



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

## INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES

<http://doi.org/10.5281/zenodo.3405455>
Available online at: <http://www.iajps.com>

Research Article

### EFFECT OF BIOLOGICALLY ACTIVE PREPARATIONS ON THE DIGESTIBILITY AND NUTRIENT AVAILABILITY OF BROILER RATIONS

Rustem B. Temiraev<sup>1</sup>, Irina I. Ktsoeva<sup>2</sup>, Anzhelika A. Baeva<sup>3</sup>, Lada A. Vityuk<sup>4</sup>, Denis V. Osepchuk<sup>5</sup>, Muayed F. Karashaev<sup>6</sup>, Soslan G. Kozyrev<sup>7</sup>, Eduard V. Beslaneyev<sup>8</sup>, Bella S. Nikkolova<sup>9</sup>, Mohamed K. Kozokov<sup>10</sup>

<sup>1</sup>Doctor of Agricultural Sciences, Professor, Chair of Technology of Food Products, North-Caucasian Mining and Metallurgical Institute (State Technological University), Vladikavkaz 362021, Russian Federation. <sup>1</sup>Gorsky State Agrarian University, Vladikavkaz 362040, Russian Federation. <sup>2</sup>Candidate of Biological Sciences, Associate Professor, Department of biology, Gorsky State Agrarian University, Vladikavkaz 362040, Russian Federation. <sup>3</sup>Doctor of Agricultural Sciences, Professor, Chair of Technology of Food Products, North-Caucasian Mining and Metallurgical Institute (State Technological University), Vladikavkaz 362021, Russian Federation. <sup>4</sup>Candidate of Technical Sciences, Associate professor, Chair of Technology of Food Products, North-Caucasian Mining and Metallurgical Institute (State Technological University), Vladikavkaz 362021, Russian Federation. <sup>5</sup>Doctor of Agricultural Sciences, Professor, Department of Animal Feeding and Physiology. Krasnodar Research Centre for Animal Husbandry and Veterinary Medicine, Krasnodar 350055, Russia. <sup>6</sup>Doctor of Biological Sciences, Professor, Chair of Animal Science and Veterinary Sanitary Expertise, Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation. <sup>7</sup>Doctor of Biological Sciences, Professor, Chair of Anatomy and Physiology. Gorsky State Agrarian University, Vladikavkaz 362040, Russian Federation. <sup>8</sup>Doctor of Biological Sciences, Professor, Chair of Commodity Science and Tourism, Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation. <sup>9</sup>Candidate of Agricultural Sciences, Associate professor, Chairs of Anatomy, Physiology and Botany, North-Ossetian State University named after K.L. Khetagurov, Vladikavkaz, 362025, Russian Federation. <sup>10</sup>Doctor of Biological Sciences, Professor, Chair of Animal Science and Veterinary Sanitary Expertise, Kabardino-Balkarian State Agrarian University named after Kokov, Nalchik 360030, Russian Federation.

Article Received: July 2019

Accepted: August 2019

Published: September 2019

**Abstract:**

*There is a positive experience in the effective co-feeding of multienzyme compositions (MEC) and probiotics in compound feeds for meat chickens based on wheat and barley grain. The objective of the research is to study the effectiveness of supplementation of probiotic Bifidum SHG and enzyme preparations (Protosubtilin G3x and Celloviridin G20x) in complete feed based on the cereal grain (maize+barley) and sunflower oil cake of local production for enhancement of the digestibility and availability of nutrients in diets for broiler chickens. In the course of three experiments, probiotic Bifidumbacterin and enzyme preparations of Protosubtilin G3x and Celloviridin G20x were introduced into the rations of meat poultry based on maize, barley and sunflower oil cake, both individually and in various combinations. According to the generally accepted method, three physiological metabolism trials have been conducted to study the digestibility and availability of nutrients of the rations. The obtained results were processed by the method of variation statistics using the Microsoft Excel software package for mathematical analysis. During the metabolism trials, it was found that hydrolysis of complex feed polymers occurred more efficiently in the gastrointestinal tract of the 4<sup>th</sup> experimental group of chickens, which compound feed was enriched with multienzyme complex (MEC): Celloviridin G20x + Protosubtilin G3x and probiotic. Therefore, against the control, the poultry of this group showed significantly ( $P > 0.95$ ) higher dry matter digestibility factors by 3.80%, organic matter - by 3.80%, protein - by 4.20%, and fiber - by 3, 10% and BEV - by 4.20%. According to the results of the III physiological experiment, with the enrichment of rations with a mixture of MEC: Celloviridin G20x + Protosubtilin G3x and probiotics, the broilers of the 4<sup>th</sup> experimental group showed the best absorption of the dietary protein against the control analogues.*

**Keywords:** broiler chickens, enzyme preparations, probiotic, compound feeds, digestibility and availability of nutrients.

**Corresponding author:****Rustem B. Temiraev,***Doctor of Agricultural Sciences, Professor,**Chair of Technology of Food Products,**North-Caucasian Mining and Metallurgical Institute**(State Technological University), Vladikavkaz 362021, Russian Federation.*

Please cite this article in press Rustem B. Temiraev et al., *Effect Of Biologically Active Preparations On The Digestibility And Nutrient Availability Of Broiler Rations., Indo Am. J. P. Sci, 2019; 06(09).*

**INTRODUCTION:**

In recent times, enzyme preparations specialized by the types of grain components have been successfully used in compound feeds for poultry. Skillful selection of these preparations in the composition of diets makes it possible to optimize the digestibility and availability of nutrients from feed, the productivity of poultry, to reduce feed consumption per unit of weight gain. To improve the digestibility and assimilation of the components of the feed, including cereal grains, enzyme preparations are used, which cleave long molecules of non-starch polysaccharides (Vityuk *et al.*, 2013; Kokaeva, 2008).

Along with this, the strengthening of the digestive metabolism in the gastrointestinal tract and the improvement of microbial populations in the intestine of poultry are positively influenced by probiotics, which contain living cells of beneficial bacteria. Moreover, when feeding these preparations provides a complete fermentation of feed polymers, the activation of the synthesis of substances with antibacterial activity, vitamins and essential amino acids (Vityuk *et al.*, 2017; Tsalieva *et al.*, 2017; Kokaeva *et al.*, 2017).

There is a positive experience in the effective co-feeding of multienzyme complexes (MEC) and the

probiotic Bifidum SHG in wheat-and-barley-based compound feeds for meat chicken. However, this direction in the nutrition of meat poultry on the rational use of probiotics and enzyme preparations to increase the conversion of feed into products requires more in-depth studies (Temiraev *et al.*, 2017; Temiraev *et al.*, 2017).

The objective of the research is to study the effectiveness of supplementation of the probiotic Bifidum SHG and enzyme preparations (Protosubtilin G3x and Celloviridin G20x) in complete feed based on cereal grain (barley + maize) and sunflower oil cake of local production for enhancement of the digestibility and availability of nutrients in diets for broiler chickens.

**MATERIAL AND RESEARCH METHODS:**

The experimental part of the work, consisting of 3 scientific and economic and 3 metabolism trials, was carried out on the poultry farm "Polyakov" of the Mozdok District of RNO-Alania on the chickens of the Smena-7 cross. At the same time, during each experiment, 4 groups of 200 animals each were formed from day-old chickens using the group-analogue method.

Table 1 shows the feeding pattern for experimental chickens during experiments.

Table 1 - Scheme of scientific and economic experiments n=200

Group	Basal diet (BD) based on local cereal grains and sunflower oil cake	Doses of supplements		
		Bifidum-bacterin, 1 dose/ 200 heads	Celloviridin G20x, g/t of feed	Protosubtilin G3x, g/t of feed
Experiment I				
1- control	Basal diet (BD)	–	–	–
2- experimental	BD + probiotic Bifidumbacterin	1 dose	–	–
3- experimental	BD + Celloviridin G20x	–	100	–
4- experimental	BD + probiotic Bifidumbacterin + Celloviridin G20x	1 dose	100	–
Experiment II				

1- control	Basal diet (BD)	–	–	–
2- experimental	BD + probiotic Bifidumbacterin	1 dose	–	–
3- experimental	BD + Protosubtilin G3x	–	–	300
4- experimental	BD + probiotic Bifidumbacterin + Protosubtilin G3x	1 dose	–	300
Experiment III				
1- control	Basal diet (BD)	–	–	–
2- experimental	BD + probiotic Bifidumbacterin + Celloviridin G20x	1 dose	100	–
3- experimental	BD + probiotic Bifidumbacterin + Protosubtilin G3x	1 dose	–	300
4- experimental	BD + probiotic Bifidumbacterin + Celloviridin G20x + Protosubtilin G3x	1 dose	100	300

The duration of all three scientific and business experiments was 42 days. Against the background of each experiment, to study the digestibility and availability of nutrients of the rations for experimental chickens under the influence of tested enzyme preparations and probiotics on poultry aged 28-35 days, three physiological experiments were carried out according to the standard technique with the addition of an inert indicator of chromium oxide to their compound feed at the rate of 0.5% by weight of the feed.

To determine nitrogen utilization of the feed in the experimental poultry, the nitrogenous substances

of their feces and urine in the litter were separated according to the generally accepted method (Dyakov, 1959).

The obtained results were processed by the method of variation statistics using the Microsoft Excel software package for mathematical analysis.

#### RESEARCH RESULTS AND DISCUSSION:

The results of the study of the digestibility of nutrients of the rations for experimental chicken in the course of all three physiological experiments are shown in table 2.

Table 2 - Digestibility coefficient of nutrients of rations,% n=5

Group	Digestibility coefficient					
	Dry matter	Organic matter	Crude protein	Fibre	Crude fat	NFE
Physiological experiment I						
1- control	80.2±0.43	81.7±0.39	84.8±0.44	12.3±0.31	87.9±0.74	86.6±0.45
2- experimental	81.8±0.37*	83.2±0.41*	85.9±0.51*	14.0±0.55*	87.5±0.8	88.5±0.52*
3- experimental	82.5±0.43*	83.9±0.39*	87.2±0.44*	14.9±0.61*	88.0±0.74	89.0±0.45*
4- experimental	83.2±0.37*	84.5±0.41*	88.0±0.51*	15.5±0.55*	87.7±0.68	89.6±0.52*
Physiological experiment II						
1- control	80.8±0.61	82.2±0.47	85.6±0.49	13.5±0.37	86.5±0.39	87.1±0.63
2- experimental	82.4±0.51*	83.9±0.56*	87.5±0.62*	14.9±0.65*	87.6±0.68	88.9±0.36*
3- experimental	83.1±0.46*	84.5±0.37*	88.0±0.44*	15.3±0.35*	86.8±0.59	89.6±0.46*
4- experimental	83.7±0.55*	85.1±0.50*	88.6±0.32*	16.0±0.48*	86.5±0.62	90.4±0.61*
Physiological experiment III						
1- 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
2- experimental	83.7±0.52*	85.1±0.51*	89.0±0.39*	15.4±0.28*	86.3±0.71	90.0±0.44*
3- experimental	83.8±0.49*	85.2±0.34*	89.2±0.42*	15.7±0.37*	86.1±0.59	90.4±0.53*
4- experimental	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

It was established that during the first metabolism trial, broilers of the 4<sup>th</sup> experimental group, receiving Celloviridin G20x and Bifidumbacterin as part of

compound feed, had higher coefficients of nutrient digestibility of the diet. The chickens of this group significantly (P> 0.95) exceeded the control analogues

in terms of the digestibility factors of dry matter by 3.00%, organic matter - by 2.80%, protein - by 3.20%, cellulose - by 3.20% and NFE - by 3.00%.

According to the results of the II physiological experiment, broilers of the 4<sup>th</sup> experimental group, that received a mixture of probiotic and the enzyme preparation Protosubtilin G3x, had significantly ( $P > 0.95$ ) higher dry matter digestibility factors by 2.90%, organic matter - by 2.90%, protein - by 3.00%, fiber - by 2.50%, and NFE - by 3.30% than in the control.

During the III metabolism trial, it was found that the hydrolysis of complex feed polymers occurred more efficiently in the gastrointestinal tract of chickens of the 4<sup>th</sup> experimental group, which feed was enriched with a

mixture of MEC Celloviridin G20x + Protosubtilin G3x and probiotic. Therefore, the poultry of this group against the control showed significantly ( $P > 0.95$ ) higher dry matter digestibility factors by 3.80%, organic matter - by 3.80%, protein - by 4.20%, fiber - by 3.10% and BEV - by 4.20%. We believe that the reason for this was the synergism of the action of the tested preparations, because in such a combination the range of exogenous and endogenous enzymes is expanded. At the same time, the intensification of hydrolysis processes of raw protein, fiber and NFE of diets based on grain of cereals and sunflower oil cake takes place in the digestive canal.

The level of protein digestibility by the experimental chickens under the influence of tested feed preparations was assessed by nitrogen balance (Table 3).

Table 3 – Availability of dietary nitrogen by experimental chickens, g n=5

Group	Taken with feed	Excreted		Deposited	Utilized from taken, %
		In feces	In urine		
Physiological experiment I					
1- control	3.138±0.041	0.478±0.004	1.036±0.031	1.624±0.006	51.75±0.46
2- experimental	3.113±0.032	0.437±0.003*	1.010±0.026	1.666±0.016*	53.51±0.60*
3- experimental	3.107±0.031	0.397±0.006*	1.029±0.037	1.681±0.019*	54.10±0.51*
4- experimental	3.082±0.029	0.370±0.006*	1.019±0.041	1.693±0.017*	54.93±0.61*
Physiological experiment II					
1- control	3.107±0.031	0.448±0.005	1.040±0.036	1.619±0.009	52.11±0.36
2- experimental	3.113±0.032	0.389±0.004*	1.065±0.023	1.659±0.014*	53.29±0.23*
3- experimental	3.120±0.039	0.375±0.006*	1.057±0.033	1.688±0.017*	54.10±0.45*
4- experimental	3.095±0.027	0.353±0.004*	1.042±0.031	1.700±0.014*	54.93±0.42*
Physiological experiment III					
1- control	3.163±0.032	0.443±0.004	1.098±0.023	1.622±0.014	51.28±0.23
2- experimental	3.126±0.039	0.326±0.006*	1.111±0.033	1.689±0.007*	54.03±0.45*
3- experimental	3.119±0.041	0.337±0.004*	1.088±0.031	1.694±0.006*	54.31±0.46*
4- experimental	3.101±0.031	0.304±0.006*	1.086±0.037	1.711±0.009*	55.18±0.51*

\* $P > 0.95$

With joint use as part of compound feeds of the probiotic Bifidum SHG, in the first case, with Celloviridin G20x and, in the second case, with Protosubtilin G3x, during I and II metabolism trials, there was an increase in protein digestibility of feeds, which in comparison with the control analogues provided the broilers of the 4<sup>th</sup> experimental group a significantly ( $P > 0.95$ ) daily increase of nitrogen deposition in the body by 0.069 and 0.081 g, respectively. In addition, when probiotics and two MECs were included in the rations of chickens of the 4<sup>th</sup> experimental group, there was a significant ( $P > 0.95$ ) improvement in the level of nitrogen utilization from the amount taken with feed by 3.18 and 2.82%, as compared to the control.

According to the results of the III physiological experiment, with enrichment of rations with MEC

mixture of Celloviridin G20x + Protosubtilin G3x and probiotics in broilers of the 4<sup>th</sup> experimental group versus control analogues, there was better absorption of the ration protein, that is, they reliably deposited in the body more nitrogen ( $P > 0.95$ ) by 0.089 g. At the same time, in the chickens of the 4<sup>th</sup> experimental group, the nitrogen from the amount received with feed, was utilized reliably ( $P > 0.95$ ) better versus the control group by 3.90%.

### CONCLUSION:

The most favorable effect on the digestibility and nutrient availability of the compound feed based on maize, barley, sunflower oil cake had joint supplements of probiotic Bifidum SHG and MEC combinations Celloviridin G20x + Protosubtilin G3x. That promoted the expansion of the spectrum of exogenous cellulases, pectinases, proteases and

amylases.

#### REFERENCES:

1. Vityuk, L.A. Kokaeva M.G., Bayeva Z.T., Tedtova V.V. Technological method of increasing consumer qualities of milk and dairy products // Sustainable Development of Mountain Territories. - 2012. - №4. - p. 81-84.
2. Kokaeva, M.G. Improvement of the nutritional value of broiler meat / M.G. Kokaeva // Proceedings of the XII All-Russian Scientific-Practical Conference "Agribusiness and Actual Problems of the Economy of Regions" - Maikop. - 2008. - p. 200-201.
3. Vityuk, L.A., Kononenko, S.I., Yarmoc, A.V., Tletsruk, I.R., Chopikashvili, L.V. 2017. Method of increasing ecological and consumer qualities of meat and intensification of the digestive metabolism processes in broilers grown in technogeneous areas. Journal of Pharmaceutical Sciences and Research. 9 (6): 766-770.
4. Tsalieva, L.V., Temiraev, R.B., Kononenko, S.I., Dzagurov, B.A., Gazzaeva, M.S. and S.A. Grevtsova, S.A. 2017. Ecological and consumer properties of pig meat from different breeds produced in technogenic zone. Journal of Pharmaceutical Sciences and Research. 9 (12) : 2397-2400..
5. Kokaeva, M.G., Temiraev, R.B., Beslanev, E.V., Cheresova, S.K., Kubatieva (Gutieva), Z.A. and Kozyrev, S.G. 2017. Influence of antioxidant and adsorbent on the processes of digestive and intermediate metabolism in lacting cows during denitrification. Journal of Pharmaceutical Sciences and Research. 9 (12) : 2401-2404..
6. Temiraev, V.Kh., Kairov, V.R., Temiraev, R.B., Kubatieva, Z.A. and Gukezhev, V.M. 2017. Method to improve productive performance and digestion exchange of broiler chickens with reduced risk of aflatoxicosis. Ecology, Environment and Conservation. 23 (1) : 554-561.
7. Temiraev, R.B., Kozhokov, M.K., Cheresova, S.K., Kokaeva, F.F. and Tletsruk, I.R. 2017. Method for diminishing the adverse effect of anthropogenic heavy metal pollution on poultry meat products. Journal of Environmental Management and Tourism. 8 (19) : 567-573.
8. Dyakov, M.I. Basics of rational feeding of poultry / M.I. Dyakov // Moscow. - 1959. - 36 p.