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HEMATOLOGICAL PARAMETERS AND LAYING ABILITY OF JAPANESE QUAILS UNDER THE INFLUENCE OF AMINO ACIDS COMPLEX AND VITAMIN E

У статті відображені результати щодо застосування та впливу комплексу амінокислот та вітаміну Е на гематологічні показники і несучість перепілок. Неповноцінний рівень забезпеченості амінокислотами та вітаміном Е організму птиці призводить до порушень процесів кровотворення, обміну речовин, сповільнення росту птиці та зниження яєчної продуктивності. Встановлено, що додавання комплексу амінокислот та вітаміну Е до основного раціону перепілок справляє позитивний вплив на окремі гематологічні показники. Також доведено, що додавання лізину, метіоніну, треоніну та вітаміну Е до основного раціону сприяє підвищенню яєчної продуктивності птиці.

Ключові слова: перепілка, амінокислоти, лізин, треонін, гематологія, вітамін Е, обмін речовин.

Statement of the problem. Currently, development of non-traditional for our country industry, namely quail breeding, is one of the ways for population supply with quality food and poultry breeding economic efficiency increase [1, 2]. This is facilitated by biological features of quails, including the main – speed growth, high egg productivity, good gustatory, dietary and medical qualities of eggs and poultry meat [3, 4]. It is known that poultry productivity depends largely on the amount of protein and essential amino acids in diet. Therefore, the reduction of amino acids content such as lysine, methionine and threonine in quail feed will decrease performance and slow down the growth of young poultry [5, 6]. Lack of vitamins, including vitamin E in the poultry diet also leads to a decrease in egg production.

Analysis of recent research and publications. Amino acids occupy an important place in quail feeding because each of essential amino acids performs and affects a number of important functions in the poultry body [7]. It is known that quail feed often lacks such essential amino acids, as lysine, methionine and threonine [8].

In particular lysine affects nervous system, the hemoglobin synthesis of blood, tissue metabolism of potassium, participates in the transport of substances through the cell membrane [9]. Methionine – essential amino acid, actively participates in the proteins synthesis, in the synthesis of vitamins, hormones and enzymes. It prevents excessive oxidation of proteins, liver fat degeneration and is associated with hematopoietic activity of the organism [10, 11]. Threonine together with methionine is involved in the metabolism of lipids, that have a positive effect on liver functioning. Threonine also positively affects the poultry immune system [12, 13].

Vitamin E has an important role in the regulation of metabolic processes in the poultry organism and redox reactions, because it is an important natural antioxidant. Since the poultry use of vitamins affects its health and performance, its supply with various vitamins, including vitamin E, allows to keep high performance and reproductive qualities during the whole productive time [14, 15].

The research goal was to study the influence of various amino acids doses – lysine, methionine, threonine with vitamin E on quail hematologic parameters and productivity.

Research methods and materials. The experiment was conducted in the vivarium conditions at the Bila Tserkva national agrarian university on the Japanese quails. By the analog method there were selected 100 quails aged 45 days, from which we formed 4 groups with 25 heads in each. The first group was the control one, and the 2-nd, the 3-rd, the 4-th – were experiment ones. The poultry of the first control group received main diet, balanced with feeding norms, during the experiment, and the quails of the experiment groups had additional lysine, methionine, threonine and vitamin E in their diet in different doses. The experiment scheme is given in table 1.

Table 1 – Experiment scheme

	Group 1 Control	Group 2 experimental	Group 3 experimental	Group 4 experimental
DL- methionine	MD	MD+0,3%	MD+0,1%	MD+0,5%
L- lysine	MD	MD+0,45%	MD+0,2%	MD+0,5%
L- threonine	MD	MD+0,4%	MD+0,24%	MD+0,5%
Vitamin E	MD	25 mg/kg	25 mg/kg	50 mg/kg

Note: MD – main diet

Japanese quails blood was the material for research. Haematological study was conducted at the research laboratory of the Normal and Pathological Animal Physiology Department in the Bila Tserkva national agrarian university.

Blood sampling and laboratory experiments were conducted according to common practice and methods [16, 17].

Laying ability was studied by calculation of layed eggs in groups during experiment.

Research results and discussion. Blood system changes are impartial evidences, characterizing state of animal organism.

While analyzing blood morphological data, it is necessary to note, that erythrocytes, leukocytes and platelets number data in the control and experimental groups before feeding quails with lysine, methionine, threonine and vitamin E were almost identical. Yet during the experiment the erythrocytes number in the quails blood have changed. Thus, it was noted, that after 15 days of application of amino acids complex and vitamin E, their number had an increase tendency, yet not significant. It is established, that by the 75-th and 90-th day of experiment the quails erythrocytes number of group 2 reliably increased by 9,87% ($p < 0,05$) and by 11,3% ($p < 0,05$) correspondingly, comparing to the control group.

The results of erythrocytes number identification, overall number of leukocytes and platelets are given in table 2.

Table 2 – Morphologic blood indicators of quails ($M \pm m$, $n=4$)

Indicators	Group			
	Group 1 Control	Group 2 experimental	Group 3 experimental	Group 4 experimental
45-th day				
Erythrocytes, T/l	3,06 \pm 0,07	2,98 \pm 0,04	3,02 \pm 0,05	3,11 \pm 0,03
Leukocytes, G/l	16,3 \pm 0,11	16,42 \pm 0,09	15,98 \pm 0,21	15,16 \pm 0,18
Platelets, G/l	79,2 \pm 4,4	81,3 \pm 3,8	77,6 \pm 3,3	80,5 \pm 4,9
60-th day				
Erythrocytes, T/l	3,13 \pm 0,04	3,08 \pm 0,02	3,10 \pm 0,05	3,16 \pm 0,06
Leukocytes, G/l	16,61 \pm 0,12	16,73 \pm 0,14	16,24 \pm 0,08	15,37 \pm 0,11
Platelets, G/l	82,3 \pm 5,2	80,08 \pm 4,1	78,3 \pm 3,9	81,3 \pm 5,1
75-th day				
Erythrocytes, T/l	3,04 \pm 0,13	3,34 \pm 0,06*	3,06 \pm 0,09	3,1 \pm 0,11
Leukocytes, G/l	16,43 \pm 0,09	16,81 \pm 0,16	16,17 \pm 0,18	15,42 \pm 0,23
Platelets, G/l	84,5 \pm 6,2	82,6 \pm 5,8	80,1 \pm 5,4	83,2 \pm 7,2
90-th day				
Erythrocytes, T/l	3,1 \pm 0,11	3,45 \pm 0,13*	3,2 \pm 0,09	3,3 \pm 0,12
Leukocytes, G/l	17,04 \pm 0,19	16,79 \pm 0,09	16,33 \pm 0,22	15,51 \pm 0,17
Platelets, G/l	84,9 \pm 6,1	83,2 \pm 5,3	82,8 \pm 6,8	84,9 \pm 5,9

Note: * $p < 0,05$ – comparing to the control group.

While characterizing the overall leukocytes and platelets number in the quails blood, one can note that when feeding with lysine, methionine, threonine and vitamin E, it did not influence these indicators essentially.

For the period of experiment we established that with age, the experimental quails of all groups their laying ability increases, yet with adding to main diet the amino acids complex and vitamin E in different doses, their laying ability changed differently.

On the results of our experiment it was established that the biggest laying ability was in poultry of the 2-nd experimental group. The productivity of this poultry group was greater in comparison with the control poultry group by 13,4 % ($p < 0,001$).

The research results of quails laying ability are given in table 3.

Table 3 – Egg productivity of quails ($M \pm m$, $n=25$)

Experiment time	Group 1 control, pieces	Group 2 experimental, pieces	Group 3 experimental, pieces	Group 4 experimental, pieces
15-th day	14,8 \pm 0,29	16,8 \pm 0,56*	15,42 \pm 0,43	14,9 \pm 0,54
30-th day	14,9 \pm 0,31	16,9 \pm 0,54*	15,7 \pm 0,48*	15,0 \pm 0,49
45-th day	15,1 \pm 0,21	17,1 \pm 0,36***	16,2 \pm 0,31**	15,2 \pm 0,41
Average during the experiment time	14,9 \pm 0,33	16,9 \pm 0,54**	15,7 \pm 0,32	15,0 \pm 0,24

Note: * $p < 0,05$; ** $p < 0,01$; *** $p < 0,001$ – comparing to the control group.

There was also a tendency of laying ability increase in the 3-rd experimental group, where in comparison with control poultry group, quails egg productivity was bigger by 5,37 % ($p < 0,01$), and the changes of 4-th group quails laying ability were unessential.

Summary. 1. The conducted research testify that the adding to quails diet the amino acids complex and vitamin E, promoted increase of their egg productivity within 5,37 – 13,4%.

It was also established that addition to quails mixed fodder of the amino acids complex and vitamin E makes positive effect on morphological blood indicators, including the number of erythrocytes. The qualitative indicators of leukocytes and platelets did not change.

We think that the study of amino acids complex and vitamin E influence on the quails metabolism processes during their growing is the perspective for further research.

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Гематологические показатели крови и яйценоскость перепёлок японской породы под влиянием комплекса аминокислот и витамина Е

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В статье отображены результаты применения и действия комплекса аминокислот и витамина Е на гематологические показатели крови и яйценоскость перепёлок. Неполноценный уровень обеспеченности аминокислотами и витамином Е организма птицы приводит к нарушениям процессов кроветворения, обмена веществ, замедляется рост птицы и снижается яйчная продуктивность. Так как изменения в системе крови являются объективными показателями, которые характеризуют физиологическое состояние организма животных, нами за период эксперимента были изучены морфологические показатели крови перепёлок и установлено, что добавление комплекса аминокислот и витамина Е к основному рациону позитивно влияет на отдельные гематологические показатели крови. Также доказано, что добавление лизина, метионина, треонина и витамина Е к основному рациону способствует повышению яйчной продуктивности птицы.

Ключевые слова: перепелка, аминокислоты, лизин, треонин, гематология, витамин Е, обмен веществ.

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