

STIMULATING EFFECT OF THE BIOMASS OF STREPTOMYCES FRADIAE CNMN-AC-11 ON THE GROWTH OF YOUNG POULTRY

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Abstract

In the paper are presented the results of scientific investigations regarding the use in the diet of young chickens of Adler Silver breed aged one day, of Streptomyces Biomass, which represents a biologically active preparation of microbiological origin, and which is obtained from apatogenic streptomycetes such as *Streptomyces Fradiae CNMN-Ac-11*, extracted from the soils of the Republic of Moldova.

The investigations were carried out within the project 20.80009.5107.12 ” Strengthening the "food-animal-production" chain by using new feed resources, and innovative sanitation methods and schemes”, which are organized and carried out within LLC "Avicola Saratenii-Vech" located in Saratenii Vechi village, Telenesti district.

The research was carried out on a batch of 100 chickens, randomly distributed in two groups of 50 chickens in each, one of which was a control group and another was a experimental group. The time duration of the investigations was 7 weeks.

It was established that at the end of the investigations the live mass was higher in the experimental group of chickens whom were administered Streptomyces biomass in propoirtion of 0.1% and who recorded an increase of 5.1% in live weight compared to chickens from the control group. The indices of the specific consumption in this group of chickens were lower by 9.3 % compared to the chickens in the control group.

Keywords: young chickens, biomass, *Streptomyces fradiae* CNMN-Ac-11, live weight, specific consumption.

Introduction

One of the most innovative branches of the livestock sector is aviculture, which is based on industrial production methods, where the entire technological process is aimed at solving problems that will ultimately lead to increased poultry productivity, increase poultry production, and will improve the quality of the obtained products.

Of all the factors that determine the productivity of agricultural birds, the largest share falls on the organization of balanced nutrition, which allows not only to fully satisfy the body's requirements in nutrients, but also to maintain the internal microbiological balance, which changes under the influence of external and internal factors.

At the same time, modern food technology should exclude the use of antibiotics to stimulate bird growth and for prophylactic purposes. The negative consequences of the use of antibiotics are dysbacteriosis, the emergence of resistance to pathogenic microorganisms and a decrease in immunity.

In these conditions of substitution of feed antibiotics a promising direction in the breeding of broiler chickens is the use of biologically active preparations, which increase the digestibility and

absorption of nutrients from feed, and reduce the negative impact of antinutritional factors that transform the bacterial composition of the gastrointestinal tract (Starciuc and Manciu, 2014; Usatai, 2001).

Against this background, preparations of microbiological origin, are the most promising in this direction due to their availability, practically absence of undesirable side effects, a wide range of therapeutic effects and the absence of development of resistance to microorganisms. One of these preparations with a growth stimulator effect is represented by biomass obtained from apatogenic streptomycetes such as *Streptomyces fradiae* CNMN-Ac-11 (Boortseva, Bereziuk, 2015; Bereziuk, 2016; Bereziuk, et al, 2016).

The product of microbial synthesis of streptomycetes is used in the form of a complex preparation, which supplements the recipe of nutrition, which leads to optimization of metabolism, fortification of the immune system and increased productivity.

In addition to nutritional value, it also possesses antimicrobial and immunomodulatory activity, which favors the digestion of feed and inhibits the development of pathogenic microflora in the intestines (Sheptytsky et al, 2007; Bereziuk, 2016; Bereziuk, 2017; Toderash, 2000).

The aim of the proposed research is to study the influence of streptomyces biomass administered in nutrition recipes on the growth and development of young poultry, as well as on some blood indices of chickens.

Materials and methods

The proposed researches were carried out within LLC "Avicola Saratenii-Vechi", village Saratenii Vechi, Telenesti district, where an experiment was organized on 100 chickens of Adler silver breed, aged one day, which by random sampling were distributed in two groups of chickens with 50 heads in each, of which a control and another experimental group that were later included in the research.

To chickens from the control group were given standard combined feed, and those from the experimental group received in the nutrition recipes a supplement of 0.1% biomass of streptomycetes.

The scheme of conducting research is presented below (tab.1).

Table 1. Scheme of the conducted experiment

Groups	Biological material	Heads number	Caracterul alimentației Suplimentarea
Control	young chickens of Adler Silver breed aged one day	50	Combined feed
Experimental	young chickens of Adler Silver breed aged one day	50	Combined feed + 0.1% biomass of streptomycetes

The working methods used were those written in the specialized literature and the duration of the investigations was 7 weeks.

The conditions of maintenance of the chicks in the experiment were identical, in batteries with cages, respecting the hygienic and microclimate conditions in accordance with the norms provided for the age category stated and the necessary changes during the experiment.

The control weighing of the chickens from the control and experimental groups was performed at the age of 15, 30 and 49 days.

The character and diet regime was identical for both the groups included in the experiment and which corresponded to the recommended requirements for the respective age categories. Food and water were administered at discretion, with daily records of the consumed feed, and the management and vaccination programs were carried out in accordance with commercial practices. The combined feed administered to the chickens in the experiment provided their needs in energy, protein and the rest of the nutrients corresponding to the age. The structure of the recipes administered to the chickens in the experiment are presented in table 2.

Table 2. Structure and nutritional value of combined feed recipes used in the experiment

Raw compounds	Involvement rate, %	
	age of 0 to 21 days	age of 22 to 49 days
Corn	54,1	50,5
Wheat	11,0	18,5
Soybean meal	28,1	24,0
Fish meal	3,0	3,0
Vegetal oil	1,0	1,0
Premix	1,0	1,0
Monocalciophosphate	1,8	2,0
TOTAL	100	100
Energy and nutrient content		
ME, kcal/kg feed	2850	2688
BP, %	21,9	19,4
Cellulose, %	3,1	3,3

During the investigations were determined the basic indices characterizing the growth process of the young poultry, namely: live weight, average daily gain and specific consumption. Upon completion of the experiment the blood samples were taken from the chickens in the experiment for morphological and biochemical analysis. The data accumulated during the research were processed mathematically by using the student statistical test.

Results and discussion

The biomass obtained from *Streptomyces fradiae* CNMN-Ac-11 possesses a valuable biochemical content, proteins, amino acids, including indispensable, carbohydrates, lipids, substances with antimicrobial activity and other physiologically important compounds, which are the basis for the use of this biologically active product in the nutrition of poultry youth. Its use leads to normalization of intestinal microflora in birds, improvement of digestion process, increase of non-specific resistance of the organism, productivity and viability of birds, simultaneously with reduction of feed consumption at production unit and increase in quality of obtained production. The results of our research demonstrate the efficiency of the use of biomass obtained from *Streptomyces fradiae* CNMN-Ac-11 on the growth process of young chickens expressed by the evolution of the basic indices, such as live weight, average daily gain and specific consumption. The evolution of the live weight of the chickens in the experiment is shown in figure 1.

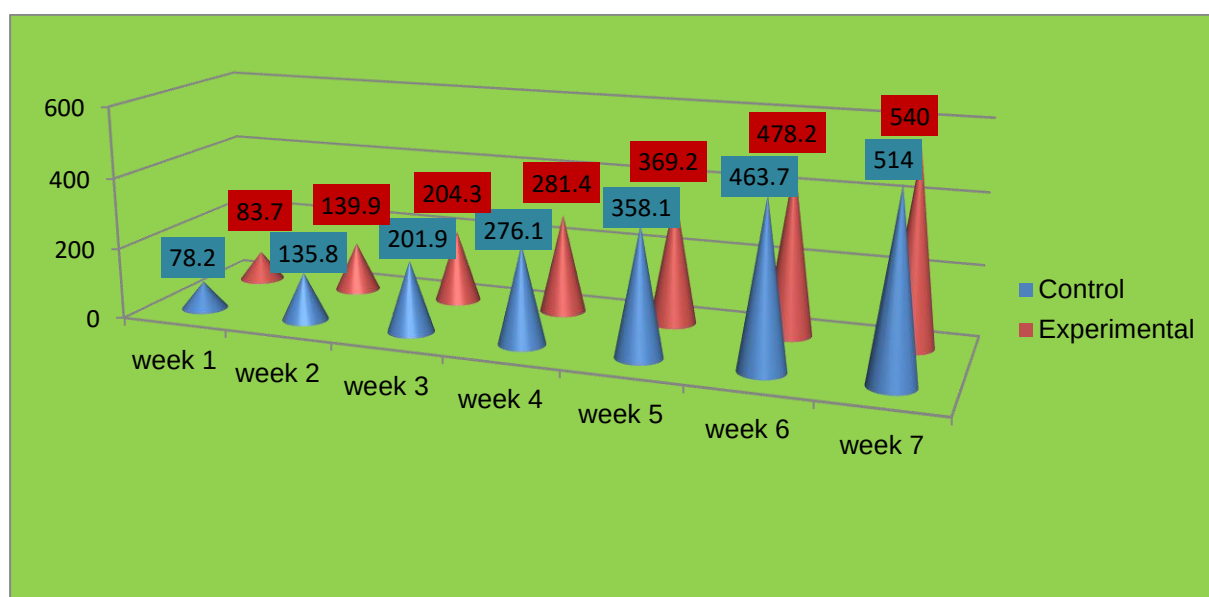


Figure.1. Evolution of live weight in chickens in the experiment, g/week

From the data presented in the table, we can mention that the live weight in the chickens from the experimental group was higher than the live weight in the chickens from the control group throughout the entire 7 weeks of investigations.

At the end of the investigations, the values of the basic indices as live weight, average daily gain and specific consumption were determined, which included the efficiency of the growth process of the young chickens from the experiment, the results being presented in figure 2.

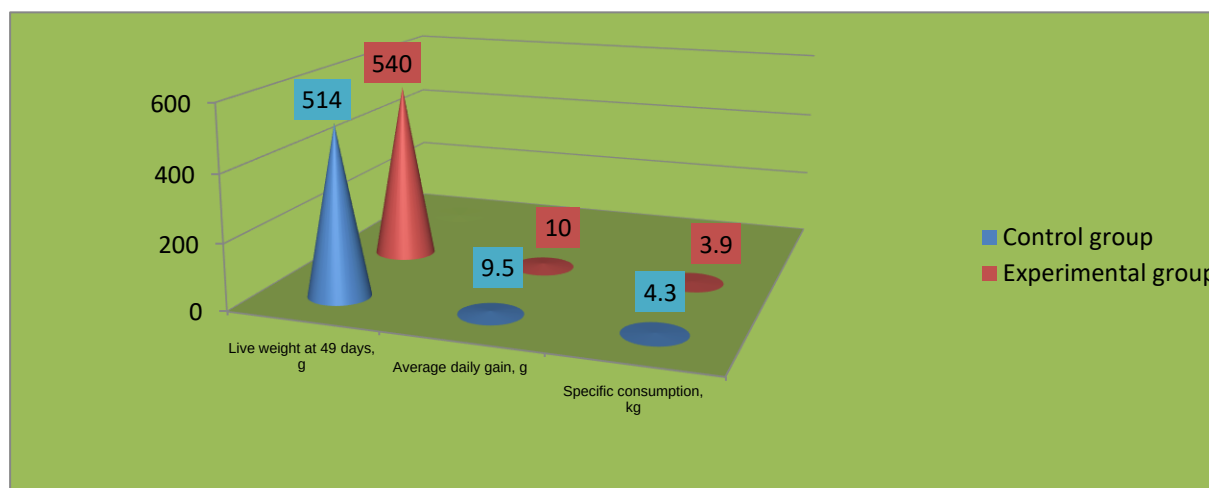


Figure.2. Growth indices of young chickens

The data presented in Figure 2 indicate that the live weight of the chickens from the control group and the experimental group were 514.0 g and 540.0 g respectively. So, the chickens from the experimental group recorded an increase of 5.1% in live weight compared to the chickens from the control group ($p < 0,01$).

The average daily gain of the chickens from the control group and the experimental group made up 9.5 g in first case and 10.0 g in second case, respectively. So, the experimental group recorded

higher values of this index, which was 5.2% higher compared to the chickens from the control group.

The specific consumption in the control group was 4.3 kg. In the experimental group this index made up 3.9 kg. Respectively, the specific consumption index recorded lower values in the experimental group, which indicates a more efficient feed consumption, and which was lower by 9.3% compared to the chickens in the control group.

In order to control the physiological state of the chickens in the experiment, blood samples were taken with the aim of establishing biochemical indices. The results of the investigations are shown in figure 3.

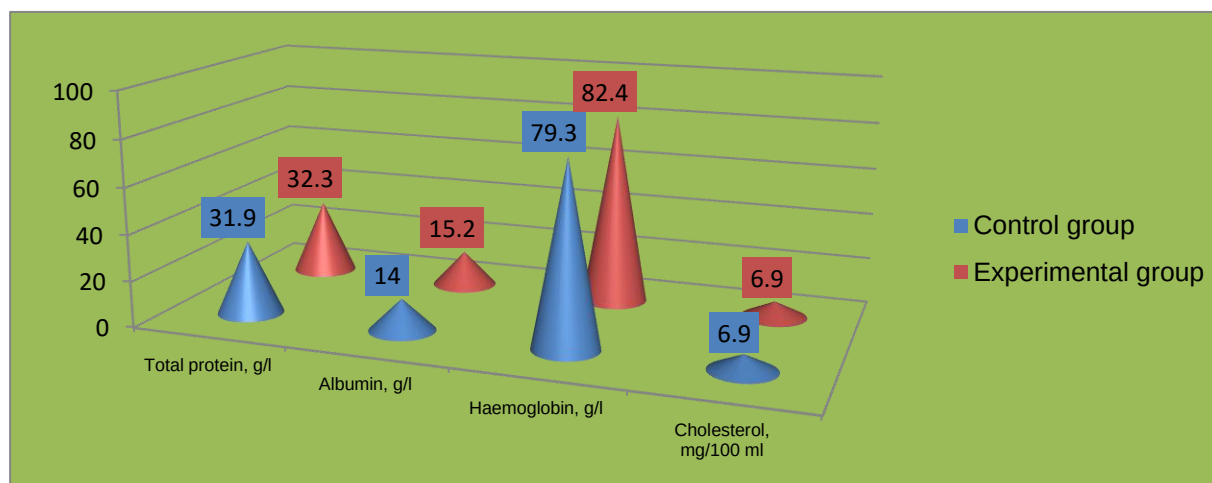


Figure.3. Biochemical indices of blood taken from chickens in the experiment

According to the data presented in the figure above, we can mention that the total protein content in the blood serum of the chickens from the control group was 31.9 g/l, and in the blood serum of the chickens from the experimental groups 32.3 g / l. The total albumin values in the blood serum of the chickens from the control group and the experimental group made up 14.0 g/l and 15.2 g/l respectively. The blood serum hemoglobin of the chickens from the control group made up 79.3 g/l, and for those from the experimental group – 82.4 g / l.

What is related to the cholesterol content in the blood serum of the chickens from the control group and the experimental group it had values of 6.9 mg/100 ml and 6.9 mg/100 ml simultaneously.

From the previously presented data we can mention that the groups in the experiment did not show significant differences in the content of protein, albumin and hemoglobin in the blood serum. We also found no effect of streptomyces biomass on cholesterol content. In the blood serum of chickens of all groups in the experiment it fluctuated differently and within insignificant limits.

Blood samples were also taken in order to study the hematological indices (of the leukocyte formula), which is essential in argumenting the state of immunological reactivity and resistance of the organism to the action of various biological contaminants. The obtained results are shown in figure 4.

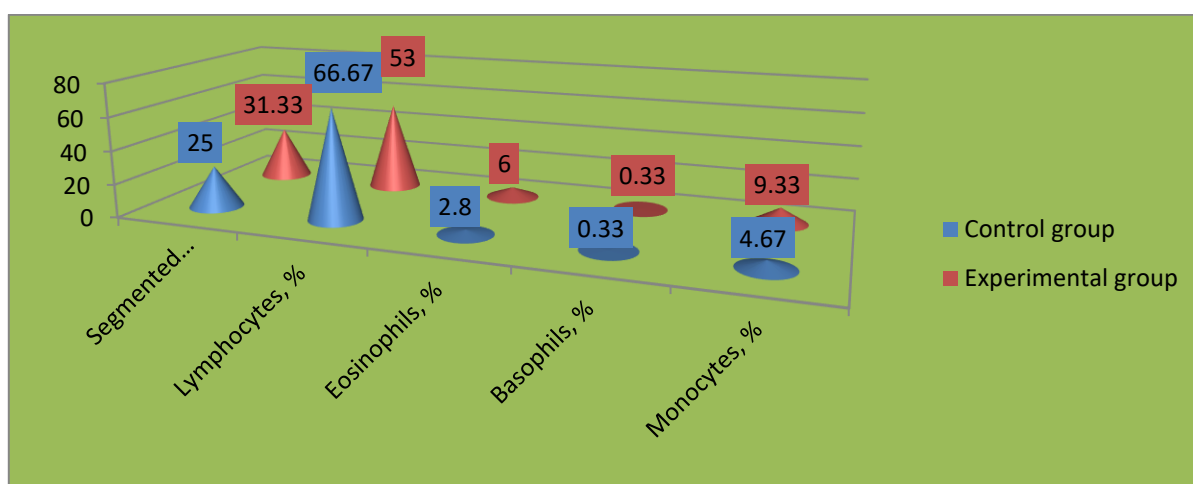


Figure 4. Leukocyte formula of blood samples taken from chickens in the experiment

The analysis of the blood indices presented earlier showed a slight increase in the number of monocytes (by 4.66%) and eosinophils (by 3.2 %) in the blood of the chickens from the experimental group, who received in the combined feed the *Streptomyces* biomass, which denotes an immunostimulating action on the chickens organism.

The biochemical and morphological indices of the blood taken from the chickens in the experiment, demonstrated a better physiological state of the chickens from the experimental group whom were given the biomass of streptomycetes in the proportion of 0.1%.

Conclusions

1. The research showed that the administration of streptomycetes biomass in a proportion of 0.1% in the combined feed intended for chickens feeding contributed to a weight gain of 5.1% and an average daily increase of 5.2%, simultaneously with a decrease of 9.9% for the specific consumption.
2. As a result of taking blood samples and conducting biochemical analyzes of blood serum, obtained from blood samples taken from chickens in the experiment, no significant differences were established in the content of protein, albumin, hemoglobin and cholesterol.
3. The morphological analyses of blood samples taken from the chickens in the experiment showed a slight increase in the number of monocytes and eosinophils (from 4 to 9% respectively) in the group of chickens that received in the combined feed the *Streptomyces* Biomass in a proportion of 0.1%, which denotes an immunostimulating action on the chickens ' organism.

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