulations, helperly-suppressor and indicates that leukocyte-T-lymphocyte ratios are in an active physiological state.

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