



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.3628604>Available online at: <http://www.iajps.com>

Research Article

**INFLUENCE OF BIOLOGICALLY ACTIVE DRUGS ON THE
DIGESTIBILITY AND DIGESTION OF FOOD NUTRIENTS IN
VIOLATION OF FOOD ECOLOGY****Julia I. Kovaleva¹, Rustam Z. Abdulkhalikov², Angelica A. Baeva³, Lada A. Vityuk⁴,
Susanna K. Cherchesova⁵, Zaurbek M. Aysanov⁶, Madina G. Tleinsheva⁷, Matvey N.
Mamukaev⁸, Ulyana V. Bagaeva⁹**

¹Postgraduate Student, Department of Animal Science and Veterinary-sanitary Expertise. Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation., ²Candidate of Agricultural Sciences, Associate Professor, Department of Animal Science and Veterinary-sanitary Expertise. Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation. , ³Doctor of Agricultural Sciences, Professor, Chair of Technology of Food Products, North-Caucasian Mining and Metallurgical Institute (State Technological University), Vladikavkaz 362021, Russian Federation., ⁴Candidate of Technical Sciences, Associate Professor, Chair of Technology of Food Products, North-Caucasian Mining and Metallurgical Institute (State Technological University), Vladikavkaz 362021, Russian Federation., ⁵Doctor of Biological Sciences, Professor, Chair of Department of Zoology and Ecology. North-Ossetian State University named after K.L. Khetagurov, Vladikavkaz, 362025, Russian Federation., ⁶Doctor of Agricultural Sciences, Professor, Department of Animal Science and Veterinary-sanitary Expertise. Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation., ⁷Candidate of Biological Sciences, Associate Professor, Department of Animal Science and Veterinary-sanitary Expertise. Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation., ⁸Doctor of Agricultural Sciences, Professor, Head of the Department of Infectious and Invasive Diseases, Gorsky State Agrarian University, Vladikavkaz 362040, Russian Federation., ⁹Candidate of Biological Sciences, Associate Professor, Chair of Department of Zoology and Ecology. North-Ossetian State University named after K.L. Khetagurov, Vladikavkaz, 362025, Russian Federation.

Article Received: August 2019

Accepted: December 2019

Published: January 2020

Abstract:

To detoxify heavy metals, adsorbents, which bind heavy metals and other toxins in the poultry digestive tract and remove them from the body without detriment to the digestibility of biologically active substances in the diet are effectively used. Along with adsorbents, preparations that have synergistic effect and at the same time optimize the composition of microflora in the digestive tract should be included in poultry diets.

The research was aimed to study the effectiveness of using probiotic Lactin and adsorbent Biocoretron in mixed feed based on cereal grain of local production containing the heavy metal excess to increase the broilers' productivity and optimize metabolism.

Research method. The objects of research were broiler chickens of cross "Smena-7". The research results were statistically processed by Student's *t*-test using mathematical analysis software package "Microsoft Excel". **Research results.** Inclusion of probiotic Lactin in a dose of 2000 g/t and adsorbent Biocoretron in a dose of 1000 g/t feed allowed the chickens of the third test group versus the control to increase significantly ($P>0,95$) the flock safety by 5,0%, indicators of absolute and average daily weight gain – by 12,0%. They also significantly ($P>0,95$) better digested the diet dry matter by 3,8% organic matter – 3,8%, crude protein – 4,2%, crude fiber – 3,1% and nitrogen-free extractives – 4,2%. Broilers of the control group used better ($P>0,95$) taken with feed nitrogen by 51,73%, and birds in the third test group – by 3,38%. Broilers of the third test group showed the highest activity of proteinases, cellulases and amylases in the chymus of the small intestine having significantly ($P>0,95$) exceeded their control counterparts on these indicators by 13,5, 12,7 and 14,5%.

Keywords: broilers, heavy metals, probiotic, adsorbent, digestibility and accessibility, enzyme activity.

Corresponding author:**Julia I. Kovaleva,**

Postgraduate Student,

Department of Animal Science and Veterinary-sanitary Expertise.

Kabardino-Balkarian State Agrarian University named after Kokov,

Nalchik 360030, Russian Federation.

QR code



Please cite this article in press Julia I. Kovaleva et al., **Influence Of Biologically Active Drugs On The Digestibility And Digestion Of Food Nutrients In Violation Of Food Ecology.**, *Indo Am. J. P. Sci.*, 2020; 07(01).

INTRODUCTION:

The relevance of the topic. Modern poultry production is increasingly focused on using local feed resources – wheat, barley, corn, sunflower cake, etc. But this raw material is characterized by low nutrition and poor digestibility due to significant content of fiber and non-starch polysaccharides [1, 2].

At the same time, these main components of poultry mixed feed produced in environmentally unfriendly climatic conditions of different regions pose danger to productivity and health. This creates the risk of poultry products contamination and negative effect on bodies of their consumers. For example, in the conditions of the Republic of North Ossetia – Alania there is a danger of a human body intoxication with salts of heavy metals (zinc, lead and cadmium), which are abundantly accumulated in the grain components of local mixed feed [3, 4].

In recent years, to detoxify heavy metals, new generation adsorbents are effectively used, which bind

heavy metals and other toxins in the poultry digestive tract and remove them from the body without detriment to the digestibility of biologically active substances. However, very often under the influence of heavy metal salts suffers the microflora of poultry gastrointestinal tract, which has a negative effect on the productivity and metabolism [5].

To eliminate this problem, along with adsorbents, preparations that have synergistic effect and at the same time optimize the microflora composition in the digestive tract should be included in poultry diets. Probiotics – biological preparations, which include living representatives of beneficial microorganisms have similar effect. At this, the range of new generation probiotics is quite wide, which largely allows to populate the gastrointestinal tract with representatives of beneficial microflora that have high competitiveness concerning harmful microflora [6, 7, 8].

The research was aimed to study the effectiveness of using probiotic Lactin and adsorbent Biocoretron as a part of mixed feed based on cereal grain of local production with excess heavy metal content to increase the broilers productivity and optimize metabolism.

Research methods. To achieve this aim in the course of the scientific experiment in the conditions of agricultural production cooperative “Vesna” in

Digorsky district of RNO-Alania the research objects were broilers “Smena – 7”. By the analogue scale day-old healthy, certified, balanced by live weight chicks of the same brood batch were divided into 4 groups of 100 birds each.

Feeding the experimental bird during the experiment was carried out according to the scheme given in table 1.

Table 1- Scheme of the research experiment n=100

Groups	Basic diet (BD) based on cereal grain of local production and sunflower cake	Supplementation doses, g/t	
		Probiotic Lactin	Adsorbent Biocoretron
Control	Basic diet (BD)	–	–
1 test	BD+ probiotic	2000	–
2 test	BD+ adsorbent	–	1000
3 test	BD+ probiotic+adsorbent	2000	1000

The experimental poultry rearing lasted 42 days. Into broilers’ mixed feed probiotic Lactin (it comprises live lactobacilli and streptococci) and adsorbent Biocoretron (based on ecologically clean natural mineral – diatomite) were administered uniformly by using dosing devices.

In the course of the experiment, the flock safety, growth rate and feed payment in products of broilers in the compared groups were studied.

Digestibility and accessibility of nutrients, as well as enzymatic activity of the content in the chicks’ gastrointestinal tract were determined by the conventional methods [9].

The research results were statistically processed by the Student’s t-test using the software package “Microsoft Excel”.

The research results and their discussion:

Feeding the experimental bird was carried out according to the existing feeding standards [10]. Broiler chickens in the first rearing period from 1 to 28 days old were fed mixed feeds balanced according to formulation PK-5, and during the second period from 29 to 49 days old – mixed feeds balanced according to formulation PK-6, the grain base of which comprises corn (40,0-42,5) and barley (15,0-17,5%) but protein – sunflower cake (of 20,3 to 23,5%). At the same time, in the formulation of these mixed feeds was observed the excess of maximum permissible concentrations (MPC) in zinc concentration by 46,2%, lead – by 42,1% and cadmium – by 38,7%.

Due to the fact that heavy metals have a depressive effect on broilers’ economic and useful qualities, the influence of the tested feed additives on the flock safety, live weight gain and feed consumption per 1 kg of experimental poultry gain was studied during the experiment (table 2).

Table 2 - Flock safety, live weight gain and feed consumption per 1 kg of experimental poultry gain n = 100

Indicator	Group			
	control	1 test	2 test	3 test
Safety, %	93	96	96	98
Live weight per 1 bird, g:				
At the beginning of the experiment	41,1±0,34	40,9±0,38	41,2±0,37	41,0±0,30
At the end of the experiment	2123,1±10,2	2299,8±10,9*	2312,3±11,0*	2373,4±11,3*
Live weight gain, g:				
absolute	2082,0±10,7	2258,9±10,9*	2271,1±11,2*	2332,4±11,2*
average daily	42,49±0,17	46,10±0,22*	46,35±0,30*	47,60±0,33*
In% to the control	100,0	108,5	109,1	112,0
Consumption per 1 kg gain	2,30	2,12	2,10	2,05

* P>0,95

It is found that the best flock safety was provided by the diet combined supplementation with probiotic Lactin at a dose of 2000 g/t and adsorbent Biocoretron at a dose of 1000 g/t mixed feed that on this indicator enabled broilers of the third test group, due to the summation of enzymatic activity of proteinase, cellulase, and amylases in the digestive tract, to exceed the control by 5%.

Inclusion of probiotic Lactin at a dose of 2000 g/t and adsorbent Biocoretron at a dose of 1000 g/t mixed feed in diets allowed chickens of the third test group compared to the control counterparts to increase significantly (P>0,95) the absolute and average daily live weight gain by 12,0%.

More efficient use of feed when conducting the experiment was promoted by the combined feeding of these preparations, allowing the chickens of the third

test group compared to the control to consume 10,9% less mixed feed per production unit.

The physiological experiment was conducted to study the level of digestibility and use of diets nutrients under the influence of enzyme preparations and probiotic on the experimental 28-35 days old broilers.

During the metabolism experiment, it was found that the best digestibility rates of mixed feed nutrients (table 3) had chicks of the third test group fed combination of probiotic Lactin at a dose of 2000 g/t and adsorbent Biocoretron at a dose of 1000 g/t mixed feed. They significantly (P>0,95) better compared to their control counterparts digested the diet dry matter by 3,8%, organic matter – by 3,8%, crude protein – by 4,2%, crude fiber – by 3,1% and nitrogen-free extractives – by 4,2%.

Table 3 – Coefficients of nutrients digestibility in diets, % n=5

Group	Digestibility coefficients					
	Dry matter	Organic matter	Crude protein	Cellulose	Crude fat	Nitrogen-free extractives
Control	80,8±0,41	82,2±0,46	86,0±0,54	13,1±0,39	86,5±0,47	87,0±0,56
1 test	83,7±0,52*	85,1±0,51*	89,0±0,39*	15,4±0,28*	86,3±0,71	90,0±0,44*
2 test	83,8±0,49*	85,2±0,34*	89,2±0,42*	15,7±0,37*	86,1±0,59	90,4±0,53*
3 test	84,6±0,55*	86,0±0,56*	90,2±0,52*	16,2±0,35*	86,1±0,57	91,2±0,61*

* P>0,95

In our opinion, the reason for this is the fact that in this combination, these preparation supplement each other with a necessary complex of missing biologically

active substances that positively affects the hydrolysis of crude protein, cellulose and nitrogen-free

extractives in mixed feeds based on cereal grain and sunflower cake.

The level of using the diet protein by the experimental bird under the effect of the tested preparations was estimated by nitrogen balance (table 4).

Table 4 - Digestibility of feed nitrogen by the experimental bird

n=5

Indicator	Group			
	control	1 test	2 test	3 test
Taken with feed	3,122±0,017	3,127±0,021	3,124±0,025	3,119±0,016
Excretion:				
droppings	1,507±0,009	1,452±0,008*	1,439±0,011	1,400±0,010*
fecal	0,577±0,004	0,483±0,005*	0,488±0,007*	0,468±0,006*
urinary	0,930±0,005	0,969±0,006	0,951±0,008	0,932±0,007
Deposited in the body	1,615±0,006	1,675±0,005*	1,685±0,006*	1,719±0,007*
Used of taken nitrogen,%	51,73±0,44	53,56±0,40	53,94±0,38*	55,11±0,49*

* P>0,95

The analysis of the research results showed that during the day the higher level of nitrogen deposition in the body had broilers of the third test group, which on this indicator significantly (P>0,95) exceeded the control counterparts by 0,104 g. Moreover, broilers of the control group used nitrogen taken with feed by 51,73%

(P>0,95) better and birds in the third test group — by 3,38%.

According to the results of the research experiment to evaluate the effect of probiotic and adsorbent on the digestive metabolism the enzymatic activity of chyme in the broilers' duodenum was determined (table 5).

Table 5 – Enzyme activity of chyme in the duodenum of chicks, UE/ml n=5

Group	Enzymes activity			
	proteinase	lipases	cellulase	amylase
Control	133 ± 1,1	90 ± 0,4	63 ± 0,6	138 ± 1,1
1 test	141 ± 1,2*	91 ± 0,5	67 ± 0,5*	150 ± 0,8*
2 test	144 ± 1,1*	90 ± 0,4	67 ± 0,4*	151 ± 1,0*
2 test	151 ± 1,0*	92 ± 0,5	71 ± 0,6*	158 ± 1,3*

* P>0,95

It is found that when these preparations are used in combination they have a complementary effect on the process of feeds enzymolysis in the gastrointestinal tract, so the broilers of the third test group differ in the highest activity of proteinases, cellulases and amylases in the chyme of the small intestine, having significantly (P>0,95) exceeded on these indicators their control counterparts by 13,5; 12,7 and 14,5%, respectively.

Combined probiotic and antioxidant supplementations did not produce any significant changes of lipolytic activity in the duodenum chyme, so birds in the compared groups had no significant (P<0,95) differences in the digestibility of feeds fat.

Therefore, the increase in the activity of proteinases, cellulases and amylases of the duodenum chyme in broilers of the third test group provided a boost to

increasing the digestibility coefficients of crude protein, cellulose and nitrogen-free extractives, which is consistent with the results of physiological experiments.

CONCLUSION:

To increasing of flock safety, growing capacity and reduce the feed consumption per 1 kg of live weight gain probiotic Lactin at a dose of 2000 g/t and adsorbent Biocoretron at a dose of 1000 g/t mixed feed should be included in broilers diets based on cereal grain and sunflower cake of local production with a higher heavy metal level, because at this a set of proteases, cellulase, amylases and pectinases increases in the content of the gastrointestinal tract.

REFERENCES:

1. Temiraev R.B. Digestive metabolism features in broilers diets supplemented with biologically

- active substances. / R.B. Temiraev // "Proceedings of Kuban state agrarian university". – Krasnodar. - 2010. – №5(26). – P. 88-90.
2. Tedtova, V.V. Preventive and detoxicative action of probiotics on metabolism and consumer quality of broilers meat / V.V. Tedtova, M.K. Kozhokov, L.Kh. Shugusheva, V.N. Kanukova, A.A. Baeva, L.A. Vityuk // Journal of Pharmaceutical Sciences and Research. - 2017. - Vol. 9. - №6. - P. 997-1001.
 3. Temiraev, V.Kh., Method to improve productive performance and digestion exchange of broiler chickens with reduced risk of aflatoxicosis / V.Kh. Temiraev, V.R. Kairov, R.B. Temiraev, Z.A. Kubatieva, V.M. Gukezhev // Ecology, Environment and Conservation. - 2017. - Vol. 23. - №1. - P. 554-561.
 4. Temiraev, R.B. Method for diminishing the adverse effect of anthropogenic heavy metal pollution on poultry meat products / R.B. Temiraev, M.K. Kozhokov, S.K. Cherchesova, F.F. Kokaeva, I.R. Tletseruk // Journal of Environmental Management and Tourism. - 2017. - Vol. 8. - №3 (19). - P. 567-573.
 5. Temiraev, R.B. Method for increasing the dietary meat quality and improvement of broilers metabolism in conditions of the industrial zone of North Ossetia – Alania / R.B. Temiraev, F.F. Kokaeva, V.V. Tedtova, A.A. Baeva, M.A. Khadikova, A.V. Abaev // Proceedings of Gorsky state agrarian university. – Vladikavkaz. - 2012. Vol. 49. - №44. P. 130-133.
 6. Kokaeva, M.G. Influence of antioxidant and adsorbent on the processes of digestive and intermediate metabolism in lacting cows during denitrification / M.G. Kokaeva, R.B. Temiraev, E.V. Beslancev, S.K. Cherchesova, Z.A. Kubatieva (Gutieva), S.G. Kozyrev // Journal of Pharmaceutical Sciences and Research. - 2017. - Vol. 9. - №12. – P. 2401-2404.
 7. Tsalieva, L.V. Ecological and consumer properties of pig meat from different breeds produced in technogenic zone / L.V. Tsalieva, R.B. Temiraev, S.I. Kononenko, B.A. Dzagurov, M.S. Gazzaeva, S.A. Grevtsova // Journal of Pharmaceutical Sciences and Research. - 2017. - Vol. 9. - №12. - P. 2397-2400.
 8. Kisinov, F.I. Selenium and tocopherol on the probiotic background / F.I. Kizinov, R.B. Temiraev, F.N. Tsogoeva, M.T. Atarova // Poultry farming. - 2005. - №10. - P. 21-22.
 9. Fomin, A.I. Methods for determining feed digestibility and rate of alimentary transit by means of chromium oxide / A.I. Fomin, A.Ya. Avrutina // Research methods for poultry feeding. M.-1967. P. 21 – 25.