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THE INFLUENCE OF THE IMMUNOFLOR COMPLEX PROBIOTIC PRODUCT ON THE EGG PRODUCTIVITY OF THE DEKALB WHITE CROSS OF LAYING CHICKEN

Abstract. The quality of the received products directly depends on the state of the microflora of the gastrointestinal tract that is reflected, in particular, on the egg productivity of laying hens. As a result, the use of biologically safe preparations, namely, probiotics, is becoming a priority in the poultry industry.

This work aims to establish the feasibility and effectiveness of the use of the complex probiotic products Immunoflor in the diet of laying chickens of the Dekalb White Cross.

Based on the comprehensive research, the feasibility of using the complex probiotic product Immunoflor in egg production technology to improve the egg-laying capacity and the quality of the obtained eggs of laying hens of the Dekalb White cross was scientifically substantiated and experimentally proven. Against the background of the use of this drug, it was found that the average daily egg-laying capacity in the 1st and 2nd experimental groups exceeded the control layers: on the 150th day - by 9.66% and 8.48%, on the 180th day - 8.8% and 5.04%, on the 210th day - 8.16% and 6.44%, on the 240th day –11.68% and 3.8%, 270th day – 7.72% and 4.84%, on the 300th day – 8.34% and 5.86%. Besides, the average daily egg mass in the 1 and 2 experimental groups was higher than in the control by 4.04 g and 3.1 g or 7.38% and 5.77%; on the 7th day of storage, the average value exceeded by 4.06 g and 3.1 g or 7.53% and 5.87%; on the 14th day - by 4.32 g and 3.16 g, or 8.18% and 6.12%, respectively. It was found that on the 7th day of storage, the mass loss in the 1st and 2nd experimental groups was 1.50% and 1.56%, which is lower than in the control (1.66%). On the 14th day of storage, the mass loss in the 1st and 2nd experimental groups was 1.95% and 2.36%, which is also lower than in the control (2.63%).

With the use of the probiotic preparation, the loss in egg mass decreases. On the 7th day of storage, the mass loss in the 1st and 2nd experimental groups was 1.50% and 1.56%, which is lower than in the control group (1.66%). On the 14th day of storage, the mass loss in the 1st and 2nd experimental groups was 1.95% and 2.36%, which is also lower than in the control (2.63%).

Key words: chickens, Dekalb White, probiotic preparation, Immunoflor, egg-laying capacity, eggs.

Introduction. In the modern realities of the agrarian industry, the poultry industry is one of the leading spheres that have a significant impact on the level of the food supply in the country.

An important driver in increasing the efficiency of poultry production and achieving the genetically determined potential of poultry productivity is the organization of rational, scientifically-based rationed feeding [1]. In this regard, over the past decades, an interest in probiotic products has increased significantly.

The data of many scholars indicate the diversity of the effects of probiotic preparations on the gastrointestinal microflora and the metabolic functions of the organism of farm animals and birds, and the

probiotic effect of various bacteria is determined by the sum of the specific activities common to these organisms [2-5].

For a long time, scientists around the world concluded that the intestinal microflora of animals and birds, living in symbiosis with a body, is one of the so-called "organs" of the body along with the heart, lungs, and liver. Diseases of intestinal microflora are just as dangerous as diseases of other organs that often leads to decreased productivity. The function of this "organ" can be easily disrupted by adverse external factors: the introduction into the diet of poor-quality feed contaminated with mycotoxins, frequent changes in diets, morbidity, decreased immunity, violation of conditions, stress factors, etc. [3,6,7].

In such a way, it can be noted that the quality of the received products directly depends on the state of the gastrointestinal microflora, which is reflected, in particular, on the egg productivity of laying chickens. As a result, the use of biologically safe preparations, namely, such as probiotics, is becoming a priority in the poultry industry.

The aim of this work is to establish the feasibility and efficiency of the use of the Immunoflor complex probiotic product in the diet of laying hens of the Dekalb White cross.

Materials and methods. To establish the effectiveness of the new complex probiotic product Immunoflor on the body of birds in the conditions of the Gornomariysky Poultry Factory SEC of the Mari El Republic, three groups of chickens (control and 2 experimental) of 50 birds of one day old each were formed by the analogue principle. The materials processing was carried out based on the laboratory of the Department of Morphology, Obstetrics and Therapy of the Chuvash State Agricultural Academy in the period from 2019 to 2020.

The birds of the control and experimental groups were in identical conditions of feeding and keeping. In the first experimental group, the main diet of chickens was given from the first to the 21st day of life following the instructions for use of Immunoflor at the rate of 15 g/t of water. In the second experimental group, as part of the main diet, the chickens were given Immunoflor at the rate of 15 g/t of feed (table 1). In the control group of chickens, this drug was not given.

Table 1 – The composition of the Immunoflor probiotic preparation

Probiotic bacteria strains	Prebiotic substances	Auxiliary components
Bacillus subtilis	Chitosan	Lactose
Bacillus licheniformis		
Bifidobacterium globosum		
Enterococcus faecium		
Saccharomyces cerevisiae		
The concentration of the active substance "Concentrate" is not less than $1x10^{10}$.		

Egg counting from the 120th day to the 300th day of laying in each group was carried out daily, according to the common method [8]. The selection and storage of eggs for studying their mass and the dynamics of its changes were carried out under the same conditions. The samples were stored in a refrigerator at + 4 °C. Determination of the egg mass in the control and experimental groups was performed using the analytical balance Shinko AJH-620 CE. During the scientific and economic experiment, the main microclimate parameters were determined with the existing veterinary methods and the use of modern measuring tools. Parameters in the premises for growing chickens were within the zoohygienic requirements.

Immunoflor is a complex probiotic preparation made only of natural components. This drug is intended to enrich and balance the diets of farm animals and poultry to increase productivity by optimizing digestion, stimulating the development of positive gastrointestinal microflora, increasing preservation, and reducing feed conversion.

The composition of the preparation includes the following components:

Bacillus subtilis and Bacillus licheniformis are important producers of proteases, amylases, amino acids, and some polysaccharides. They are also producers of polypeptide antibiotics. It is used to protect the gastrointestinal tract and prevent dysbiosis.

Bifidobacterium globosum has a pronounced antagonistic activity against putrefactive bacteria. In the life process, they synthesize vitamins B and K, also affect the hydrolysis and absorption of proteins, fats, minerals in the gastrointestinal tract.

Enterococcus faecium has a high enzymatic activity, suppress pathogenic microflora due to the synthesis of antibiotic-like substances - bactericins. Also, these microorganisms activate gut-associated immunity and ferment carbohydrates with the formation of lactic acid.

Saccharomyces cerevisiae are yeast cells that actively absorb oxygen in the life process, creating anaerobic conditions that are unfavorable for the development of Salmonella, Escherichia Coli, and other microorganisms that are also conditionally pathogenic. In addition, they have high enzymatic activity, contribute to the digestion of fiber.

Chitosan reduces cholesterol, uric acid in the blood, has antibacterial and antifungal properties, improves the absorption of calcium from food. Chitosan enhances the intestinal motility, accelerates wastes and toxins removal from the body, and helps to normalize intestinal microflora.

Lactose is a disaccharide that is a nutrient substrate for the lactic acid bacteria of the preparation and the digestive tract [9].

Results. During the experimental work, it was found that the main microclimate parameters in the premises for keeping birds corresponded to zoohygienic standards.

The average daily rations for hens during the egg-laying period from the 120th day to the 300th day provided the body's needs for energy and nutrients, mineral elements and vitamins according to the detailed feeding standards.

The application in the egg-directed poultry industry of the complex probiotic preparation Immunoflor stimulates the egg-laying capacity of the laying hens and also helps to improve the egg quality.

Table 2 – The amount of the preparation from the 1st to 21st days in the diet for 50 birds, g

Days	Groups (50 birds in each)	
	First experimental	Second experimental
1-10	0.0075	0.0075
11	0.00825	0.00825
12	0.009	0.009
13	0.00975	0.00975
14	0.0105	0.0105
15	0.01125	0.01125
16	0.012	0.012
17	0.01275	0.01275
18	0.0135	0.0135
19	0.01425	0.01425
20	0.015	0.015
21	0.01575	0.01575

By the end of the experiment, the egg-laying capacity of the experimental laying chickens had significant differences.

So, from the data of the above table (table 3), it follows that the average daily egg production capacity in the 1st and 2nd experimental groups exceeded this indicator go the control hens: on the 150th day - by 9.66% and 8.48%, on the 180th day - 8.8% and 5.04%, on the 210th day - 8.16% and 6.44%, on the 240th day –11.68% and 3.8%, on the 270th day – 7.72% and 4.84%, on the 300th day - 8.34% and 5.86%.

Table 3 – Egg-laying capacity indicators, 120th to 300th days, %

Group	Egg-laying capacity indicators					
	150 days	180 days	210 days	240 days	270 days	300 days
Control*	68.84±0.18	74.62±0.24	78.46±0.19	80.86±0.16	85.58±0.21	86.68±0.24
First experimental*	78.5±0.23	83.42±0.22	86.62±0.21	92.54±0.26	93.3±0.25	95.02±0.19
Second experimental*	77.32±0.21	79.66±0.13	84.9±0.23	84.66±0.19	90.42±0.18	92.54±0.21
*P<0.01						

Also, the studies of the egg mass were carried out during their storage for 14 days.

Table 4 shows that the average egg mass on day 1 in the first and second experimental groups exceeded the control by 4.04 g and 3.1 g or 7.38% and 5.77% on day 7 - 4.06 g and 3.1 g or 7.53% and 5.87%, on day 14 - 4.32 g and 3.16 g or 8.18% and 6.12%, respectively. The dynamics of the mass loss of laid eggs on days 7 and 14 have also been investigated. On the 7th day of storage, the mass loss in the 1st group was 1.50% and in the 2nd experimental group was 1.56% that is lower than in the control (1.66%). On the 14th day of storage, the mass losses in the 1st and 2nd experimental groups were 1.95% and 2.36%, which are also lower than in the control (2.63%).

Table 4 – Indicators of egg mass during 14 days, g

Group	The average egg mass		
	Day 1	Day 7	Day 14
Control*	50.67±0.13	49.83±0.09	48.52±0.11
First experimental*	54.71±0.16	53.89±0.07	52.84±0.09
Second experimental *	53.77±0.12	52.93±0.07	51.68±0.08
*P<0.01			

Thus, the use of the Immunoflor enhanced the egg-laying capacity and egg mass, and also reduced the egg mass loss during storage for 14 days.

Conclusions. 1. The use of the Immunoflor complex probiotic product in the diet of young chickens for 21 days at a dose of 15 g/t of water from the 1st day of life increases their productive qualities. So, the average daily egg-laying capacity rate in the 1st and 2nd experimental groups exceeded the control hens: on the 150th day - by 9.66% and 8.48%, on day 180 - 8.8% and 5.04%, on day 210 - 8.16% and 6.44%, on day 240 - 11.68% and 3.8%, on day 270 - 7.72% and 4.84%, on day 300 - 8.34% and 5.86%.

2. Against the background of the Immunoflor application, the average daily egg mass in the 1 and 2 experimental groups was higher than in the control by 4.04 g and 3.1 g or 7.38% and 5.77%; on the 7th day of storage, the average value exceeded by 4.06 g and 3.1 g or 7.53% and 5.87%; on the 14th day - by 4.32 g and 3.16 g, or 8.18% and 6.12%, respectively.

3. With the use of this probiotic product, the egg mass loss was decreased. On the 7th day of storage, the mass loss in the 1st and 2nd experimental groups was 1.50% and 1.56%, which is lower than in the control (1.66%). On the 14th day of storage, the mass loss in the 1st and 2nd experimental groups was 1.95% and 2.36%, which is also lower than in the control (2.63%).

Summary. Under the influence of the probiotic product Immunoflor, the egg-laying capacity of laying hens of the Dekalb White cross is improved, the mass of eggs increases and the mass loss of eggs by water evaporation decreases, which leads to the egg quality improvement.

It has been experimentally proved that the use of the complex probiotic product has a positive effect on the egg-laying capacity and quality of eggs in the laying chickens of the Dekalb White cross.

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КЕШЕНДІ ПРОБИОТИКАЛЫҚ «ИММУНОФЛОР» ДӘРМЕГІНІҢ ДЕКАЛБ УАЙТ КРОСС МЕКИЕН ТАУЫҒЫНЫҢ ЖҰМЫРТҚА ӨНІМДІЛІГІНЕ ӘСЕРІ

Аннотация. Жұмыс мақсаты – Декалб Уайт кросс мекиен тауық рационында кешенді пробиотикалық «Иммунофлор» дәрмегін қолданудың қажеттілігі мен тиімділігін анықтау.

Жүргізілген ғылыми-тәжірибелік жұмыстар барысында құстарды үй-жайда ұстауға лайықты микроклиматтың негізгі көрсеткіштері зоогигиеналық нормаларға сай келетіндігі анықталды. 120 тәуліктен 300 тәулікке дейінгі жұмыртқалау мерзіміне арналған тәулік рационы, ағзадағы энергия мен қоректік заттар, минералды элементтер мен дәрумендерге қажеттілігін толықтай қамтамасыз ете алды. Жұмыртқа өндіру бағытындағы құс шаруашылығында кешенді пробиотикалық «Иммунофлор» дәрмегін қолданғанда өнім шығымы мен сапасын арттыруға мүмкіндік беретіні анықталды.

1 және 2-тәжірибелік топтарда жұмыртқалаудың орташа тәуліктік көрсеткіші бақылау тобындағы мекиендерден тиісінше 150 тәулікте – 9,66% және 8,48%, 180 тәулікте – 8,8% және 5,04%, 210 тәулікте – 8,16% және 6,44%, 240 тәулікте –11,68% және 3,8%, 270 тәулікте – 7,72% бен 4,84%, 300 тәулікте – 8,34% және 5,86%-ға басым болды.

1 тәулікте бірінші және екінші тәжірибелік топтардағы жұмыртқа массасының орташа көрсеткіші бақылау тобындағыдан тиісінше 4,04-3,1 г немесе 7,38% және 5,77%, 7 тәулікте – 4,06 - 3,1 г немесе 7,53% және 5,87%, 14 тәулікте – 4,32 - 16 г немесе 8,18% және 6,12% - ға артық болды.

7 тәулік бойы сақтау барысында бақылау тобымен (1,66%) салыстырғанда 1 және 2-тәжірибелік топтардағы салмақ жоғалту 1,50% және 1,56%-ға төмен екендігі анықталды. 14 тәулік сақтау мерзіміндегі 1 және 2-тәжірибелік топтағы салмақ жоғалту 1,95% және 2,36% құрады, бұл бақылау тобына (2,63%) қарағанда біршама төмен.

Сонымен, кешенді пробиотикалық «Иммунофлор» дәрмегін қолдану, жұмытқа саны мен оның массасын арттырып, сондай-ақ 14 тәулік сақтау кезінде салмақ жоғалтуды төмендететіні анықталды.

Тауық балапандары рационында 1 тәулігінен бастап 21 тәулік бойына 15 г/т су дозасында кешенді пробиотикалық»"Иммунофлор» дәрмегін қолдану олардың өнімділік сапасын арттырады. Атап айтқанда, 1 және 2-тәжірибелік топтарда жұмыртқа өнімділігі бақылау тобымен салыстырғанда тиісінше: 150 тәулікте – 9,66 – 8,48%, 180 тәулікте – 8,8- 5,04%, 210 тәулікте – 8,16 - 6,44%, 240 тәулікте – 11,68 - 3,8%, 270 тәулікте – 7,72 - 4,84%, 300 тәулікте – 8,34% және 5,86% басым болды.

Пробиотикалық «Иммунофлор» дәрмегін қолдану нәтижесінде жұмыртқа массасының артатыны анықталды. 1 және 2-тәжірибелік топтарда тәуліктік жұмыртқалардың орташа салмағы бақылау тобымен салыстырғанда тиісінше: 4,04 г - 3,1 г немесе 7,38% және 5,77%; 7 тәулік сақталғандарында – 4,06- 3,1 г немесе 7,53 және 5,87%; 14 тәулік сақтағандарында – 4,32 - 3,16 г немесе 8,18% және 6,12% - ға басым болды.

Пробиотикалық «Иммунофлор» дәрмегін қолдану барысында жұмыртқаның салмақ жоғалту жағдайы азаяды. 7 тәулік сақтау кезіндегі 1 және 2-тәжірибелік топтарда салмақ жоғалту бақылау тобындағымен (1,66%) салыстырғанда тиісінше 1,50% және 1,56% төмен болды. 14 тәулік сақтау кезіндегі 1 және 2-тәжірибелік топтарда салмақ жоғалту тиісінше 1,95-2,36% құрап, бақылау тобынан (2,63%) аз екендігі анықталды.

Зерттеу нәтижелері көрсеткендей, кешенді пробиотикалық «Иммунофлор» дәрмектерін қолдану әсерінен Декалб Уайт кросс мекиен тауығының жұмыртқалау жағдайында жұмыртқа салмағы артып, сақтау кезіндегі ылғалдың кебу әсерінен салмақ жоғалту үдерісі төмендейді және бұл өнім сапасының артуына ықпал етеді.

Жүргізілген тәжірибе нәтижесінде кешенді пробиотикалық «Иммунофлор» дәрмектерін қолдану Декалб Уайт кросс мекиен тауығының жұмыртқалау жағдайын арттырып, оның сапасына оң ықпал ететіндігі дәлелденді.

Түйін сөздер: тауық, Декалб Уайт, кешенді пробиотикалық дәрмек, «Иммунофлор», жұмыртқалау, жұмыртқа.

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ВЛИЯНИЕ КОМПЛЕКСНОГО ПРОБИОТИЧЕСКОГО ПРЕПАРАТА «ИММУНОФЛОР» НА ЯИЧНУЮ ПРОДУКТИВНОСТЬ КУР-НЕСУШЕК КРОССА ДЕКАЛБ УАЙТ

Аннотация. Цель настоящей работы – установление целесообразности и эффективности применения комплексного пробиотического препарата «Иммунофлор» в рационе кур-несушек кросса Декалб Уайт.

В ходе экспериментальной работы было установлено, что основные показатели микроклимата в помещениях для содержания птиц соответствовали зоогигиеническим нормам. Среднесуточные рационы для кур-несушек в период яйценоскости со 120 дня по 300 день обеспечивали потребности организма в энергии и питательных веществах, минеральных элементах и витаминах согласно детализированным нормам кормления. Установлено, что применение в птицеводстве яичной направленности комплексного пробиотического препарата «Иммунофлор» стимулирует яйценоскость кур-несушек, а также способствует повышению качества яиц.

Среднесуточный показатель яйценоскости в 1 и 2 опытных группах превосходил данный показатель контрольных несушек: на 150 сутки – на 9,66% и 8,48%, на 180 сутки – 8,8% и 5,04%, на 210 сутки – 8,16% и 6,44%, на 240 сутки –11,68% и 3,8%, 270 сутки – 7,72% и 4,84%, на 300 сутки – 8,34% и 5,86%.

Средний показатель массы яиц на 1 сутки в первой и второй опытных группах превосходит контрольную на 4,04 г и 3,1 г или 7,38% и 5,77%, на 7 сутки – 4,06 г и 3,1 г или 7,53% и 5,87%, на 14 сутки – 4,32 г и 3,16 г или 8,18% и 6,12% соответственно.

Установлено, что на 7 сутки хранения потеря в массе в 1 и 2 опытных группах составила 1,50% и 1,56%, что ниже, чем в контрольной (1,66%). На 14 сутки хранения потеря в массе в 1 и 2 опытных группах составила 1,95% и 2,36%, что так же ниже, чем в контрольной (2,63%).

Таким образом, применение комплексного пробиотического препарата «Иммунофлор» повышало показатели яйценоскости и массы яиц, а также снижало потерю массы яиц при их хранении в течение 14 суток.

Применение комплексного пробиотического препарата «Иммунофлор» в рационе молодняка кур в течение 21 суток в дозе 15 г/т воды с 1 суток жизни повышает их продуктивные качества. Так, среднесуточный показатель яйценоскости в 1 и 2 опытных группах превосходил контрольных несушек: на 150 сутки – на 9,66% и 8,48%, на 180 сутки – 8,8% и 5,04%, на 210 сутки – 8,16% и 6,44%, на 240 сутки – 11,68% и 3,8%, 270 сутки – 7,72% и 4,84%, на 300 сутки – 8,34% и 5,86%.

На фоне применения комплексного пробиотического препарата «Иммунофлор» улучшается масса яиц. Установлено, что средний показатель массы суточных яиц 1 и 2 опытных групп был выше контрольной на 4,04 г и 3,1 г или 7,38% и 5,77%; на 7 сутки хранения – на 4,06 г и 3,1 г или 7,53% и 5,87%; на 14 сутки – на 4,32 г и 3,16 г или 8,18% и 6,12% соответственно.

На фоне применения пробиотического препарата уменьшается потеря в массе яиц. На 7 сутки хранения потеря в массе в 1 и 2 опытных группах составила 1,50% и 1,56%, что ниже, чем в контрольной (1,66%). На 14 сутки хранения потеря в массе в 1 и 2 опытных группах составила 1,95% и 2,36%, что так же ниже, чем в контрольной (2,63%).

Результаты исследований показали, что под влиянием комплексного пробиотического препарата «Иммунофлор» повышается яйценоскость кур-несушек кросса Декалб Уайт, увеличивается масса яиц и снижается потеря массы яиц путем испарения влаги, что обуславливает повышение качества яиц.

Экспериментально доказано, что применение комплексного пробиотического препарата «Иммунофлор» имеет положительный эффект на яйценоскость и качество яиц кур-несушек кросса Декалб Уайт.

Ключевые слова: куры, Декалб Уайт, пробиотический препарат, «Иммунофлор», яйценоскость, яйца.

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REFERENCES

[1] Kairov V.R., Karaeva Z.A., Ramonova Z.G., Khubaeva M.M. (2017) The effectiveness of the use of multi-enzyme complexes and probiotics in the feeding replacements and laying hens [*Effektivnost' ispol'zovaniya mul'tienzimnykh kompleksov i probiotika v kormlenii remontnogo molodnyaka i kur-nesushek*] // News of the Gorsky State Agrarian University. Vladikavkaz. Vol. 54, N 2. P. 80-87 (in Russ.).

[2] Alekseev I.A., Ishtudova E.R., Kuznetsov A.F. (2016) The use of the Basulifor probiotic in a peasant farm for growing young quail. Regulatory issues in veterinary medicine [*Primeneniye probiotika Basulifor, v krest'yanskom fermerskom khozyaystve pri vyrashchivanii molodnyaka perepelov*]. SPb. N 3. P. 142-145 (in Russ.).

[3] Mazanko M.S., Prazdnova E.V., Makarenko M.S., Usatov A.V., Bren A.B., Chistyakov V.A., Chikindas M.L., Gorlov I.F., Komarova Z.B., Mosolova N.I., Pilipenko D.N., Krotova O.E., Struk A.N., Tutelyan A.V., Lin A. (2018) Bacillus probiotic supplementations improve laying performance, egg quality, hatching of laying hens, and sperm quality of roosters // Probiotics and Antimicrobial Proteins. New York, USA. Vol. 10, N 2. P. 367-373.

[4] Volodina A.I., Betlyaeva F.Kh., Trofimov O.V., Rustamov R.D., Pak I.V. (2016) The effect of probiotics on egg production and hen immune status. Agrarian Bulletin of the Urals [*Vliyaniye probiotikov na yaichnuyu produktivnost' i immunnyy status nesushki. Agrarnyy vestnik Urala*]. Ekaterinburg. N 6 (148). 2 p. (in Russ.).

[5] Salomatova E.A., Slobozhaninov K.V., Vereshchagina E.N., Paderina R.V. (2019) Use of probiotics in feeding laying hens [*Ispol'zovaniye probiotikov v kormlenii kur-nesushek*] // Poultry farming. M. N 9-10. P. 48-50 (in Russ.).

[6] Yildirim E.A., Brazhnik E.A., Ilyina L.A., Dubrovin A.V., Filippova V.A., Novikova N.I., Tyurina D.G., Bolshakov V.N., Laptev G.Yu. (2019) A modern probiotic for the health of chickens. Effective animal husbandry [*Sovremennyy probiotik dlya zdorov'ya kur*]. Krasnodar. N 4 (152). P. 66-67 (in Russ.).

[7] Tsogoeva F.N., Temiraev R.B., Mamukaev M.N., Osikina R.V., Tletseruk I.R., Kokov T.N., Vasiliadi G.K. (2018) Use of antioxidant and probiotic in diet of layers to reduce the risk of aflatoxicosis // Asian Journal of Microbiology, Biotechnology and Environmental Sciences. New Delhi, India. Vol. 20, N 2. P. 534-538.

[8] Semenov V.G., Baimukanov A., Ivanov N.G., Tadzhiyeva A.K., Karynbayev A.K., Karibayeva D.K. (2019) Bird biopotential against the correction of non-specific resistance and specific immunogenesis // Bulletin of the National Academy of Sciences of the Republic of Kazakhstan. Vol. 6, N 382 (2019), 111-119. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). https://doi.org/10.32014/2019.2518-1467.152

[9] Recommendations for the use of water-soluble Immunoflor: dosage and method of application [*Rekomendatsii po ispol'zovaniyu vodorastvorimogo Immunoflora: dozirovka i sposob primeneniya*]. (2012). TR No. 9291-002-90166827-2012. Certificate of Conformity No. POCC RU. IIH88.CO4732 (in Russ.).