

## Hematological Blood Indexes of Various Age Sport Horses at Use of Pro-Biotic Medicine Vetom 3.22

<sup>1</sup>Grigoriy A. Nozdin, <sup>1</sup>Ekaterina A. Didenko, <sup>2</sup>Aleksandr I. Lelyak,

<sup>2</sup>Anastasiya A. Lelyak and <sup>2</sup>Zlata V. Andreeva

<sup>1</sup>Novosibirsk State Agrarian University, Novosibirsk,  
St. Dobrolyubov 160, Novosibirsky Oblast, Russia

<sup>2</sup>Research and production company "Research Center", Koltsovo,  
Novosibirsky Region, RU-630559, Russian Federation

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**Abstract:** Urgent problems in a training of sports horses are increase in their serviceability and resistance to loadings and also acceleration of process of restitution after exercise stresses. For optimization of physiological processes in an organism of horses in particular for stabler transferring of loadings both during the training and during the competitions we conducted a research of pro-biotic medicine twisted 3.22. For realization of the purpose of researches test and control groups of horses of a different age were created by the principle of analogs. To horses medicine was applied according to the scheme developed by us. To the adult horses at the age of 6 and 12 years participating in competitions, medicine was applied prior to the competitions and after their completion. Blood at horses was investigated twice before application and after phase-out of medicine during the periods stated above. As a result of researches it is established that at horses of test groups of all age in blood the quantity of erythrocytes and a hemoglobin content within physiological norm increases. During competitions all experimental horses had an increase the maintenance of erythrocytes and a hemoglobin in blood that is normal physiological response on extreme exercise stresses. However, more expressed their increase was recorded in test groups that allowed to use as much as possible a reserve of muscle work and to provide more intensive metabolism. Vetom 3.22 in the studied dose and the approved schemes had no negative effect on an organism.

**Key words:** Probiotic, turn 3.22, sports horses, training, erythrocytes, hemoglobin, leukocytes, hematocrit, competitions, adaptation

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### INTRODUCTION

For increase in serviceability, preservation of sports qualities and decrease of the period of restitution after sports loadings it is necessary to promote as much as possible adaptation of a horse to conditions of training process, adequately and in due time to correct her physiological state. In order to avoid physical and physiological overworks at a training it is necessary to minimize a psychological and physiological stress and thereby to provide to an animal of a condition for the fullest disclosure of the genetic potential and pedigree opportunities during the performances. It is not less important to create optimum conditions for function restitution locomotorium and a normalization of physiological processes in an organism of a horse after participation in competitions.

Many Russian and foreign scientists in the researches touch upon a subject of development of optimum system of a training taking into account individual adaptation and other opportunities of a horse. Works of the All-Russian Research Institute of horse breeding of Russia on a factory training of young horses are presented to an attention of "horse" audience. Bases of a factory training are described in Dorofeyev research.

Agafonova worked on ways of assessment of the functional condition of a sports pair the rider horse. For the first time the Russian scientist touched a subject of the functional condition of two organisms at the cell-like level working in couple.

A number of works of the Russian and foreign scientists is devoted to application of pharmacological means not of doping character for disclosure of the

complete genetic and physiological potential both young horses during the training and adult horses during preparation and participation at competitions (Nozdrin, 1997; Bashkirova, 2005). Scientific bases of application of probiotics of the Vetom series for farm animals were developed Nozdrin (1997, 2003, 2009, 2010; 2012), Ivanova (2005), Shevchenko (2010), etc. Collective of scientific NGAU works on given the scientific direction, since 1994. Positive takes on use of medicines of this series for different types of farm animals including for cows, calf, pigs, pigs, an agricultural bird, bees and fishes are during this time received. Use of medicines of a series by Vet for horses was not exposed to detailed studying earlier. Nozdrin showed that a series probiotics twisted exerts positive impact on digestive tract microbiocenoses, intensify exchange processes and biosynthesis of protein in an organism, normalize oxidation-reduction processes, a metabolism, increase amount of vitamins, stimulate cell-like and humoral factors of immunity on the example of use of medicine for calves (1996). In view of features of a structure of bodies of the alimentary system of horses and also high probability of developing of pathologies in this system of bodies of this species of animals and lack of works on application of probiotics on the basis of bacilli in sports horse breeding was decided to conduct researches on a medicine influence izucheyiya twisted 3.22 on the basis of *Bac. amyloliquifaciens*, on horses of various age.

The research purpose to establish influence Vetom 3.22 on a morphological picture of blood of sports horses of a different age before use of medicine and competitions and after completion of use of medicine and competitions. For realization of the purpose of researches the following tasks were set:

- To study influence Vetom 3.22 on morphological composition of horse blood at the age of 2nd and 3rd
- To study influence Vetom 3.22 on morphological composition of horse blood at the age of 6 and 12 years, prior to competitions and after their completion
- To find out regularities in operation of medicine on horses of various age

## MATERIALS AND METHODS

Research and production experiment was made on the basis of GAU sales tax "a center of sports training on equestrian sport" of Novosibirsk. Laboratory researches in the accredited LLC NPF Research Center laboratory, the item Koltsovo, sales Tax.

In 2013 on clinically healthy horses of a different age 3 series of experiments were made. In the 1st series of tests, from horses of 2011 of year of birth, test and control groups, on 4 animals in everyone were created. In the 2nd series of tests studied effect of medicine on the horses of 2006 of year of birth taking the fissile part in competitions in jumping, triathlon and a dressage. Test and control groups on 3 animals in everyone were created. In the 3rd series of tests 2002 year of birth which is also sharing in competitions were created test and control groups on 3 animals from animals in everyone. An animal of all test groups prior to competitions twisted 3.22 appointed in a dose 1 mkl kg<sup>-1</sup> masses, 1 time a day, the first 5 days daily and then at an interval of days, only 15 appointments. After the competitions medicine was applied 1 time a day, cycles on the 3rd days in a row at an interval of 3 days, all -3 cycles, 9 appointments (Table 1).

In 2014 also Control of group of animals analogs, 2011 b.y., on 4 horses in everyone was created 2 test. To

Table 1: Test scheme, 2013

Parameters	Age/groups					
	2011		2006		2002	
	Test	Control	Test	Control	Test	Control
<b>Prior to competitions</b>						
Vetom 3.22	Yes	No	Yes	No	Yes	No
The scheme, 1 time a day, the first 5 days daily, then at an interval of 3 days	15 appointments	0	15 appointments	0	15 appointments	0
Dose of the active material, ¼-½ /kg	1	0	1	0	1	0
	Age/groups 2006		2002			
	Test	Control	Test	Control		
<b>After competitions</b>						
Vetom 3.22	Yes	No	Yes	No		
The scheme, cycles for 3 days (3 cycles)	9 appointments	0	9 appointments	0		
Cycle	1 time a day,	-	1 time a day.	-		
Dose of the active material, ¼-½ /kg	1	0	1	0		

Table 2: Test scheme, 2014

Parameters	Groups		
	1-я Test	2-я Test	Control
Use of medicine before experience	Yes (1 year prior)	No	No
Medicine	Vetom 3.22	Vetom 3.22	Unused
Duration of application (days)	12	12	0
Cycle	1 time a day	1 time a day	-
Dose of the active material, ¼-½/kg	1	1	0

horses at the age of 3 years medicine raced 12 days in a row. All animals were at a stage of the training training. The 1st test group included the horses accepting the medicine Vetom 3.22 in 2013. An animal of the 2nd test group medicine was appointed for the first time. To horses to control group medicine not raced (Table 2). Medicine to horses raced in a dose 1 ¼-½ kg, 1 time a day, beforehand having adsorbed on standard a piece of sugar-rabbinate (Table 2).

At horses 2011, 2006 and 2002 b.y. investigated blood before use of medicine and after completion of use of medicine. At horses of 2006 and 2002 b.y. also investigated blood to and After competitions and also after completion of use of medicine. At a blood analysis defined: quantity of erythrocytes and leukocytes (in a cytometer of Goryaev); a hemoglobin content (according to Sallie); hematocrit (centrifugation method); erythrocytes (by Panchenkov's method). Blood analyses were conducted in the accredited LLC NPF Research Center laboratory. Statistical processing of data was carried out with use of the Microsoft Excel 2007 program. Reliability was determined by student.

## RESULTS AND DISCUSSION

In 2013 g at a blood analysis at horses of test and control groups at the age of 2 years before use of medicine did not note reliable distinctions but the quantity of erythrocytes was below physiological norm (Table 3). After completion of use of medicine for horses of test group concentration of erythrocytes in blood was within physiological norm, but above, than at analogs from control group for 19.03% ( $p<0.05$ ), from control group the maintenance of erythrocytes in blood continued to remain With horses below physiological norm (Table 3, Fig. 1).

In 2014 before use of medicine quantity of erythrocytes in horse blood, a 3-year age, test and control groups had no reliable distinctions (Table 3). After completion of introduction of medicine in blood horses of the 1-2nd of test groups had a quantity of erythrocytes within physiological norm and 28.26 above ( $p<0.01$ ) and 26,45% ( $p<0.001$ ), respectively, than at analogs from monitoring (Table 3) is reliable.

Table 3: The maintenance of erythrocytes in horse blood, 2011, 1012/1

Year researches/group	Before use of medicine (M±m)	After completion of medicine use (M±m)
Physiological norm	7.00-10.00	
<b>2013</b>		
Test	7.10±0.20	8.13±0.21*
Control	6.90±0.34	6.83±0.31
<b>2014</b>		
1 Test	7.40±0.27	8.85±0.37**
2 Test	6.73±0.19	8.72±0.20***
Control	6.95±0.25	6.90±0.21

\* $p<0.05$ ; \*\* $p<0.01$ ; \*\*\* $p<0.001$

Table 4: The maintenance of leukocytes in horse blood of 2011, 109/1

Year researches/group	Before use of medicine (M±m)	After completion of medicine use (M±m)
Physiological norm	5.50-12.00	
<b>2013</b>		
Test	7.93±0.10	8.03±0.14
Control	7.78±0.28	7.80±0.31
<b>2014</b>		
1 Test	9.33±0.54	9.33±0.81
2 Test	9.98±0.96	9.78±0.85
Control	9.35±0.83	9.28±0.70

Thus, the maintenance of erythrocytes in horse blood of test groups of the 2nd and 3-year age changed with similar regularity. However more expressed effect was recorded at horses at the age of 3 years, especially at animals to whom in 2013 g medicine more narrow appointed (Fig. 1).

Experimental animals of the 2nd and 3-year age in 2013 and 2014 in blood had a maintenance of leukocytes within physiological norm. For the test period by us it is not established reliable influence of medicine on concentration of leukocytes in horse blood (Table 4, Fig. 2).

Before use of medicine in 2013 and 2014 the hematocrit at horses of test and control groups had no reliable distinctions (Table 5). After completion of use of medicine the hematocrit of horse blood of test group exceeded analogs from monitoring in 2013 for 7.31%, in 2014 at horses of the 1st and 2nd test group for 8.09 and 3.46%, respectively (Fig. 3).

When carrying out researches in 2013 and 2014 on horses of 2011 b.y. us it is established that before use of medicine in blood experimental horses had a hemoglobin content below physiological norm and had no reliable differences at animals of test and control groups. In 2013 g, after completion of application of Vetom 3.22, the

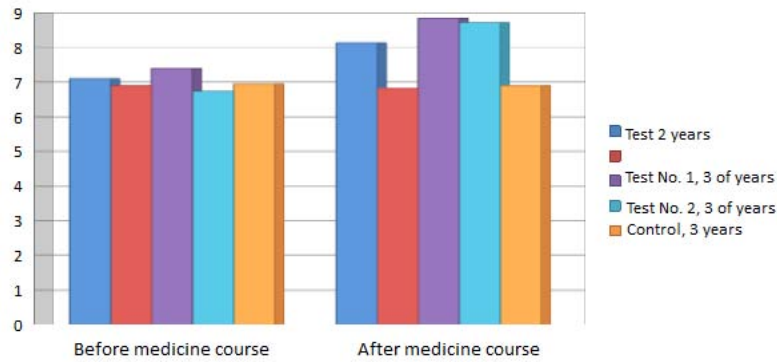


Fig. 1: The maintenance of erythrocytes in horse blood of 2011, 1012/1

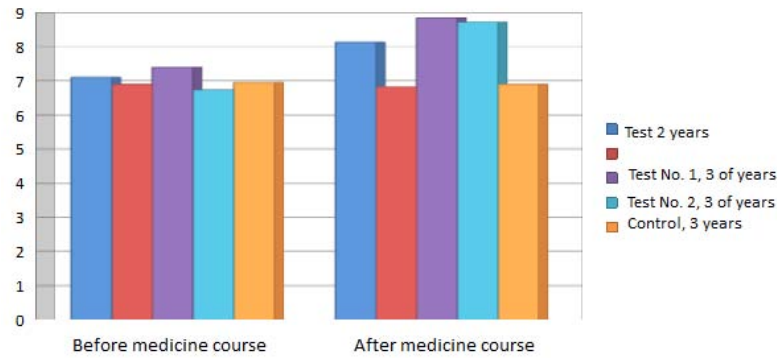


Fig. 2: The maintenance of leukocytes in horse blood of 2011, 109/1

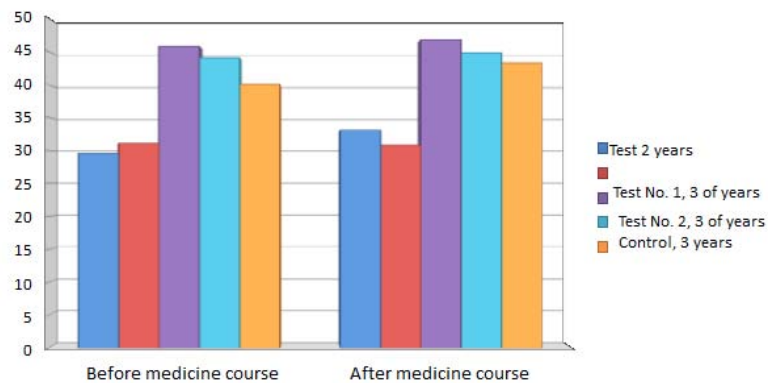


Fig. 3: Hematocrit of horse blood of 2011, %

Table 5: Hematocrit of horse blood of 2011, %

Year researches/group	Before use of medicine	After completion of medicine use
Physiological norm	-----35.00-50.00-----	
<b>2013</b>		
Test	29.50±0.96	33.00±1.47
Control	31.00±0.82	30.75±1.11
<b>2014</b>		
1 Test	42.75±2.32	46.75±2.39
2 Test	44.00±3.16	44.75±1.70
Control	40.00±3.24	43.25±2.21

hemoglobin content in horse blood of test group of rather initial data increased by 36.70% and was above analogs from monitoring for 35% ( $p < 0.01$ ). At control group the hemoglobin content went down for 0.31% and remained below physiological norm (Table 6, Fig. 4). In 2014 g at horses of a 3 year age under the influence of the studied medicine also recorded change of a hemoglobin content in horse blood (Table 6).

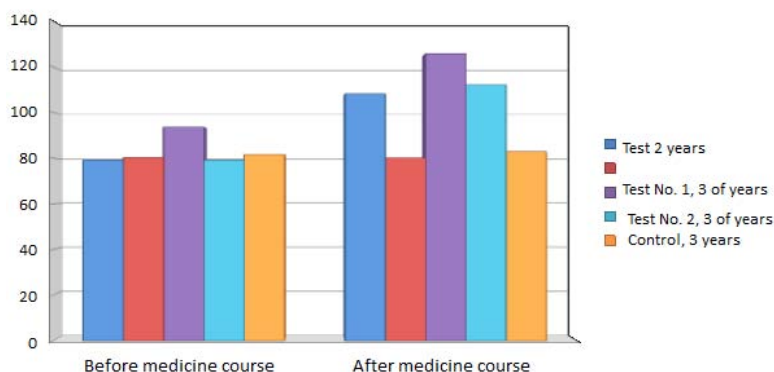


Fig. 4: A hemoglobin content in horse blood of 2011, a g L<sup>-1</sup>

The hemoglobin content in blood 1-2nd of test groups was within physiological norm but above analogs from control group for 51.90% ( $p < 0.001$ ) and 35.30% ( $p < 0.001$ ) according to (Table 6, Fig. 4). Therefore, at horses of the 2nd and 3-year age at use of medicine the hemoglobin content in blood changes with identical regularity. However at horses of a 3 year age the hemoglobin content in blood changed more at animals of the 1st test group to whom Vetom 3.22 applied at 2 year age.

When studying influence of medicine on erythrocytes S.R. of blood it is not established reliable distinctions for test animals and control groups (Table 7). In the 2nd and 3rd series of tests studied influence of Vetom 3.22 on morphological composition of blood of sports horses of 2006 and 2002 b.y., taking fissile part in competitions in a dressage, jumping and triathlon.

By us it is established that at horses of test and control groups 2006 and 2002 the birth of Prior to use of medicine the maintenance of erythrocytes in blood had no reliable distinctions. The quantity of erythrocytes in horse blood of 2006 b.y. of test and control group increased rather initial data: after completion of use of medicine prior to competitions for 5.36 and 3.84%; after competitions for 32.46 and 15.24%, respectively (Table 8). Test animals on the maintenance of erythrocytes in blood exceeded After competitions analogs from monitoring for 3.42%.

After completion of application of Vetom 3.22 After competitions on the maintenance of erythrocytes in blood of a horse of test group exceeded analogs from control group for 11.6% but within physiological norm (Table 8, rice 5).

During this period, data After competitions is relative, at horses of test and control group the maintenance of erythrocytes went down for 5.81 and 12.58%, according to (Table 8, rice 5).

For horses of 2002 similar changes of maintenance of erythrocytes in blood (Table 8, Fig. 5) were observed. The

Table 6: Hemoglobin content in horse blood of 2011, a g L<sup>-1</sup>

Year researches/group	Prior to use of medicine (M±m)	After completion of medicine use (M±m)
Physiological norm	-----115.00-170.00-----	
<b>2013</b>		
Test	79.00±2.86	108.00±5.82
Control	80.25±0.63	80.00±1.73
<b>2014</b>		
1 test	93.50±3.30	125.75±2.50
2 test	79.00±2.65	112.00±2.27
Control	81.50±1.76	82.75±3.20

Table 7: Blood sedimentation rate of horses of 2011, g L<sup>-1</sup>

Year researches/group	Prior to use of medicine (M±m)	After completion of medicine use (M±m)
Physiological norm	-----22.00-57.00-----	
<b>2013</b>		
Test	62.00±1.96	61.50±0.29
Control	61.75±2.78	62.50±3.23
<b>2014</b>		
1 Test	56.25±4.37	56.25±1.25
2 Test	54.00±4.78	48.50±3.01
Control	46.50±4.05	54.25±4.82

quantity of erythrocytes in horse blood 2002 b.y. of test and control groups increased rather initial data: after completion of use of medicine prior to competitions for 14.3 and 6.2%; after competitions for 31.9 and 18.8% respectively (Table 8). At completion of use of medicine prior to competitions animals of test group exceeded analogs from monitoring for 12.27%. Quantity of erythrocytes in blood test animals had After competitions above analogs from control group for 15.85%. After completion of application of Vetom 3.22 After competitions on the maintenance of erythrocytes in blood of a horse of test group exceeded analogs from control group for 25.17% (Table 8). During this period concerning data After competitions at horses of test and control group the maintenance of erythrocytes went down for 4.22 and 11.35%, according to (Table 8, rice 5).

As Prior to use of medicine and after completion of its appointment prior to competitions of a horse of test and control groups 2006 by had no reliable distinctions on the

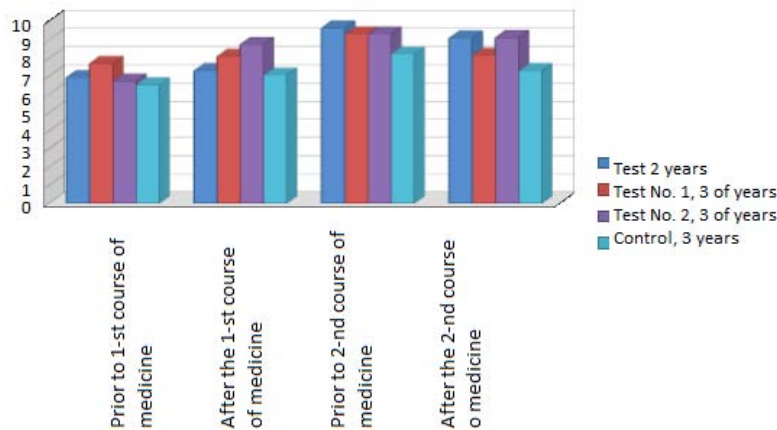


Fig. 5: The maintenance of erythrocytes in horse blood of 2006 and 2002, 1012/l

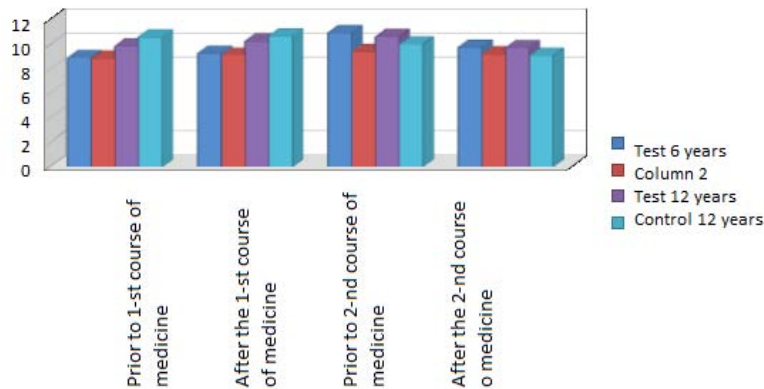


Fig. 6: The maintenance of leukocytes in horse blood of 2006 and 2002, 10<sup>9</sup>/l

Table 8: The maintenance of erythrocytes in horse blood of 2006 and 2002, 1012/l

Groups	Prior to use of medicine (M±m)	After completion of use of medicine (M±m)	After competitions (M±m)	After completion of use of medicine, after competitions (M±m)
Norm	7.00-10.00			
<b>2006</b>				
Test	6.90±0.35	7.27±0.48	9.63±0.59	9.07±0.62
Control	7.67±0.38	8.07±1.24	9.30±0.38	8.13±0.33
<b>2002</b>				
Test	7.20±0.62	8.23±0.23	9.50±0.09	9.10±0.31
Control	6.90±0.12	7.33±0.12	8.20±0.17	7.27±0.49

Table 9: The maintenance of leukocytes in horse blood of 2006 and 2002, 10<sup>9</sup>/l

Groups	Prior to use of medicine (M±m)	After completion of use of medicine (M±m)	After competitions (M±m)	After completion of use of medicine, after competitions (M±m)
Physiological norm	5.50-12.00			
<b>2006</b>				
Test	8.90±0.56	9.27±0.38	10.97±1.01	9.77±1.65
Control	8.87±0.32	9.13±0.80	9.43±0.47	9.23±0.95
<b>2002</b>				
Test	9.87±0.70	10.27±0.54	10.64±0.25	9.73±0.54
Control	10.63±0.47	10.70±0.90	10.03±0.47	9.10±0.87

maintenance of leukocytes in blood (Table 9). After competitions at horses of test group the maintenance of leukocytes in blood was 16.33% higher, than at analogs from control group. At completion of purpose of the medicine After competitions at animals of test group

decrease in quantity of leukocytes in blood were registered. However, at animals of test group of leukocytes in blood was more, than at analogs from control group for 5.85% but data are not reliable (Table 9, Fig. 6).

Table 10: Hematocrit of horse blood of 2006 and 2002, %

Groups	Prior to use of medicine (M±m)	After completion of use of medicine, prior to competitions (M±m)	After competitions (M±m)	After completion of use of medicine, after competitions (M±m)
Physiological norm	-----35.00-50.00-----			
<b>2006</b>				
Test	37.67±2.03	39.28±2.08	34.00±0.58	38.67±4.33
Control	38.00±2.08	38.66±1.86	31.00±2.08	35.00±4.04
<b>2002</b>				
Test	38.33±0.67	40.33±1.45	37.67±0.88	42.00±1.53
Control	38.13±2.00	33.89±3.51	33.00±3.51	35.33±5.21

Table 11: Dynamics a hemoglobin content in horse blood of 2006 and 2002, a g L<sup>-1</sup>

Groups	Prior to use of medicine (M±m)	After completion of use of medicine, prior to competitions (M±m)	After competitions (M±m)	After completion of use of medicine after competitions (M±m)
Physiological norm	-----115.00-170.00-----			
<b>2006</b>				
Test	97.67±3.84	119.00±2.65	129.67±3.28	117.67±1.20
Control	98.33±4.91	94.33±3.18	108.67±5.21	98.67±2.60
<b>2002</b>				
Test	89.67±0.88	109.33±3.18	119.33±3.28	110.67±2.03
Control	90.00±2.00	95.67±1.45	103.33±2.03	94.67±0.88

The maintenance of leukocytes in horse blood of test group 2002 the birth of Prior to use of medicine and after completion of its application prior to competitions had no reliable distinctions concerning analogs from control group.

In test group animal blood surpassed after competitions in the maintenance of leukocytes for 6.08% of analogs from control group was observed. After completion of use of the medicine After competitions the maintenance of leukocytes in horse blood of test group was 6.92% higher, than at analogs from control group (Table 9, Fig. 6).

The hematocrit of prior to use of medicine blood at animal test and control groups 2006 and 2002 b.y. had no reliable distinctions (Table 10). The blood hematocrit after phase-out of medicine prior to competitions increased concerning analogs from monitoring at test animals of 2006 b.y. 1.6%, at horses of 2002 b.y. for 19% (Table 10). After competitions at horses 2006 b.y. of test and control group a hematocrit of blood decreased by 15.5 and 24.7% and at horses of 2002 b.y. for 7.1 and 2.6%, respectively. After completion of use of the medicine After competitions animals of test group 2006 and 2002 b.y. analogs from monitoring for 10.5 and 18.9% in the level of a hematocrit respectively, but data are not reliable (Table 10).

Prior to use of medicine a hemoglobin content at horses of test and control groups 2006 and 2002 the birth had no reliable distinctions (Table 11). After completion of use of medicine to competitions the hemoglobin content in horse blood of test groups 2006 and 2002 by increased in comparison with monitoring by 26.2 and 14.3%, respectively. After competitions in blood animal test groups 2006 and 2002 also b.y. analogs from

monitoring for 19.3 and 15.5% in amount of hemoglobin, respectively. At completion of use of the medicine After competitions, a horse of test groups 2006 and 2002 b.y. also surpassed analogs from monitoring in a hemoglobin content for 19.3 and 16.9% according to (Table 11, Fig. 7).

Thus, on data of our researches Vetom 3.22 affects with identical regularity morphological composition of horse blood the 2-, 3-, 6- and 12 a summer age. In horse blood of test groups of all age the quantity of erythrocytes and a hemoglobin content within physiological norm increases. When studying influence of medicine on content in blood of test animals of the 2nd and 3 years age of leukocytes and a hematocrit it is not established stable and reliable distinctions. Erythrocytes S.R. in blood of young horses did not change under the influence of medicine. At the horses of a 3 year age who were earlier already receiving Vetom 3.22, changes in blood, the quantitative character were more expressed in comparison with animals to whom medicine was appointed for the first time.

At adult horses of the 6th and 12 a summer age dynamics of change of maintenance of erythrocytes, a hemoglobin and hematocrit of blood of test animals at use of medicine prior to competitions is established, after competitions and at purpose of the medicine after competitions at once. At use of medicine prior to competitions at horses of a different age increase in erythrocytes, a hemoglobin and hematocrit were observed that favorably influences exchange processes in muscular tissue and contains a padding reserve for its work. During competitions all experimental horses had an increase the maintenance of erythrocytes and a hemoglobin in blood that is normal physiological response on extreme exercise

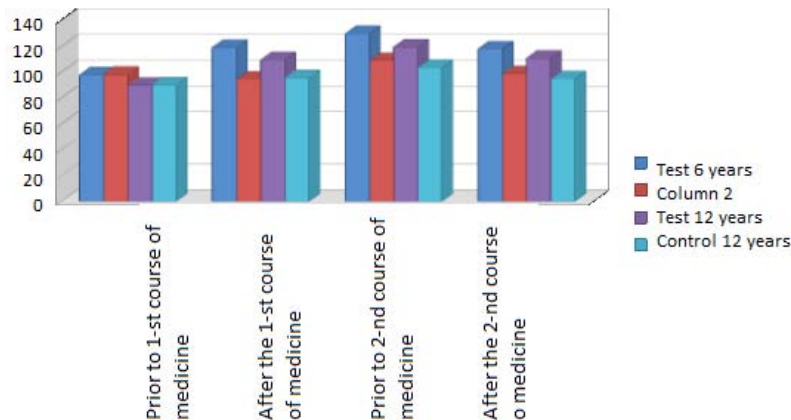


Fig. 7: A hemoglobin content in horse blood of 2006 and 2002, a g L<sup>-1</sup>

stresses. However, more expressed their increase was recorded at animal test groups that allowed to use as much as possible a reserve of muscle work and to provide more intensive metabolism. During competitions there was a decrease in a hematocrit of blood in connection with larger losses of liquid an organism, however at test animals these changes were less expressed that favorably affected water and electrolytic balance. As a result of application of Vetom 3.22 after competitions end to level dynamics of weakening of erythrocytes and a hemoglobin in blood that promoted the accelerated deduction of products of anaerobic metabolism from a musculature and more fast recovery of horses from test groups. During the researches at horses of test groups did not note the secondary, undesirable phenomena and pathologies with a symptom-complex of tormina.

Therefore, medicine can be recommended for application in sports horse breeding prior to competitions and after their completion because Vetom 3.22 is not the forbidden World Anti-Doping Agency and its application does not contradict any point of the Russian and International Anti-doping Rules.

## CONCLUSION

The physiological status of horses at application of Vetom 3.22 raises. In peripheral blood the maintenance of erythrocytes and a hemoglobin at use of medicine to and After competitions increases. Vetom 3.22 increases serviceability and resistance of an organism of horses to high exercise stresses, optimizing its functional activity during competitions and during the reduction period after the competition.

Medicine affects an organism of horses of various age with identical regularity. It is physiologic for horses and causes changes of positive character within physiological opportunities of an organism. Reaction of an organism to Vetom 3.22 is more expressed at young

animals and at its repeated appointment. Vetom 3.22 in the studied dose and the approved schemes had no negative effect on an organism.

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