

**Short Communication**

**BIOLOGICAL INFLUENCE OF METHENAMINE SILVER ON BROILERS**

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**ABSTRACT**

**Objective:** Important trend in the global agribusiness is restrictions of antibiotics content in meat and poultry products. Widespread of antibiotic-resistant microorganisms leads to huge losses of the effectiveness of the drugs. The aim of the present work was an investigation of the biological activity of antibacterial complex-silver methenamine poultry farming.

**Methods:** The study of biochemical and hematological indices of blood we performed one day after single and course of oral drug administration on broilers Ross 308. Evaluation of biological action in industrial poultry farming was carried out on a group of 30 thousand broilers after a course of oral administration.

**Results:** revealed the silver complex (in form of water solution) has no toxic effects on blood parameters. It was shown the positive influence on survival and productivity of broilers.

**Conclusion:** Methenamine silver has certain potential as prospect drug and food additive.

**Keywords:** Methenamine silver, Hexamethylenetetramine silver, Poultry, Broilers, Blood parameters

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Poultry breeding is one of the profitable and developed livestock industries worldwide. Last decades, production of poultry products increased globally [1]. Different housing system and management greatly influenced on poultry condition [2]. Use of antibiotics in livestock industry also boosts new resistant bacteria that increase foodborne illness in humans and causes significant economic losses [3]. Therefore, one of the trends in the global agribusiness is restrictions of antibiotics in meat and poultry products. Widespread of antibiotic-resistant microorganisms also leads to loss of effectiveness of the drugs while maintaining the side effects [4]. Passive immunization with pathogen-specific antibodies is emerging as a potential alternative to antibiotics for the treatment and prevention of various animal diseases [5]. Metal-containing drugs are also a prospective alternative for antibiotics. Reportedly, metal complexes are used in poultry feed, allowing increase the body mass and protein value [6]. It was confirmed that nanocrystalline metals Fe, Cu, ZnO and Se supplemented to chicken feed resulted in certain improvement of poultry breeding [7]. In this regards, much attention has been paid to prophylactics in livestock breeding [8], especially as an alternative for antibiotics [9]. Previous studies have shown low genotoxic properties of methenamine (hexamethylenetetramine) silver complex and its antibacterial activity [10, 11]. Despite that, silver nanoparticles express certain genotoxic effects [12]. This work is part of pilot trials to assess methenamine silver influence on performance, biochemical and haematological parameters of the

agricultural animal. Here we present an evaluation of methenamine silverbiological effects in poultry breeding.

All tests were conducted on broilers ROSS 308. Methenamine silver was used in the experiment as 0.5% stabilized aqueous solution, orally administered. The birds were kept under identical conditions in special cages, feeding in accordance with the daily needs based on age. Experimental birds were divided into 4 groups of 20 birds each. In the experiment, all the birds received 0.5% solution of the drug at different doses. Control group received drinking water as usual. The experimental groups were given the drug individually, as following: first group-single dose of 1 mg/kg (dose of therapeutic range), the second group-single dose 25 mg/kg, the third group-course often doses of 2.5 mg/kg consequentially every 24 h, fourth group (control)-drinking water without tested drug. The study of hematological and biochemical indices of blood was performed one day after taking the drug. Indices were measured on the hematology analyzer PCE 90 Vet (HTI, USA) and on biochemical analyzer Hymalizer Junior (HUMAN GMBH, GERMANY). The results were statistically processed by Statistica 12 software and considered as significant with  $p \geq 0.05$ . The data are shown as mean $\pm$ SEM.

Hematologic parameters in the control and experimental groups were not significantly different, without going beyond the physiological norm (table 1).

**Table 1: Complete blood count under influence of tested drug**

Indicator	Unit	1Group	2Group	3 Group	Control
Hemoglobin	g/l	94.1 $\pm$ 2.73	91.8 $\pm$ 3.9	93.4 $\pm$ 6.3	93.6 $\pm$ 4.5
RBC	$\times 10^{12}$ /l	2.4 $\pm$ 0.02	2.3 $\pm$ 0.012	2.4 $\pm$ 0.03	2.41 $\pm$ 0.023
Platelets	$\times 10^9$ /l	80.9 $\pm$ 7.01	88.0 $\pm$ 5.8	78.0 $\pm$ 7.6	81.0 $\pm$ 3.01
Lymphocytes	%	58.7 $\pm$ 0.67	59.2 $\pm$ 0.30	55.4 $\pm$ 0.5	58.9 $\pm$ 0.73
Erythrocyte sedimentation rate	mm/h	3.2 $\pm$ 0.21	3.3 $\pm$ 0.31	3.4 $\pm$ 0.12	3.1 $\pm$ 0.23

The number of platelets, as well as the erythrocyte sedimentation rate in the test group and in the control group, was not significantly different. Analysis of leukocyte formula showed that the number of

lymphocytes in the experimental groups did not change significantly from the level of control. Biochemical indices in all experimental groups and in control were in the same range (table 2).

Table 2: Biochemical parameters of blood under influence of tested substance

Biochemical parameters	Unit	1Group	2Group	3 Group	Control
Albumen	g/l	27.50±0.93	29.30±1.22	30.40±1.87	27.70±1.01
Totalbilirubin	mmol/l	1.86±0.19	1.93±0.18	2.36±0.26	1.80±0.22
Creatinine	mmol/l	1.31±0.12	1.32±0.21	1.35±0.23	1.30±0.15
Glucose	mmol/l	3.21±0.31	3.34±0.55	4.05±0.44	3.17±0.48

Results revealed the positive influence of silver complex on poultry health and productivity. Different doses of the drug did not cause changes in haematological and biochemical indicators when applied orally both in single or course of administration. The general condition of birds was satisfactory throughout the period of experiments.

Biological effects of silver salt in industrial poultry farming were assessed on broilers. There were two groups with 32480 birds (test group) and 32320 birds (control group). The tested substance was added to the drinking water. The course included watering broilers with drinking water with the additive in certain experimental point at the age of 4, 6, 8, 13, 15, 17, 19, 23 and 25 d in the dosage of 1 mg/kg of live weight per day. In the process of growing broilers in the poultry house (experimental and control groups) from the first days of life (1-3 d) was administered the antibiotic according to the current regulations. The period of broiler growing was 41 d with daily monitoring of condition. Within this period, poultry survival in test group broilers higher to 1.7% compared with the control group. Average daily weight gain per broiler in the test group was 2.8% higher than in the control group.

Thus, the results showed no toxic influence on haematological and biochemical blood parameters in different dosage and in single or course application per os. Experiment in industrial poultry farming revealed moderate raise of productivity and reduction of mortality in experimental group of broilers under the action of silver methenamine within experimental dosage.

#### AUTHORS CONTRIBUTIONS

All the author have contributed equally

#### CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest

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