

## HEMATOLOGIC CHANGES IN THE BLOOD OF RABBITS WITH THE USE OF ANTI-MYXOMATOUS VACCINE AND IMMUNOMODULATOR – RIBOTAN

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*The article depicts the dynamics of blood counts in rabbits when using anti-myxomatous vaccine and immunomodulator – Ribotan. The introduction of Ribotan immunomodulator together with the anti-myxomatous vaccine of the 'B-82' strain helps stimulating the work of hemopoietic system and immunogenesis in rabbits, and is accompanied by an increase in hematological indicators with positive changes in the leukogram.*

**Key words:** *blood, rabbits, vaccine, immunomodulator – Ribotan*

**Introduction.** The morbidity of animals is always accompanied by a decrease in indexes of immunity, and in turn, the emergence of disorders in the immune system is one of the pathogenetic mechanisms of any pathological process. Therefore, its correction with drugs of immunomodulatory action is currently relevant. [1, 2].

**Research materials and methods.** Studies were performed on 20 rabbits. For vaccination, a virus vaccine from B-82 strain was used against myxomatosis, manufactured at the Sumy Biofactory. The rabbits were divided into three groups. Rabbits of the first control group were administered nothing, animals of the second control group were injected intramuscularly (the femur area) at the age of 1.5 months. Three months later, they were revaccinated according to the guidelines. Rabbits of the studied group, at the same age, in parallel with the vaccine was administered the immunomodulator - Ribotan. Blood samples from rabbits on the 6<sup>th</sup> and 9<sup>th</sup> day after vaccinations, revaccinations and in 3 and 6 months after them were taken, and the amount of hemoglobin, erythrocytes, leukocytes was determined with defining the leukogram according to the conventional methods. Statistical data processing was performed by Strelkov R.B. method [3].

**Study results.** Dynamics of the hemoglobin, erythrocytes and leukocytes in amount the blood of rabbits are shown in the table 1.

From the data in Table 1: on day 6 the amount of hemoglobin and red blood cells in vaccinated rabbits, compared with unvaccinated, increased by 1.6–8.2 % ( $P \leq 0,10$ ). At the same time, the number of leukocytes increases significantly by 32.8 % ( $P < 0,002$ ).

Table 1

**The amount of hemoglobin, erythrocytes and leukocytes in rabbits vaccinated and revaccinated against myxomatosis with Ribotan, M±m**

Terms for studying rabbits		hemoglobin (g/L)	erythrocytes (t/L)	leukocytes (g/L)
Prior vaccination		96,4±1,73	4,5±0,22	4,2±0,17
6-th day	Vaccination	98,0±0,86	4,9±0,32	6,3±0,58***
	V + R	100,2±1,24	6,4±0,10	6,5±0,12
9-th day	Vaccination	102,6±4,11	5,5±0,33***	5,9±0,56***
	V + R	107,8±1,08	8,7±0,06	9,9±0,22
6-th day	Revaccination	104,2±2,59*	5,9±0,21****	8,3±1,09***
	Rev. + R	109,5±2,14	7,77±0,23	9,6±0,44
9-th day	Revaccination	104,2±2,39*	5,3±0,12****	7,2±0,49****
	Rev. + R	112,6±1,75***	9,7±0,12****	10,4±0,17***
3 months	Revaccination	106,0±1,51	6,1±0,12	10,3±0,61
	Rev. + R	111,8±2,77	6,3±0,13	7,7±0,36
6 months	Revaccination	98,0±1,08	4,9±0,5	9,6±0,73
	Rev. + R	108,2±1,7	6,59±0,11	6,44±0,29

Note. P value compared to non-vaccinated ones: 1.\*P<0,02; 2.\*\*P<0,01; 3.\*\*\*P<0,002; 4.\*\*\*\*P<0,001

On the 6<sup>th</sup> day after comprehensive vaccination with Ribotan, compared to rabbits immunized with a pure vaccine, only the content of erythrocytes positively increased by 23.4 % (P<0.001).

On the 9<sup>th</sup> day after vaccination there is an unreliable increase in the amount of hemoglobin in rabbits. The number of erythrocytes positively increased by 18.2 % (P<0.002) and leukocytes – by 28.3 % (P<0.002).

On the 9<sup>th</sup> day after the introduction of Ribotan, the number of erythrocytes increased by 36.7 % (P<0.001), leukocytes by 40.4 % (P<0.001)

After revaccination on day 6, the following indicators is significantly increased in rabbits: hemoglobin amount by 7.5% (P<0.02), erythrocyte count – by 23.7 % (P<0.001), leukocyte count – by 49.4% (P<0.002).

On the 6<sup>th</sup> day after Ribotan vaccination, a significant increase in erythrocyte count by 23.3 % (P<0.001) was also observed, other indicators did not change significantly during this period.

On the 9<sup>th</sup> day after revaccination, an increase of hemoglobin by 7.3 % (P<0.01), the number of erythrocytes – by 15.1 % (P<0.001) and the number of leukocytes – by 41 % (P<0.001) was observed in rabbits.

On the 9<sup>th</sup> day after the introduction of Ribotan, compared with revaccinated rabbits, there is a significant increase in hemoglobin content by 7.6 % (P<0.01), the number of erythrocytes by 45.3 % (P<0.001), leukocytes by 30,7 % (P<0,001).

Three months after revaccination, a significant increase of the amount of hemoglobin by 9.1 % (P<0.001), the number of erythrocytes – by 26.2 % (P<0.001), the number of leukocytes – by 56.3 % (P<0.001) is positively observed in rabbits.

Three months after Ribotan vaccination, hemoglobin content increased by 5.2 % (P<0.05), erythrocyte count increased by 3.2 % (P<0.05), and leukocyte count

decreased by 25.2 % (P< 0,002).

Six months after vaccination, leukocyte counts increased significantly by 52 % (P<0.001), compared with rabbits prior to vaccination.

Six months after Ribotan-based vaccination with respect to rabbits in the same period, hemoglobin content increased positively by 9.4 % (P<0.001), erythrocyte count by 25.7 % (P<0.002), and leukocyte count decreased by 33,3 % (P<0,001). Indicators of leucogram are given in the table 2.

Table 2

**Blood leucogram of rabbits vaccinated and revaccinated for myxomatosis with Ribotan, M±m**

Terms for rabbits under study		Basophiles, %	Eosinophils, %	Neutrophils		Lymphocytes, %	Monocytes, %
				P, %	S, %		
Prior vaccination		3,5±0,86	2,0±0,22	1,4±0,1	25,4±2,4	65,4±2,7	2,3±0,32
6-th day	Vaccination	3,8±0,76	1,5±0,1	1,8±0,1	19,3±2,3	71,1±3,0	2,5±0,22
	V + R	3,3±0,37	1,6±0,22	1,9±0,2 <sub>3</sub>	19,0±1,10	71,4±1,22	2,8±0,33
9-th day	Vaccination	2,0±0,32	1,4±0,1	2,0±0,2 <sub>2</sub>	19,0±1,73	73,5±2,48	2,1±0,43
	V + R	3,6±0,31	2,5±0,17	2,3±0,1 <sub>5</sub>	12,8±0,96	76,6±1,06	2,2±0,29
6-th day	Revaccination	2,5±0,32	1,8±0,32	1,6±0,2 <sub>2</sub>	23,0±1,84	68,1±2,38	3,0±0,32
	Rev. + R	2,8±0,25	2,2±0,25	1,7±0,2 <sub>1</sub>	21,5±1,45	68,7±1,49	3,1±0,28
9-th day	Revaccination	3,0±0,54	2,8±0,32	1,4±0,1	21,3±2,16	67,9±1,95	3,6±0,75
	Rev. + R	3,4±0,34	3,0±0,30	1,9±0,2 <sub>3</sub>	13,9±1,17	74,0±1,60	3,8±0,44
3 months	Revaccination	1,6±0,22	1,4±0,12	1,0±0,1 <sub>2</sub>	16,8±2,27	77,7±2,48	1,5±0,22
	Rev. + R	3,2±0,64	1,4±0,38	1,1±0,3 <sub>8</sub>	31,8±1,77	60,9±1,96	1,6±0,22
6 months	Revaccination	2,3±0,43	1,8±0,21	1,8±0,2 <sub>1</sub>	25,1±0,86	67,2±1,29	1,8±0,21
	Rev. + R	3,6±0,43	1,6±0,16	0,9±0,2	25,3±2,31	65,6±2,02	3,0±0,21

Note. P value compared to non-vaccinated ones: 1. \*P<0,05; 2. \*\*P<0,02; 3\*\*\* P<0,01; 4.\*\*\*\*P<0,002; 5.\*\*\*\*\*P<0,001.

Table 2 depicts the fact that on day 6 after vaccination the number of basophils increased in rabbits by 7.9 %, lymphocytes and monocytes – by 8 % (P<0.10). The number of eosinophils is positively reduced by 33.3 % (P<0.02), segmented neutrophils – by 31.6 % (P<0.05) and the number of band neutrophils increases by 22.2 % (P<0.001).

On day 6 of Ribotan vaccination, most leucograms indicators remained almost at their previous level.

In rabbits on the 9<sup>th</sup> day after vaccination, relative to control ones, the number of basophils and monocytes decreases by 75 % – 9.5 % (P<0.10), eosinophils by 42.8 % (P<0.05), segmented neutrophils – by 33.7 % (P<0.05). The number of



banded neutrophils significantly increased by 30 % ( $P<0.01$ ), and lymphocytes by 11 % ( $P<0.05$ ).

On the 9<sup>th</sup> day, the number of eosinophils with the use of immunomodulator significantly increased by 44 % ( $P<0.001$ ), segmented neutrophils decreased by 32.6 % ( $P<0.002$ ), and the percentage of basophils, banded neutrophils, lymphocytes and monocytes increased slightly.

On the 6<sup>th</sup> day after revaccination, the number of banded neutrophils, lymphocytes, and monocytes increased insignificantly, while other indicators in relation to control decreased.

The increase in leuko-formula, on the 6<sup>th</sup> day after the revaccination with Ribotan and except the segmented neutrophils, was observed, but very negligible.

On the 9<sup>th</sup> day after the vaccination, the number of eosinophils significantly increased by 28.6% ( $P<0.05$ ) in rabbits. Other indicators of leuko-formula were lower or remained at the control level, but lymphocytes and monocytes exceeded it.

On the 9<sup>th</sup> day after complex revaccination, the percentage of banded neutrophils significantly increased by 26.3% ( $P<0.02$ ), lymphocytes by 8.2 % ( $P<0.02$ ), and the segmented nuclei decreased by 34.7% ( $P<0.01$ ). The percentage of basophils, eosinophils, monocytes at this time increased by 11.7%, 6.6%, 5.2% respectively ( $P<0,10$ ).

Three months after the rabbit vaccination, the lymphocyte count continued to increase by 15.9 % ( $P<0.002$ ). At the same time, the number of basophils decreases by 34.6 % ( $P<0.05$ ), eosinophils – by 42.8 ( $P<0.05$ ), banded neutrophils – by 40 % ( $P<0.02$ ), segmented neutrophils – by 51.2% ( $P<0.02$ ), and monocytes – by 53.3 % ( $P<0.02$ ).

Changes in leucograms were also observed three months after the Ribotan vaccination. Significantly increased: the number of basophils by 50 % ( $P<0.02$ ), segmented neutrophils by 47.1 % ( $P<0.001$ ), and lymphocytes – decreased by 21.9 % ( $P<0.001$ ).

Six months after the revaccination, the leukogram indicators, with the exception of banded neutrophils, returns to control level or remains slightly higher.

During the same period, after using the Ribotan vaccine, all leucograms, except for basophils, banded neutrophils and monocytes remained at the same level.

### **Conclusions.**

1. The content of leukocytes on the 9<sup>th</sup> day after vaccination in animals of the experimental group significantly increases in the blood of rabbits by 40,4 % ( $P<0,001$ ), in animals of the 2<sup>nd</sup> control group - by 22 % ( $P<0,001$ ). On the 9<sup>th</sup> day after revaccination, the maximum increase in leukocyte content in the serum of rabbits of the experimental group was found to be 30.7 % ( $P<0.001$ ) due to basophils, eosinophils, lymphocytes and a decrease in rabbits of the 2<sup>nd</sup> control group by 8.3 %, respectively. After 3 months, in the blood of rabbits of the experimental group, the number of basophils significantly increased by 50 % ( $P<0.05$ ), segmented neutrophils by 47.1 % ( $P<0.001$ ), lymphocytes - decreased by 21.9 % ( $P<0.001$ ).

2. Introduction of the immunomodulator "Ribotan" simultaneously with the vaccine against myxomatosis from "B-82" strain promotes stimulation of the

hemopoietic system and immunogenesis in rabbits and is accompanied by increase in hematological parameters with positive changes in the leucogram.

### **References.**

1. V. A. Pogodayev, B. A. Aysanova. The use of complex immunomodulator in livestock farming // Zootechnia, 2008. #2. p.16.
2. S. B. Yarantseva. General condition and indicators of natural resistance // Agricultural Biology, 2008. #6. P. 91–95.
3. R. B. Strelkov. Method for calculating standard error and confident intervals of average confident values using the table. Sukhumi, 1966. P. 2–10.

#### ***Гематологические изменения крови у кроликов при применении провомиксоматозной вакцины и иммуномодулятора – риботан***

***Попова И. М.***

*В статье приведена динамика показателей крови у кроликов при применении противомиксоматозной вакцины и иммуномодулятора – риботан. Установлено, что введение иммуномодулятора «Риботан» одновременно с вакциной против миксоматоза из штамма «В-82» способствует стимуляции работы органов кроветворения и иммуногенеза у кроликов и сопровождается повышением гематологических показателей с положительными изменениями в лейкограмме.*

***Ключевые слова:*** кровь, кролики, вакцина, иммуномодулятор – риботан

#### ***Гематологічні зміни крові у кролів за застосування протиміксоматозної вакцини і імуномодулятора – риботан***

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*У статті наведена динаміка показників крові у кролів за застосування протиміксоматозної вакцини і імуномодулятора – риботан. Встановлено, що введення імуномодулятору «Риботан» одночасно з вакциною проти миксоматозу із штамму «В-82» сприяє стимуляції роботи органів кроветворення та імуногенезу у кролів й супроводжується підвищенням гематологічних показників з позитивними змінами в лейкограмі.*

***Ключові слова:*** кров, кролі, вакцина, імуномодулятор – риботан