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HEMATOLOGICAL PROFILE OF CLINICALLY HEALTHY ADULT KAZAKH HORSES ZHABE BREED TYPE OF THE KAZAKHSTAN

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The article illustrates the data of studies of hematological indicators of the Kazakh breed of horses of the Zhabe type. To obtain a hematological profile, whole blood samples of 12 clinically healthy adult horses of the Type Zhabe of both sexes, raised on the pure pasture content of the farm "AKIMBEKOV" Zhetisu region were examined on the hematological analyzer MS 4-3Vet (France). The results of the blood test were recorded in winter and the intervals were set especially for erythrocyte parameters: hematocrit (Hct) 34.8 – 49%, hemoglobin 10.1–15.9 g/dl, the number of erythrocytes – 6.13–9.59 (m/mm3); leukocytes (m/mm3) – 8.50-24.47, lymphocytes % – 26.7–49.5 and monocytes % 1.7–6.9; platelet count 315-720 (m/mm3). Significant (P <0.05) differences were noted for the number of red blood cells, the total number of red blood cells, the number of leukocytes (TLC), depending on gender. The hematological indicators indicated here can help in monitoring the health status of horses with hard maintenance through the use of diagnostics in veterinary medicine.

Key words: hematological parameters, whole blood, horses, Type Zhabe, blood morphology.

ҚАЗАҚСТАННЫҢ ЖАБЫ ТИПІНДЕГІ ҚАЗАҚ ЖЫЛҚЫ ТҰҚЫМЫНЫҢ КЛИНИКАЛЫҚ САУ ЖЫЛҚЫЛАРДЫҢ ГЕМАТОЛОГИЯЛЫҚ БЕЙІНІ

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Мақалада Жабы типіндегі қазақ жылқы тұқымының гематологиялық көрсеткіштерін зерттеу деректері берілген. Гематологиялық бейін алу үшін "Акимбеков " ШҚ Жетысу облысы таза жайылымда өсірілетін қос жыныстағы 12 клиникалық сау ересек жылқылардың жаңа алынған қан үлгілері MS 4-3vet (Франция) гематологиялық анализаторында зерттелді. Қанды зерттеу нәтижелері қыс мезгілінде тіркелді және аралықтар эритроциттік көрсеткіштер үшін белгіленді: гематокрит (Нct) 34.8 – 49%, гемоглобин 10.1–15.9 г / дл, эритроциттер саны – 6.13–9.59 (м/мм3); лейкоциттер (м/мм3) – 8.50-24.47, лимфоциттер % – 26.7–49.5 және моноциттер% 1.7–6.9; тромбоциттер саны 315-720 (м/мм3). Эритроциттер саны, эритроциттердің жалпы саны, лейкоциттер саны (TLC) жынысына байланысты сенімді (р <0,05) айырмашылықтар байқалды. Мұнда көрсетілген гематологиялық көрсеткіштер ветеринарлық медицинада балау жасау арқылы табынды ұстау кезінде жылқылардың денсаулық жағдайын бақылауға көмектеседі.

Түйінді сөздер: гематологиялық параметрлер, қан, жылқы, Жабы типі, қан морфологиясы.

ГЕМАТОЛОГИЧЕСКИЙ ПРОФИЛЬ КЛИНИЧЕСКИ ЗДОРОВЫХ ВЗРОСЛЫХ КАЗАХСКИХ ЛОШАДЕЙ ПОРОДЫ ЖАБЕ КАЗАХСТАНА

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В статье представлены данные исследований гематологических показателей Казахской породы лошадей тип жабе. Для получения гематологического профиля, были исследованы на гематологическом анализаторе MS 4-3Vet (Франция), образцы цельной крови 12 клинически здоровых взрослых лошадей тип Жабе обоих полов, выращиваемых на чистопастбищном содержании КХ «Акимбеков» Жетысуская область. Результаты исследования крови регистрировались в зимний период времени и интервалы установлены особенно для эритроцитарных показателей: гематокрит (Нct) 34.8 – 49 %, гемоглобин 10.1–15.9 г/дл, количество эритроцитов – 6.13–9.59 (м/мм3); лейкоциты (м/мм3) – 8.50-24.47, лимфоциты % – 26.7–49.5 и моноциты% 1.7–6.9; количество тромбоцитов 315-720 (м/мм3). Достоверные (Р <0,05) различия были отмечены для количества эритроцитов, общего количества эритроцитов, количество лейкоцитов (TLC), в зависимости от пола. Гематологические показатели, указанные здесь, могут помочь в мониторинге состояния здоровья лошадей при табунном содержании за счет использования диагностики в ветеринарной медицине.

Ключевые слова: гематологические параметры, цельная кровь, лошадь, тип Джабе, морфология крови.

Introduction. One of the widespread monitoring in animal husbandry is the use of hematological indicators to assess the functional state of the animal body [1, p. 17]. Blood sampling is useful in the diagnosis of clinical diseases (whether infectious, parasitic or caused by dysfunction of certain organs), as well as in the usual care of horses [2, p.200] (for example, during regular examinations of newborn foals,

monitoring of horse performance, pre-anesthetic checks and examinations before purchase). In addition, laboratory tests are sometimes required for insurance examinations (for example, tests for immunoglobulin G [IgG] for newborn foals) and often for import/export examinations [3, p.468].

Blood is a liquid movable tissue circulating in a closed system of blood vessels, transporting various chemicals to organs and tissues, and integrating metabolic processes occurring in various cells [4, p. 38]. Thanks to a well-developed network of blood capillaries, it comes into contact with cells of all tissues and organs [5, p. 400], providing the possibility of their respiration, nutrition, and removal of end products of metabolism. Being in close contact with organs, blood has all the reactive properties of tissues [6, p. 563]. Fluctuations in their composition affect the state of organs and tissues. And all sorts of processes occurring in the tissues of the body affect the composition and properties of blood. Both the biochemical and morphological composition can change [7, p. 1941]. According to the set of indicators [8, p. 666], it is possible to judge the various adaptive mechanisms of the organism that appear in response to adverse environmental factors. As a result, a blood test is of great diagnostic importance. Hematological studies are used to clarify the diagnosis of various clinical symptoms. They help to control the course of the pathological process [9, p. 21].

Breeding and breeding work on the reproduction and improvement of horses of the Kazakh breed of the Type Zhabe, on the basis of Mugalzhar breed of horses and its factory type – Saryarka was created, was started in 1930 with the organization of the Embi stud farm in Aktobe, and in 1959 in the farm of the Betpakdala experimental station. Horses of the Kazakh breed of the type Zhabe are distinguished by their small stature, long massive body, sufficiently developed chest, strong backbone, and dark red coat color without signs [10, p. 69]. They keep the body well in all seasons of the year, they are distinguished by good fertility – the fallibility of mares from them is 83-90%. The stallions of this line are perfectly adapted to the winter pasture conditions. Good overgrowth of the front legs from the inside allows them to break the solid snow crust, protecting them from injury. The full development of horses of this type ends by 6.5 years, reaching maximum measurements and live weight. Puberty of mares occurs in 2.5-3 years, in stallions in 3 years. The uterus is characterized by sufficient strength, which ensures good development of young animals during the feeding period [10, p. 68].

In horses of any type, breed characteristics are manifested in a variety of appearance and character, but there are also differences in blood composition, reflected by variations in hematological and biochemical parameters [11, p. 2267]. In horses, several such differences have been reported including [12, p. 101] higher arthrogram value and slow hematocrit in heavy horse and pony breeds, as well as other minor differences. There are numerous reports in world literature devoted mainly to hematological studies [13, p. 8] and morphological ones. The traits of the horse breed are manifested in a unique appearance and character [14, p. 66]. Physiological diversity is more complex and is related to the composition of blood [15, p. 257], which is reflected in the variations of hematological and biochemical parameters [16, p. 439]. Thus, when establishing reference intervals (RI) of blood parameters and interpreting blood tests, breed differences should be considered [17, p. 71]. The intervals reported in the literature may also vary due to demographic differences, such as geographical location, physical activity, age, gender, biological rhythms, etc. [18, p. 61].

Thus, the purpose of this study was to expand the characteristics of this breed by determining the reference intervals (RI) for selected hematological parameters based on a population of clinically healthy adult horses of the Kazakh horse breed type Zhabe of the Zhetisu region of the Republic of Kazakhstan.

Materials and methods of research. At the time of the study, horses of the Kazakh breed type Zhabe were kept in the farm "Akimbekov" Zhetisu region. The study included 12 clinically healthy horses (8 mares and 4 stallions). The age of the horses ranged from 2 to 10 years.
Samples of the following products were selected for testing for compliance with the requirements of the Law of the Republic of Kazakhstan on Livestock Breeding dated July 9, 1998 No. 278
Sampling location: farm «Akimbekov»,
Date and time of sampling: _10.00-17.00, 18.12.2022 y.
Sampling was carried out in accordance with the requirements of: Order of the Minister of Agriculture of the Republic of Kazakhstan dated April 30, 2015 No. 7-1/393 "On approval of the Rules for sampling transported objects and biological material".

A biological sample used a whole blood, which was taken in a volume 2 ml from mares, stallions, and fillies. Blood sampling from the jugular vein was taken using a 21G needle into vacuum blood tubes (2 ml BD Vacutainer, England). Whole blood was collected Tubes with ethylenediaminotetraacetic acid (EDTA) were used for blood hematology.

The content of hematological parameters [19, p. 55] in whole blood was determined using a hematological analyzer MS 4-3Vet (France) using a set of reagents MS 4-3Vet (France). In whole blood, leukocytes, m/mm3, lymphocytes, %, monocytes, %, granulocytes, %, erythrocytes, m/mm3, cf. erythrocyte volume, mm3, hematocrit, %, cf. hemoglobin content in erythrocyte, rd, cf. erythrocyte content, g/l, erythrocyte distribution width, %, hemoglobin, g/l, platelet, m/mm3, cf. platelet volume, mm3, thrombocytosis %, platelet distribution width.

Research results. The high–altitude border areas of the Zhetisu region, located above sea level at an altitude of 1200 m, are characterized by extreme weather conditions and a fodder base represented by high-altitude pastures. The study of the state of the main clinical hematological parameters of the blood of horses was carried out in winter, in conditions of pasture maintenance of wintering [20, p. 3], which was characterized by low temperatures reaching -25 C and typical snow cover for this area (20-30 cm) [21, p. 1]. In this regard, even a month after the start of the pasture period, the animals had fatness that can be described as "above average" [22, p. 582]. All the mares studied were foaled, and the breeding stallions showed well-expressed sexual instincts, as well as 2.5-3-year-old non-foaled fillies [23, p. 133].

The hematological percentage parameters determined in this study are shown in table 1.

Table 1 – The hematological percentage parameters

№	ID number of animals	Indicators						gender
		Lymphocytes, %	Monocytes, %	Granulocytes, %	Hematocrit, %	Thrombocytocrit, %	Platelet distribution width	
	Designation	Lym	Mon	Gra	Hct	Pct	PDW	
	Standard	*25-60*	*2-4*	*ND*	*32-48*	*ND*	*ND*	
1	A21	48,1	2,6	49,3	41,1	0,3	8,8	mare
2	153	39,5	2,1	58,4	41,5	0,33	8,5	stallion
3	155	52,4	2,7	44,9	36,5	0,27	8,6	stallion
4	15/52	35,8	3,4	60,8	41,1	0,47	7,8	mare
5	2A/18	41	3	56	44,8	0,53	8	mare
6	8/155	45,1	3,5	51,4	48,8	0,48	8,5	stallion
7	3A14	40,8	3,4	55,8	45,5	0,48	7,6	mare
8	5A24	45,9	4,2	49,9	39,7	0,63	7,9	mare
9	11/88	40,5	3,5	56	49,1	0,65	8,2	mare
10	15A31	37,7	5,9	56,4	39,6	0,44	7,8	stallion
11	11/10	37,4	4,8	57,8	39,8	0,56	8,7	filly
12	420/17	45,9	4,2	49,9	39,7	0,63	7,9	stallion
	average value	**40,6**	**3,21**	**56,2**	**40,2**	**0,44**	**8,43**	

ND – not defined * – not enough sample.

The main hematological parameters of domestic horses (the content of hemoglobin and erythrocytes in the blood), despite the tense state of the body as a result of wintering [24, p. 330], were within the physiological norm, or slightly below the reference values (the content of erythrocytes).The hemoglobin content in the population of horses of the Kazakh breed, the type Zhabe, turned out to be slightly lower than in the population of horses of the same breed in the summer (by 9.6%), however, no significant difference was found in the content of erythrocytes. Apparently, the content of erythrocytes in the blood of adult horses in winter at the level of 7.2-8.7 m / m3 can be considered normative. According to the number of leukocytes in the blood of the adult horse population, a significant excess over the normative indicators was revealed. A higher level of leukocyte content was noted in foaled mares, the average lymphocyte level of 49-52% in the blood of Kazakh-bred horses of both sexes studied according to the results of the studies is at the same level. The average value of platelet volume, mm3, was 8.3 and 8.9, at the same time, there was a significant difference in this indicator in horses of this group. The level of hemoglobin g/dl., in the blood of horses of both sexes was within the physiological norm. This fact is connected with the better provision of this group of horses with winter pasture feed, since the Zhetisu region is in more favorable climatic conditions The main parameters shown in table 2.

Table 2 – Results of hematological examination of horses of the type Zhabe

№	ID / number of animals	Indicators									gender
		Leukocytes, m/mm3	Erythrocytes, m/m3	Average volume of erythrocytes, microns³	Average / hemoglobin content in erythrocyte, pg	Average red blood / cell count, g/l	Width / of red blood cell distribution, %	Hemoglobin, g/l	Platelet, m/mm³	Cf. volume / Platelets, microns³	
Designation		WBC	RBC	MCV	MCH	MCHC	RDW	Hb	THR	MPV	
Standard		5,5-12,5	6-12	34-58	10-18	31-37	ND	10-18	100-600	3,5-6,5	
1	A21	18,7	7,8	52,8	19,6	37,2	14,3	15,3	348	8,5	mare
2	153	10,7	7,51	55,3	19,5	35,4	14	14,7	392	8,5	stallion
3	155	13,4	7,65	47,8	17,6	36,9	15,9	13,5	319	8,6	stallion
4	15/52	12,3	7,99	51,5	17,8	34,7	14,7	14,7	565	8,4	mare
5	2A/18	11,2	8,97	50	17,6	35,2	14,6	15,8	622	8,5	mare
6	8/155	11	9,12	53,6	18,5	34,6	14,3	16,9	560	8,6	stallion
7	3A14	11,4	9,63	47,3	16	34	16,2	15,5	566	8,5	mare
8	5A24	11,9	7,67	51,8	17,6	34	14,1	13,5	756	8,3	mare
9	11/88	12,7	8,76	56,1	18,1	32,3	14,9	15,9	770	8,5	mare
10	15A31	17,6	8,09	49	17,3	35,3	15,4	14	510	8,6	stallion
11	11/10	19,8	8,23	48,4	20,6	42,7	15,9	17	638	8,7	filly
12	420/17	11,9	7,67	51,8	17,6	34	14,1	13,5	756	8,3	stallion
	average value	**14,7**	**7,94**	**50,7**	**17,7**	**34,3**	**14,5**	**13,8**	**516**	**8,47**	

ND – not defined * – not enough sample.

The values of the erythrogram and leukogram determined in our study were also associated with the age of horses, as many authors also report, we noticed that the number of red blood cells decreases with age with a compensatory increase in the average volume of red blood cells, mm3 and the average hemoglobin content in the erythrocyte. The number of white blood cells also decreases with age, but although the ratio of lymphocytes to monocytes was not significantly increased in our study. The revealed changes in our research results confirm the conclusion that age-related changes represent a natural state reflecting a decrease in bone marrow. The hematological features identified in our research work are of scientific interest related to breed and age, but have limited diagnostic significance.

Conclusion. Blood studies of horses of the Kazakh breed of the type Zhabe have been conducted, considering the use of herd content, health status, age, gender, allowing to clarify many clinical standards and establish that the variability of some hematological indicators is normal. Clearly differentiable morphometric and morphological signs of erythrocytes, leukocytes (lymphocytes and monocytes) and platelets were noted. Under the influence of the peculiarities of the habitat, an ecological and geographical type of the Kazakh horse the type Zhabe was formed in the mountainous regions of the republic, having pronounced morpho-hematological characteristics that provide an optimal level of regulation of vital activity

and stability of the organism. The hematological indicators indicated here can assist in monitoring the health status of horses with herd maintenance through the use of diagnostics in veterinary medicine.

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