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HEMATOLOGICAL INDICATORS GOATS OF THE ZAANEN BREED IMPORTED FROM ABROAD ACCORDING TO DIFFERENT AGE AND CONSTITUTION TYPE IN THE CONDITIONS OF KARAKALPAKSTAN

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ABOUT ARTICLE

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Abstract: In this article, hematological parameters of goats of the Zaanen breed imported from abroad, bred in the conditions of Karakalpakstan, were studied for the first time according to different age and constitution type. The obtained data were compared with the standard indicators.

INTRODUCTION

Blood is the body's biological fluid, which ensures the normal functioning of important vital processes. Blood is a liquid tissue that circulates in the arteries, veins and capillaries of the body. It is a physiological condition for the survival of the organism and the normal functioning of all organs and tissues that the blood reaction, composition, and physico-chemical properties always remain the same at the standard level. That is why it is the window of the body. Red bone marrow, thymus, spleen, and lymph nodes are blood-forming organs in vertebrates at various stages of growth and development.

According to the composition of blood, it consists of two parts, it includes blood plasma and blood cells. Blood cells, or in other words, the shaped elements of blood, include leukocytes, erythrocytes and platelets. Each shaped element has its own specific function that it performs in the body.

Erythrocytes (Red Blood Cells, or RBC) are red blood cells that do not have a nucleus. In mammals, erythrocytes are disc-shaped with a concave center. The shape of erythrocytes is maintained stably by spectrin protein in the membrane. The main function of erythrocytes in the body is gas exchange during

respiration. Due to the absence of a nucleus in the composition of erythrocytes and their unique shape, they provide the most optimal properties of the gas exchange process, as well as deformation and osmotic resistance. The largest red blood cells are found in dogs, followed in descending order by cats, horses, cattle, sheep and goats. The lifespan of erythrocytes is 90-120 days. Erythrocytes have antigen properties, on the basis of which they are differentiated into blood groups [4]

During the growth process in poultry and mammals, the size of erythrocytes decreases, and the number increases, on the contrary. As a result of this, the total surface surface layer of red blood cells increases and accelerates the gas exchange function of blood [3].

METHODS

The main part of the cytoplasm of erythrocytes of all vertebrates consists of hemoglobin (Hemoglobin, or HGB), which is a complex combination of iron oxide. That is why blood has a red color. Hemoglobin is a chromoprotein that transports oxygen from the alveoli of the lungs to the cells of the whole body and carbon dioxide from the cells to the alveoli of the lungs. Hemoglobin consists of protein - globin and non-protein - heme (iron and protoporphyrin IX complex).

Leukocytes (White Blood Cells, or WBC) are white blood cells, a heterogeneous group of nucleated peripheral blood cells that perform an immune function in the body. Leukocytes are divided into several types according to the staining of the nucleus, the color of the cytoplasm, the presence or absence of granularity and its nature. Their size ranged from 6 μm (lymphocytes) to 14 μm (monocytes). Its main function is to protect the body. They change their shape and destroy the bacteria that enter the body.

Hematocrit (Hematocrit, or HCT) represents the percentage of formed elements in the total blood volume. As mentioned above, the shaped elements include erythrocyte, leukocyte and platelets. As a rule, hematocrit reflects the number of red blood cells in relation to blood plasma. Sometimes hematocrit is defined as the ratio of the total volume of all shaped elements (erythrocytes, leukocytes, platelets) to the total volume of blood. But the difference is very small. Because 99% of the total volume of shaped elements corresponds to erythrocytes. The hematocrit indicator is expressed as a percentage of the total blood volume, the unit is expressed as a percentage (%), if it is expressed as a volume, the unit is displayed in the form of liters (l/l). Studying the hematocrit index allows to evaluate the index value of the erythrocyte.

Physiological and biochemical indicators of blood are one of the indicators characterizing the normal course of vital processes in the body. Based on this, determining the number of shaped elements of

blood is of great practical importance. If we know the indicators of blood in the body, we can think about the changes in the physiological condition of animals in the new environmental conditions.

Resource and method of the research. Research on hematological parameters of Zaanen goats depending on the age and constitution type was conducted at the farm "PANAEV FARMS" located in the Karaozak district of the Republic of Karakalpakstan. In May 2017, 300 7-month-old female goats and 10 male goats were brought to this farm from Austria. Female goats were selected as the research object. These goats were divided into dense, thin and strong constitution type groups based on the generally accepted method of determining constitution type in zootechnics. Each group consisted of five goats (n-5), which were maintained under the same feed and conditions. A blood sample was taken from the neck of the goats in the morning before feeding using a syringe into a vacuum blood collector (Figure 1). Hematological indicators of blood were determined using the "BK-6190" automatic hematological analyzer manufactured in the People's Republic of China. WBC - leukocytes, RBC - erythrocytes, HGB - hemoglobin, HCT - hematocrit were studied using this device. The obtained digital data were biometrically processed using the Microsoft Office Excel 2007 computer program [2], and the average arithmetic value and its error ($\bar{X}\pm Sx$), coefficient of variation (Cv%) were calculated. Differences between groups were compared using confidence criteria ($P<0.05$; $P<0.01$;).

The obtained results and their analysis. Table 1 shows the results of research on hematological indicators of goats. The analysis of table data shows that the amount of erythrocytes in the blood increased with age in goats. In particular, at the age of 8 months of goats with strong constitution, this indicator was on average 11.4 x 1012/l, while at the age of 12, 18 and 24 months, it was 11.6 x 1012/l, 12.2 x 1012/l and 12.1x 1012/l, respectively. In goats with a dense constitution type, the amount of red blood cells increased in the age group. In particular, at the age of 8 months, this indicator corresponded to 11.2 x 1012/l on average, and 11.7 x 1012/l, 12.1 x 1012/l and 11.8 x 1012/l in the age periods of 12, 18 and 24 months, respectively. The tendency of red blood cells to increase with age was also observed in goats of fine constitution type. In particular, the amount of erythrocytes at the age of 8 months of goats of the thin constitution type corresponded to 11.3 x 1012/l on average, and according to the following age periods, it was 11.5 x 1012/l, 11.9 x 1012/l and 11.4 x 1012/l. In general, the erythrocyte parameters of the robust and dense type goats showed a slight superiority over the thin type. This advantage was in the range of 0.88-6.14% in the robust type, and in the range of 0-3.15% in the dense type. However, a reliable difference in types was not detected.

The analysis of data on leukocyte index showed that leukocyte count varies to some extent by age. In contrast to erythrocytes, the amount of leukocytes was relatively high in the early stages. In particular,

at the age of 8 months of goats of strong constitution type, this indicator corresponded to 9.6 x 109/l on average, and at the age of 12 months it was 9.8 x 109/l. It was 9.7 x 109/l and 9.3 x 109/l respectively at 18 and 24 months of age. Goats of the dense constitution type had an average of 9.8 x 109/l at 8 months of age. This indicator was 9.9 x 109/l at the age of 12 months. A slight decrease in leukocytes was observed at the next 18 and 24 months of age in goats of dense constitution type, which were 9.4 x 109/l and 9.5 x 109/l, respectively. Leukocyte parameters of thin type goats have a slightly different dynamics compared to robust and dense type. Specifically, 8; 12; 9.2 x 109/l in age periods of 18 months; It increased to 9.5 x 109/l and 9.6 x 109/l, slightly decreased to 9.4 x 109/l in the two-year period. However, no reliable difference was found between the groups in terms of age, as well as erythrocytes. However, it should be noted that leukocyte variation (Cv% 7.40-11.64) was higher than erythrocyte variation (Cv% 4.08-6.40). This indicates the formation of the immune system in organisms at different speeds.

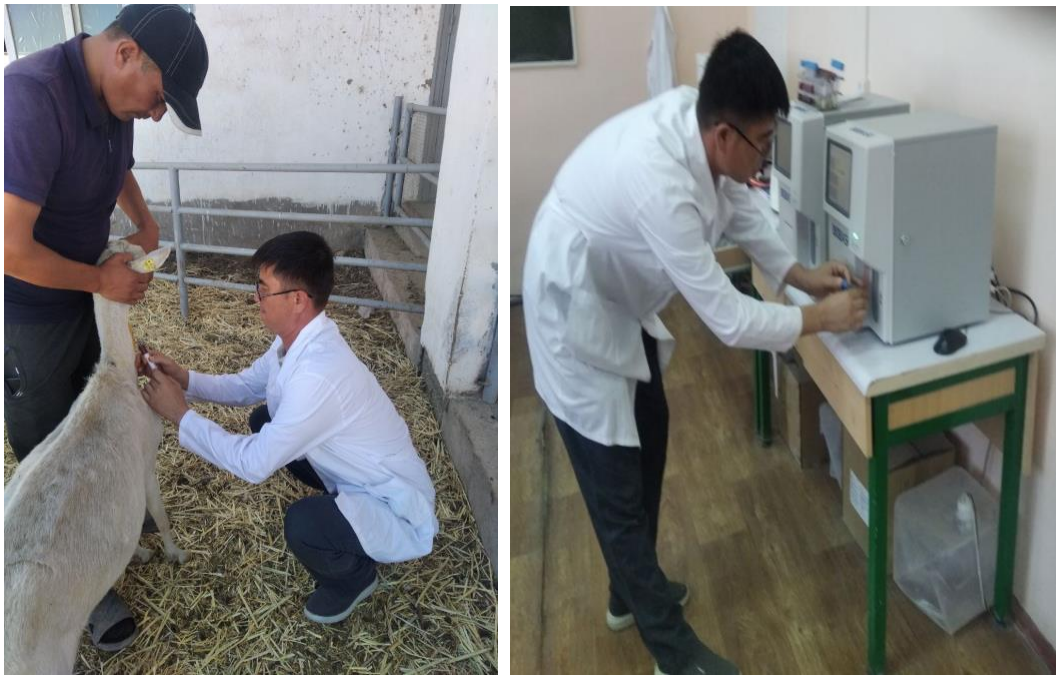

Figure 1. Blood sampling and testing process

The data obtained on hemoglobin indicators of goats show that this indicator changes according to age periods. In particular, in 8-month-old goats with strong constitution, this indicator was on average 113.2 g/l, and at the age of 12 and 18 months, it was 114.2 g/l and 115.2 g/l, respectively. It was observed that the indicator of goats at the age of 24 months was reduced by 5.6 g/l or 4.86% compared to the age of 18 months. Hemoglobin index of dense constitution type goats at the age of 8 months was on average 112.2 g/l, at the age of 12 and 18 months it was 114.8 g/l and 115.6 g/l, respectively. This indicator was 108.2 g/l at the age of 24 months, a decrease of 7.4 g/l ($P<0.05$) or 6.40% compared to

the age of 18 months. A trend of unstable changes in the dynamics of hemoglobin indicators of sensitive type goats was observed. In particular, it was 112.6 g/l in goats at the age of 8 years, and at the age of 12 months, this indicator decreased by 2.2 g/l (P>0.05) and was 110.4 g/l. At the age of 18 months of goats, a slight increase (+3.2 g/l) was observed in the hemoglobin indicator, which corresponded to 113.6 g/l. However, at the age of 24 months, there was a decrease in the amount of hemoglobin, as in other types of goats. A decrease of 3.3 g/l or 3.0% was observed in goats compared to 18 months of age. According to the hemoglobin index, goats of strong and dense constitution type were slightly superior to thin type, but no difference in the level of confidence criteria was detected between the groups according to the corresponding age periods.

Table 1

Morphological indicators of blood of goats in different age and constitution type, n-5

Indicators	Age, month	Constitution type						Norm
		Strong		Dense		Thin		
		$\bar{X}\pm S_x$	C_v %	$\bar{X}\pm S_x$	C_v %	$\bar{X}\pm S_x$	C_v %	
Erythrocyte, 10^{12}/l	8	11,4±0,21	4,08	11,2±0,29	5,71	11,3±0,29	5,84	8-18
	12	11,6±0,28	5,44	11,7±0,33	6,40	11,5±0,29	5,79	
	18	12,2±0,26	4,82	12,1±0,24	4,34	11,9±0,30	5,61	
	24	12,1±0,33	6,01	11,8±0,30	5,72	11,4±0,26	5,11	
Leukocyte, 10^9/l	8	9,6±0,32	7,40	9,8±0,45	10,41	9,2±0,48	11,64	5-13
	12	9,8±0,37	8,44	9,9±0,37	8,33	9,5±0,41	9,62	
	18	9,7±0,40	9,13	9,4±0,38	9,05	9,6±0,44	10,21	
	24	9,3±0,34	8,15	9,5±0,38	11,32	9,4±0,40	9,57	
Hemoglobin, g/l	8	113,2±2,03	4,02	112,2±1,77	3,53	112,6±2,25	4,47	80-120
	12	114,2±2,52	4,93	114,8±1,69	3,28	110,4±2,42	4,90	
	18	115,2±1,77	3,44	115,6±1,75	3,38	113,6±2,23	4,48	
	24	109,6±2,11	4,31	108,2±2,37	4,91	110,2±2,23	5,27	
Hematocrit, %	8	32,3±0,65	4,49	32,2±0,64	4,46	32,2±0,64	4,90	22-38
	12	32,4±0,68	4,69	32,4±0,75	5,16	32,3±0,76	5,26	
	18	33,3±0,62	4,14	33,2±0,61	4,13	32,8±0,71	4,84	

	24	32,1±0,74	5,17	31,7±0,95	6,71	31,5±0,72	5,09	

Changes in hematocrit percentage of goats in the experimental group were similar to the dynamics of red blood cells. Because the percentage of hematocrit is determined by the amount of erythrocytes. At the age of 8 months, the rate of goats of strong constitution type is 32.3%, correspondingly for the following age periods it was 32.4%, 33.3% and 32.1%. In goats of the dense constitution type, this hematocrit indicator is 32.2%, 32.4%; 33.2% and 31.7%, respectively, according to age periods; and in goats of thin constitution type it was 32.2; 32.3; 32.8 and 31.5%. A decrease in the hematocrit index was observed in groups at the age of 24 months. In our opinion, this is due to the fact that the blood sample was taken after the goats gave birth. Because after giving birth, the mother's body loses a certain amount of blood and fluid. The hematocrit percentage decreases because the body collects the necessary fluid a little faster compared to the shaped element.

From the analysis of the data in the above table, it can be seen that the amount of formable elements of blood changes according to age periods. The absence of a reliable difference between the groups can be explained objectively by the moderate variation of the symptoms and subjectively by the low number of goats (n-5).

In the course of the research, changes in shaped blood cells (erythrocytes) in Zaanen goats in the new environmental conditions of the Republic of Karakalpakstan were compared. According to the European scientific source [8], it was shown that the average amount of erythrocytes in Zaanen goats corresponds to 13.1-15.4 x1012/l. According to this [5] internet source, the average height of Austria above sea level is 900 meters. In addition, in the study of Svetloyarsk [1], whose district center is 18 meters above sea level [7], according to the Internet source, it was determined that the erythrocyte index of Zaanen goats was in the range of 9.33-9.60 x1012/l.

The average height of the Republic of Karakalpakstan above sea level [6] is shown to be 103 meters on average. In our study, the results of erythrocyte count were in the range of 11.2-12.2 x1012/l for all types.

CONCLUSION

From the analysis of the obtained results, it can be concluded that the amount of erythrocytes is affected by the altitude of the area where the animal lives. If the area is higher than the sea level, the amount of erythrocytes increases, if it is the opposite, it decreases. In the new environmental conditions of the Republic of Karakalpakstan, a decrease in the amount of erythrocytes of goats was observed. This is

also proven by our results of comparison of areas at different heights above sea level. In general, the results of the hematological indicators were within the physiological limits for goats.

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