

The Influence of the BioR Remedy on the Protein Metabolism of Broilers

Victor PUTIN

State University Agrarian of Moldova, Str. Mircelti 44, MD- 2049, Chisinau, Republic of Moldova, Email: putin_comvet@yahoo.com

Abstract. The problem of using the growth stimulators on animals has been aggravating especially after the ban of antibiotics as growth stimulators in the EU since 2006. The aim of our researches was mainly the complex study of the BioR Remedy, obtained from *Spirulina Platensis* and produced in the Republic of Moldova. The experiment involved 5 lots 30 broilers each. 4 experimental lots received intramuscular administration injections of the BioR remedy, two times in a row, on the 9th day, in doses of 0,3-0,6 ml/broiler and the second time, on the 21st day, in doses of 0,4-1,0 ml/broiler, while the broilers from the control lot were injected 0,4 and, respectively, 0,6 ml/broiler saline. The biochemical results we came to revealed the fact that this product intensifies the protein metabolism, it being confirmed by higher values of total protein in blood and the albumin fraction so the albumin-globulin ratio has better results in the experimental lots. At the same time has been proved an increase of creatinine in blood in the broilers from the experimental lots, value that shows the state of the protein metabolism. In parallel, at the experimental lots has been revealed a weak trend of ceruloplasmin decrease in serum, indices that directly show the intensification of the metabolic processes of the young broilers' organism. These good biochemical results are reflected and in the bioproductive indices of the broilers from the lots tested with the BioR Remedy.

Keywords: BioR remedy, *Spirulina platensis*, broilers, protein, albumin, globulin, creatinine, ceruloplasmin.

INTRODUCTION

Broiler breeding plays an important role in food security and has recently gained weight in most countries of the world (12,15,16, 29).

Taking in consideration the inappropriate growth conditions of birds in poultry farms and other stress conditions, the results obtained are not always up the expectations. Within this context some authors draw attention to the spread of noninfectious bird diseases, it being explained by the use in big proportions of antimicrobial drugs that lead to disruption of the physiological processes in the organism (1,25,30). Thus the birds bred in industrial conditions should be subjected to remedial measures of disordered physiological processes. Within this context of great interest are the remedies of animal and vegetable origin that do not have the shortcomings, the negative repercussions of the xenobiotics, because are natural products with special protective and adaptive effects and great perspectives to apply in the zooveterinary practice (4,11,13,17,30).

The elucidation of the influence of this and other remedies on the physiological-metabolic processes and, first of all the study of the protein metabolism, represents a special interest for its use in the zooveterinary practice especially for the breeding of young birds (2,3,6,7,18,21,26).

The study aim was to research the BioR remedy action on some of the protein metabolism parameters at broilers at the administration in different doses of the remedy in the conditions of intensive breeding.

MATERIALS AND METHODS

The research was made in a hall of birds in the conditions of Avicola Shaver poultry farm located in Bucovat, Republic of Moldova. The research involved 150 broilers, divided into 5 lots 30 broilers each. The study principle of organization is shown in Table 1.

Tab. 1.

Diagram of injections of the BioR remedy to young broilers

Broiler lots	Number of broiler	BioR 0,05%, ml		Sol.0,9% NaCl, ml	
		on the 9 th day	on the 21 st day	on the 9 th day	on the 21 st day
Control	30	-	-	0,4	0,6
Experimental 1	30	0,3	0,4	-	-
Experimental 2	30	0,4	0,6	-	-
Experimental 3	30	0,5	0,8	-	-
Experimental 4	30	0,6	1,0	-	-

The BioR remedy was obtained through biotechnological means from the alga *Spirulina platensis* at the Institute of Microbiology and Biotechnology of Academy of Sciences of the Republic of Moldova (10). In the study was used the product BioR, injectable solution 0,5% (Registration Certificate Nr. 9217 from 29.09.2005, issued by Ms of the Republic of Moldova). Before administration the tested remedy had been diluted with saline 1:10. This medical drug contains a complex of biologically active substances such as amino acids, especially immunoactive amino acids, phycobiliproteins (Phycocyanin C), carbohydrates, oligopeptides, trace elements, etc.

During the research young poultry had been permanently examined and at range of 7-10 days was weighed in order to evaluate the bioproductive indices. For the biochemical test blood was collected from 5 broilers on the 9th day before the administration of the BioR remedy and on the 41st day, before slaughter, from 5 broilers from each lot. In blood serum was determined the total protein level and the protein fractions through usual methods (19, 24). The level of creatinine and ceruloplasmin in blood serum was determined at the biochemical analyzer FP-900, Finland, being used the sets of reagents from "Elitech" company-France, according to the attached instructions.

RESULTS AND DISCUSSIONS

At the lots treated with BioR during a period of over 30 days hadn't been reported indizerable reactions at the place of administration or adverse reactions of the whole body. The total protein level evaluation results and its blood serum fractions of broilers treated with the BioR remedy are shown in Table 2.

The obtained results show that the total protein level at the beginning of the study is $35,70 \pm 0,37\text{g/l}$, before the administration of the BioR remedy, a parameter that with age increases statistically by 13,4% ($p < 0,05$). This physiological tendency of increase in total

protein values persists also in the broilers from the experimental lots when this parameter at the end of the study exceeded the indices registered at the control lot by 5,4-10% ($p < 0,05$), this results showing us the anabolic action of the studied remedy and pleads for the tested product. In literature there are reports on the total protein values growth at broilers and also there are reports on different drugs administration (2, 13, 20, 22). In addition Sandul P.A. (2007) showed that by using of vitamin E and F concentrate from rapeseed oil obtained higher values of total protein in blood serum as compared to the control lot and with broilers which benefitted from vitamin E (vit. E – 25%) from the commercial network.

Tab. 2.

Total protein level and the protein fractions in blood serum at broilers treated with the BioR Remedy

Broiler lots	Number of broilers	Total protein, g/l	Protein fractions,%				Ratio A/G
			Albumin	Globulin			
				α	β	γ	
Beginning of the study	5	35,70± 0,37	35,75± 1,74	30,29± 1,63	14,40± 1,21	18,89± 1,21	0,56
Control	5	40,48 ± 0,35	38,29± 1,29	27,00± 2,96	7,59± 1,18	27,14± 1,99	0,62
Experimental 1	5	44,44± 0,45*	50,08± 3,30*	22,13± 2,10	12,18± 1,17	15,60± 2,17*	1,00
Experimental 2	5	44,54± 0,31*	50,20± 2,77*	23,69± 1,75	10,20± 0,71	15,90± 2,30*	1,01
Experimental 3	5	43,88± 0,70*	46,31± 3,31	22,30± 2,12	10,97± 1,16	20,41± 3,73	0,86
Experimental 4	5	42,68± 0,57	44,84± 4,48	25,05± 1,76	10,10± 0,72	20,00± 3,57	0,81

Note: $p < 0,05$

In case of our study with age there is a nonessential serum albumin increase in broilers from the control lot (by 7,1%) and a higher increase in the experimental lots by 25,4 – 40,4% as compared to the basal level. Moreover the facts presented in table 2 show that the serum albumin value at the end of the study is higher by 17,1 – 31,1% as compared to the control lot ($p < 0,05$ in the experimental lots 1 and 2), similar manifestations with total protein which can be defined by induction of their synthesis, produced by the studied remedy.

Because the serum albumin are synthesized in liver due to food intake of amino acids and due to the common metabolic background (2, 8) it can be concluded that serum albumin increase is due namely to the BioR remedy. This fact can be confirmed by higher values of serum pseudocolinesteraza, enzyme synthesized in liver which is an index of the proteosynthetic function of the liver values previously recorded in broilers treated with the BioR remedy with the same doses (5). Higher values of the serum albumin were registered at young broilers subjected to a diet with a higher protein content (6), at layers with a natural plant antioxidants supplemented ration (9) and at layers with parasitic diseases after the treatment (14).

At broilers with age there is an obvious tendency of α -globulin decrease in all the lots from the research but with a more pronounced tendency in the experimental lots. Thus the

value of this index at broilers treated with BioR at the end of the study is lower by 7,2-18,0% as compared to the reference group. The α -globulin level decrease with age at broilers is a normal physiological reaction being considered a physiological peculiarity pointed out and by other authors (31). The data from table 2 show that β -globulin fraction evidences the same tendency of decrease just as α -globulin fraction from all the studied lots, at the same time showing a prevalence of this parameter in broilers from the experimental lots.

The level of serumal γ -globulin shows a tendency of increase being more pronounced in the broilers from the control lot ($p < 0,05$). The lots treated with BioR at the end of the study show a more pronounced decrease of this parameter, at the administration of lower doses of the drug, by 24,8- 42,5% as compared to the control lot.

The lower level of γ -globulin revealed by us in the experimental lots shows a more favorable natural resistance at broilers treated with the tested remedy. Congruent with these facts are the results of the researches published by Macari V. that revealed similar tendency of γ -globulin manifestation due to the BioR remedy in young pigs (3,4). At similar results of γ -globulin decrease have reached and other authors who studied this parameter at contaminated with parasites layers after the treatment (14).

The obtained results point out that the administration of the BioR remedy determine the albumin-globulin ratio increase a fact that can be considered a reaction which favours the nonspecific resistance of the broilers' organism from the experimental lots. Congruent with the facts related previously are our results about the evaluation of the modifications of the creatinine and ceruloplasmin content in blood serum shown in Table 3 below.

Tab. 3.
Modifications of some biochemical indices in blood serum of young broilers treated with the BioR remedy sol. 0,05%

Study lots	Nr. of broilers	Dose, ml		Creatinine, mkmol/l	Ceruloplasmin, mg/l
		On the 9 th day	On the 21 st day		
At the beginning of the study	5	-	-	57,28±9,82	108,05±12,52
Control, sol. 0,9% NaCl	5	0,4	0,6	37,93±6,66	110,62±10,63
Experimental 1	5	0,3	0,4	69,32±4,44*	87,29±4,76
Experimental 2	5	0,4	0,6	65,32±7,03*	96,46±11,52
Experimental 3	5	0,5	0,8	53,04±6,08	98,42±7,01
Experimental 4	5	0,6	1,0	53,20±5,66	108,96±9,45

Note: $p < 0,05$

The results obtained and presented in Table 3 show that at broilers untreated with BioR the level of creatinine at the end of the study drops 1,5 times as compared to the basal level from the beginning of the research ($p < 0,05$). Also there is an increase of this parameter at the end of the study in the experimental lots 1 and 2 by 14,0 – 21,0% as compared to this value from the beginning of the research. Thus it's obvious that the tested drug after the administration in low doses led to a serumal creatinine increase in broilers 1,4 – 1,8 times as compared to the control lot ($p < 0,05$). These results indicate the intensification of anabolic processes aimed at muscle growth. Congruent with these facts are the results of the researches

made by Taranov M.T. on young pigs, pointing out that creatinine in the blood of piglets increased from 0,9 mg % - on the 5th day of life up to 1,8 mg % - at the age of 2 months, period in which there is a major synthesis of protein in pigs (27). Within this context Tița N. U. mentions that the creatinine blood level decreases in case of muscle decrease (28).

In order to maintain the animal body protein metabolism a prominent role plays ceruloplasmin. Ceruloplasmin (CP) is a α -2 globulin that contains copper and is being synthesized in liver then thrown in the bloodstream and transported to tissues that use copper where it is released while CP is being metabolized.

Besides copper transport CP participates in hematopoiesis also having antioxidant and antiinflammatory action. CP is an acute phase reactant, its concentration increases taking place during the acute and chronic inflammatory processes. According to the data from Table 3 it shows that at the beginning of the study the CP index is $108,05 \pm 12,52$ mg/l, parameter which with age in broilers from the control lot practically doesn't change remaining at the same level.

Our study shows a slight decrease of ceruloplasmin by 11,0 – 21,1% as compared to the control lot under the influence of the BioR remedy at the end of the study in all the experimental lots except lot 4, which probably represents a adaptive - compensatory mechanism of maintaining cellular homeostasis and the body metabolic processes with the participation of copper. Congruent with these data are our recently published results about the intensification of the hematopoietic function and the superiority of the hematological indices in broilers treated with the BioR remedy (23).

The successive administration of the BioR product to broilers positively influenced the productive performances in young poultry. Thus daily average increment during the whole period of broiler breeding was in the control lot – 52,15 g while the remedy BioR tested on broilers contributed to the increase of this index by 4,5 – 15,0% as compared to the reference lot data that allow us to highlight the growth stimulatory properties of this product.

Therefore the obtained results demonstrate that the administration of the BioR remedy two consecutive times ensures the protein metabolism amelioration and improves the bioproductive indices in broilers during their breeding.

CONCLUSIONS

- The BioR remedy obtained through modern technologies from *Spirulina platensis* administrated to broilers in production conditions during a period of over 30 days has a great local and general tolerance.
- The BioR remedy contributes to the metabolism improvement especially to the protein one in a critical period for broilers bred in extreme farm conditions.
- The BioR remedy administrated to broilers contributes to the improvement
- of the productive performances reflected in a daily average increment higher by 4,5 – 15,0% as compared to the reference lot.
- The optimal doses of the BioR remedy are 0,3 – 0,4 ml per bird at the first administration and 0,4 – 0,6 ml per bird at the second administration.

REFERENCES

1. Bălănescu S., Holban D., Voiniți E. (2005). Acțiunea produsului SEL-PLEXTM asupra puilor de găină. Știința Agricolă, nr.2. p. 59-64.

2. Dunca I. (2010). Rezumat al tezei de doctorat cercetări privind tehnologia de creștere a puilor de găină pentru carne. Cluj-Napoca. 46 p.
3. Macari V. (1998). Efectele preparatului BioR asupra metabolismului proteic la tineretul porcine. Luc. șt. vol.6, Med.vet., Chișinău. p.116-122.
4. Macari V. (2003). Aspecte fiziologico-metabolice ale acțiunii preparatului BioR de origine algală asupra organism. animal/Autoref. tezei de dr.hab. în biolog., Chișinău.
5. 48 p.
6. Macari V., Putin V., Gudumac V. (2009). Activitatea pseudocolinesterazei și nivelul seric al glucozei și ureei la puii-broiler tratați cu BioR. Luc.șt., Vol 52, partea II, Ed. "Ion Ionescu de la Brad", Iași. p. 1070-1074.
7. Oduguwa O.O., Odugawa B.O., Fanimu A.O., Dipeolu M.A. (2000). Potency of two proprietary micronutrient premixes for broiler chickens at marginally deficient protein contents, archives de Zootehnia vol. 49, numero 188, Universidad de Cordoba Espana.
8. p. 433- 444.
9. Pîrvu Gh. (1992). Supravegherea nutrițională a animalelor, Ed. Ceres, București. 392 p.
10. Pârvu Gh., Coste H., Costea M. (1996). Nutriția răspunsul imun și sănătatea animalelor. Ed. CERES, București. 159 p.
11. Radwan Nadia ș.a. (2008). Effect of Natural Antioxidant on Oxidative Stability of Eggs and Productive and Reproductive Performance of Laying Hens. Internațional Journal of Poultry Science 7(2). p.134-150.
12. Rudic V., Gudumac V. (1996). Preparat medicamentos. Brevet de invenție Nr.545, publicat în BOPI Nr. 5. 14 p.
13. Rudic V., Cojocari A., Cepoi L., Chiriac T., Rudi I., Gudumac V. Macari V., Codreanu S. ș.a. (2007). Ficobiotehnologie - cercetări fundamentale și realizări practice/ Chișinău: s.n. (Tipografia „ Elena V.I.” SRL). 365 p.
14. Șumanshii A., Bâzgu I., Modvala S. (2010). Studiul dezvoltării sectorului avicol la nivel național și internațional. Luc. șt. vol.26, Zootehnie și Biotehnologii, Chișinău.
15. p. 122-126.
16. Sandul P.A. (2007) Аffectivnosti primeneniya broileram conțentrata vitaminov E i F uz rapsovogo masla// Ucennîe zapiski. Haucino-practiceskii jurnal, Vitebsk.-T.43.-Vâpusk 1.c. 210 - 212.
17. Zamornea M. (2009). Diversitatea parazitozelor la păsările domestice și modificările morfofiziologice la Gallus Gallus Domesticus după tratamentul Antiparazitar. Autoref. al tezei de dr. în biologie, Chișinău. 26 p.
18. Zoltan P., Voinițchi Eu., Bețivu Iu., Bălănescu S. (2011). Situația actuală și tendințele dezvoltării sectorului avicol din R. Moldova și la nivel internațional. Chișinău. 116 p.
19. Капитонова Е.А., Гласкович А.А., Красочко П.А., Голушко В.Н.(2008). Рекомендации по применению иммуностимулятора «Альвеозан» и пробиотика
20. « Диалакт» в бройлерном птицеводстве. Витебск: ВГАВМ. 36 с.
21. Карпуть И.М., Курденко А.П. (2009). Рекомендации по применению иммунокорректоров для повышения резистентности и профилактики болезней молодняка сельскохозяйственных животных и птиц. Витебск - ВГАВМ. 55 с.
22. Клетникова Л.В. и др. (2010). Физиологическое обоснование использования пробиотиков в ранний постэмбриональный период онтогенеза цыплят кросса Хайсекс коричневый для коррекции метаболизма и повышения продуктивности. VI-й Межд. вет. конгресс по птицеводству, Москва, 26-29 апреля. с.167-170.
23. Кондрахин И. П. и др. (1985). Клиническая лабораторная диагностика в ветеринарии. Справочное издание/М: Агропромиздат. 287с.

24. Костюченко Н.А. (2009). Морфофункциональные изменения у цыплят при микоплазмозе. Труды Кубанского государственного аграрного университета. Серия: Ветеринарные науки № 1 (ч. 2). с. 41-57.
25. Красочко П.А. (2009). Состояние обменных процессов у цыплят-бройлеров после включение в рацион иммуностимулятора «Альвеозан» и пробиотика «Диалакт». Учен. записки, Том 45, выпуск 2, часть 1, июль-декабрь. с.68.-72.
26. Курилович А.М., Матвеев Е.В., Зинуков В.В. (2007). Влияние кормовой добавки «Семерик» на продуктивность и клинико-биохимические показатели крови цыплят-бройлеров в условиях РУСПП «Смолевинская бройлерная птицефабрика» Ученые записки, том 43, выпуск 1. с. 136.-139.
27. Макарь В.И., Путин В. (2008). Влияние биостимулятора на гематологич. показат. цыплят-бройлеров. Аграрн. вісник причорномор'я. Випуск 42, ч.1, Одесса. с. 34-38.
28. Петухова Е.А., Бессарабова Р.Ф., Халенева Л.Д. Антонова О. А. (1989). Зоотехнический анализ кормов. Москва ВО «Агропромиздат». 238 с.
29. Рабаданова Г.Ш. (2010). Влияние кормовой добавки Натузим на зоотех. и биохим. показатели цыплят-бройлеров. Ж. «Птица и птицепродукты», №5. с. 38- 41.
30. Стегний Б.Т. и др. (2009). Влияние инфицирования изолятами вируса болезни Марека разной патогенности на биохимические показатели крови цыплят. Учен. записки, Том 45, выпуск 2, часть 1, июль-декабрь. с. 260-263.
31. Таранов М.Т. (1976). Биохимия и продуктивность животных. М., «Колос». 238 с.
32. Тица Н. У. (1986). Клиническая оценка лабораторных тестов: К 49 Пер. с англ./ Под ред. Н. У. Тица. –М.: Медицина. 480 с.
33. Фисинин В.И. (2009). Общие проблемы птицеводства. V-й Межд. вет. конгресс по птицеводству. 21-24 апреля. с. 5-26.
34. Хорошевская Л. и др. (2010). Инновационные подходы к использованию биологически активных препаратов в бройлерном птицеводстве. VI-й Межд. вет. конгресс по птицеводству, Москва, 26-29 апреля. с.142-145.
35. Циновый В.И. (1970). Функциональные изменения белковых комплексов сыворотки крови в онтогенезе кур и роль их в формировании желтка. Материалы к XIV всемирному конгрессу по птицеводству. Изд. « Колос», М. с.158-172.