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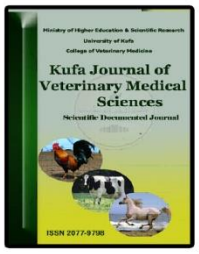

Evaluation of Using of (Toxicom) on Blood Pictures and body weight of Broilers Fed on Mycotoxin Contaminated Ration and Vaccinated Against Gumboro

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Abstract

The aim of this study is to evaluate the possible protective effect of preparation which synthesized in Vitebsk State Academy of Veterinary Medicine adsorbent ((Toxicom)) 5g\kg diet against the toxic effects of mixed mycotoxins in growing broiler chickens .Total 75 chicks, one week age, were divided into 5 treated groups, 15 birds for each. The first group (G1) fed a contaminated ration with mycotoxin and supplemented with (Toxicom) 5g/kg of diet and vaccinated with Infectious Bursal Disease (IBD) vaccine at 15 and 22 days of age. The second group (G2) was fed a ration contaminated with mycotoxin and vaccinated with IBD vaccine at 15 and 22 days of age and not supplemented with (Toxicom). The third group (G3) was fed an intact broiler ration and vaccinated with IBD vaccine at 15 and 22 days of age. The fourth group (G4) was only fed a contaminated ration with mycotoxins and not vaccinated. The fifth group (G5) was fed intact broiler ration and not vaccinated as a control group. The diet was naturally contaminated with many mycotoxins and analyzed by ELISA and the level of mycotoxins were as follows : Aflatoxin B1 0.001 mg/kg, Dezoxivalenol 1.24 mg/kg, Zearalenon 0.068 mg/kg, Ochratoxin 0.005 mg/kg, T2 toxin 0.09 mg/kg, Fuminisen B1 0.2 mg/kg. It was concluded that this preparation which synthesized in Vitebsk State Academy of Veterinary Medicine is protect chicken blood parameters in comparison with the other groups.

Key words: Mycotoxins, Absorbent, IBD, Broilers, Blood picture.

تاثيراستخدام التوكسيكوم على وزن الجسم والصورة الدموية لدجاج اللحم المغذى بعليقة تحتوي السموم الفطرية والملقحة بلقاح الكمبورو

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الخلاصة:

كان الهدف من هذه الدراسة تقييم التأثير الوقائي المحتمل لاستخدام (توكسيكوم) المادة المحضرة في اكاديمية فيتبسك الحكومية للطب البيطري وبجرعة 5 غم/ كغم علف ضد السموم الفطرية المختلطة في علائق فروج اللحم. استخدم في التجربة 75 فرخا بعمر اسبوع واحد قسمت الى خمس مجاميع . المجموعة الأولى أعطيت

العليقة الملوثة بالسموم الفطرية مع مادة التوكسيكوم بجرعة 5 غم/ كغم علف ولقحت بلفاح الكمبورو بعمر 15 و22 يوما ،تم تغذية المجموعة الثانية العليقة الملوثة بالسموم الفطرية ولقحت ايضا بعمر 15 و 22 يوما ،المجموعة الثالثة اعطيت العلف السليم الخالي من السموم الفطرية ولقحت ايضا بعمر 15 و22 يوما ،اما المجموعة الرابعة فقد اعطيت العلف الملوث ولم تلقح وقد تركت المجموعة الخامسة كمجموعة سيطرة .تم تحليل العلف الملوث بواسطة الاليزا وكانت نسب السموم الفطرية كالاتي : الافلاتوكسين 0.001ملغم/ كغم،الديزوكسيفالينول 1.24 ملغم/ كغم،الزيرالينون0.068 ملغم/ كغم،الاوكراتوكسين 0.005 ملغم/ كغم،ت 2 0.09 ملغم/ كغموالفومينيسينب1 0.2 ملغم/ كغم . تم الاستنتاج بان المادة المستحضرة في اكاديمية فيتبسك الحكومية للطب البيطري تحمي الصورة الدموية للدجاج وتقلل تأثير السموم الفطرية مقارنة بباقي المجاميع وقد تمت التوصية باستخدامها كمادة مضادة للسموم في جمهورية بيلاروسيا.

Introduction

Mycotoxins are chemical substances produced by several fungi, particularly by many species of *Aspergillus*, *Fusarium*, *Penicillium* and *Alternaria*. They comprise a group of several hundreds of chemically different toxic compounds. The most common mycotoxins are aflatoxins,ochratoxin A, trichothecenes, zearalenone, and fumonisins (1).

The Food and Agriculture Organization (FAO) has estimated that worldwide about 25% of crops are affected annually with mycotoxins (2). Surveys reveal sufficiently high occurrences and concentrations of mycotoxins to suggest that they are a constant concern (3). A total of 2,753 assays were performed on 1,507 samples taken from European and Mediterranean markets for the determination of mycotoxins, 52% of these samples were tested positive indicating that the incidence of mycotoxins is quite high in animal feed (4). Mycotoxin exposure can affect the health and performance of poultry, causing reduced weight gain, decreased productivity, reduced immune response, and even death (5). Mycotoxins are unavoidable because they are naturally occurring compounds. They contaminate crops before harvest or invade feedstuffs of laying hen during processing, transport or storage (6, 7). Chronic and low level mycotoxin contamination through naturally contaminated grains often causes reduced production efficiency and increases susceptibility to many immune related infectious diseases (8, 9, 10). Presence of fungi and their toxic metabolites (mycotoxin) in poultry ration is virtually inevitable particularly in tropic areas. Many strategies have been tested in attempts to bind or absorb or degrade toxins to alleviate the toxin effect through inorganic and organic adsorbents or through nutritional manipulation methods. Tests were made by using many nutrients such as antioxidants (Vitamin A, Vitamin C, Vitamin E and Selenium to control tissue or cell structure damage), phenolic compounds, aspartame, piperine, coumarin and immunoglobulin to prevent mycotoxicosis (8, 10, 11). The best procedure to prevent the effect of mycotoxins is the minimizing of the mycotoxin production itself (12), for instance, by harvesting the grain at maturity and low moisture and storing it at cool and dry condition which is difficult to perform in countries with a warm and humid climate. Furthermore, the growth of fungi and therefore the production of mycotoxins is limited by the use of propionic acid or ammonium isobutyrate. Feed additives like antioxidants, sulphur-containing amino acids,vitamins,and trace elements can be useful as detoxicants (13). Biological methods are not yet used in

practice though the number of corresponding patents increases continuously (14, 15). These methods include fermentation procedures with microorganisms. One example is the conversion of aflatoxin B1 (particularly by *Flavobacterium auranticum*) to harmless degradation products. The conversions, however, are generally slow and incomplete (16, 17). The physical methods are focused on the removal of mycotoxins by different adsorbents added to mycotoxin-contaminated diets (18) with the hope of being effective in the gastro-intestinal tract more in a prophylactic rather than in a therapeutic manner. Certain bacteria, particularly strains of lactic acid bacteria, propionibacteria and bifidobacteria, appear to have the capacity to bind mycotoxins, including aflatoxin and some Fusarium produced mycotoxins (19, 20, 21). Activated charcoal may be important in binding zearalenone and/or deoxynivalenol (22, 23). In an *in vitro* gastrointestinal model, activated carbon reduced availability of deoxynivalenol and nivalenol (24). The addition of mycotoxin binders to contaminated diets has been considered the most promising dietary approach to reduce effects of mycotoxins. The theory is that the binder decontaminates mycotoxins in the feed by binding them strongly enough to prevent toxic interactions with the consuming animal and to prevent mycotoxin absorption across the digestive tract. Therefore, this approach is seen as prevention rather than therapy (25). Even though food is often contaminated with more than one mycotoxin, most studies are limited to the toxicology of a single mycotoxin.

The aim of this search is to study the effect of mixed mycotoxin in chicken body weight and blood parameters and evaluate the effect of using (Toxicom) in keeping chicken performance.

Materials And Methods

This experiment was conducted to determine the effect of dietary supplementation of (Toxicom) (lignin derivative, synthesized in Republic of Belarus) on detoxification of mycotoxin in broilers ration. The chicks were reared from 7 to 42 days in the condition of epizootology department and Pathanatomy and Histology department, Vitebsk state academy of Veterinary Medicine, Republic of Belarus. A total of (75) chicks, one week age were used. Birds were fed starter diet during the third week of age (beginning date of experiment; 22.6% crude protein and 2870.4 kcal/kg of diet) and finisher diet (20.5% crude protein and 2920 kcal/kg of diet) until the marketing age (42 days of age). Chicks were randomly divided into 5 treated groups, 15 birds for each. The first group (G1) fed a contaminated ration with mycotoxin and supplemented with (Toxicom) 5g/kg of diet and vaccinated with IBD vaccine on 15^{th} and 22^{nd} days of age. The second group (G2) was fed a ration contaminated with mycotoxin and vaccinated with IBD vaccine on 15^{th} and 22^{nd} days of age but not supplemented with (Toxicom). The third group (G3) was fed intact broiler ration and vaccinated with IBD vaccine on 15^{th} and 22^{nd} days of age. The fourth group (G4) was only fed a contaminated ration with mycotoxins and not vaccinated with IBD. The fifth group (G5) was fed a commercial broiler ration as a control group. The strain of vaccine was interfield 2512 that produced in Russian Federation, the vaccine was supplemented manually intra crop for

every chick with one dose. The diet was naturally contaminated with many mycotoxins and analyzed in Central Research Laboratory of grain products by ELISA (ridaskrin fast) and the final level of mycotoxins were as follows Aflatoxin B1 0.001 mg/kg, Dezoxivalenol 1.24 mg/kg ,Zearalenon 0.068 mg/kg, Ochratoxin 0.005 mg/kg , T2 toxin 0.09 mg/kg, Fuminisen B1 0.2 mg/kg. Five birds of each group were sacrificed to collect the blood and count the number of, Erythrocytes, Thrombocytes and leukocytes, as well as estimation of Hemoglobin accoding to (26) with some modification (27). All data are analyzed by statistical program for study variation statistics, based on the significance ($P<0.05$), (Microsoft Excel 2003).

Results and Discussion

After seven days of the first IBD vaccine, the body weight of (G2) and (G4) significantly ($P<0.05$) differ from the control, but the (Toxicom) group (G1) is not affected in comparison with the control ($P>0.05$).The (G2) significantly ($P<0.05$) depressed leukocytes10^9/L account from the third group which recorded the highest account among all groups, these results agree with (28) who refer that the mixed mycotoxins causes decreasing of leukocytes in broiler chickens. On the other hand, the Erythrocytes10^{12}/L account was the least 2.27±0,05 in (G2) among all groups ($P<0.05$).There were differences in thrombocytes count and hemoglobin but these differences were not significant, these results agreed with (29) who confirm that mixed mycotoxins decreased the erythrocytes count as in Table (1).

Table (1): The values after (7) days after first IBD vaccine

	Body Weight/ g	Leukocytes 10^9/L	Thrombocytes 10^9/L	Erythrocytes1 0^{12}/L	Hemoglobin
Group 1	510.00 ± 53.37 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	24.50±2.25 P1-2>0.05 P1-3>0.05 P1-4>0.05 P1-5>0.05	57.00±10.11 P1-2>0.05 P1-3>0.05 P1-4>0.05 P1-5>0.05	3.05±0.46 P1-2>0.05 P1-3>0.05 P1-4>0.05 P1-5>0.05	75.71 ± 2.26 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05
Group2	480.00 ± 44.94 P_{2-3}>0.05 P_{2-4}>0.05 **P_{2-5}<0.01**	23.00±1.69 **P2-3<0.05** P2-4>0.05 P2-5>0.05	47.00±11.80 P2-3>0.05 P2-4>0.05 P2-5>0.05	2.27±0.05 **P2-3<0.05** **P2-4<0.05** **P2-5<0.05**	70.02 ± 3.01 P_{2-3}>0.05 P_{2-4}>0.05 P_{2-5}>0.05
Group3	527.50 ± 53.37 P_{3-4}>0.05 P_{3-5}>0.05	29.00±1.69 **P3-4<0.01** P3-5>0.05	50.50±7.30 P3-4>0.05 P3-5>0.05	3.10±0.33 P3-4>0.05 P3-5>0.05	70.04 ± 8.28 P_{3-4}>0.05 P_{3-5}>0.05
Group 4	515.00 ± 42.14 **P_{4-5}<0.05**	21.00±1.12 P4-5>0.05	54.50±14.61 P4-5>0.05	2.86±0.14 P4-5>0.05	74.04 ± 1.13 P_{4-5}>0.05
Group 5	635.00 ± 22.47	25.50±2.25	59.00±12.92	3.66±0.53	76.06 ± 4.52

The values represent Mean±SE

The effect of mycotoxins with or without vaccine was very clear after 7 days of second IBD vaccine in (G2) and (G4) which recorded decrease in bodyweight ($P<0.05$) in comparison with control group. But, the weight of (Toxicom) group (G1) is not affected in comparison with the control ($P>0.05$). The effect of mycotoxins was very clear after 7 days of second

IBD vaccine in (G4) which recorded the least Leukocytes 22.50±0.56 and the difference was significant from the control (P<0.05) , these results agree with many researchers who reported that T-2 toxin caused leukopenia , and deoxynivalenol cause mild anemia and leukopenia (\ 29). The effect of mycotoxins in hemoglobin was very clear in (G2) which recorded decrease in hemoglobin(P<0.05) in comparison with control, this result agree with many scientists who refer that mycotoxins cause anemia and reduction of hemoglobin concentration (30,31,32), whoever; these results disagreed with (33) who reported no significant changes in PCV and Hb levels by feeding AF at dietary levels of 50, 150 and 300 ppb in broilers from 0 to 42 days of age(34). On the other hand, the (Toxicom) group (G1) is not affected in comparison with the control (P>0.05). The use of mycotoxin binders, or adsorbents, may have the greatest application for routine avoidance of this constant exposure to low levels of multiple mycotoxins. The use of adsorbents to prevent effects of mycotoxins has been actively researched for over 25 years. A number of binder products have been shown effective and their use offers one of the greatest potentials for preventing animal toxicity (33). There were differences in thrombocytes count and hemoglobin but these differences were not significant (Table 2).

Table (2): The values after (7) days after second IBD vaccine

	Body Weight/ g	Leukocytes 10^9/L	Thrombocytes 10^9/L	Erythrocytes10^{12} /L	Hemoglobin
Group 1	750.00 ± 70.23 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	26.50 ± 1.12 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	58.00 ± 9.55 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	2.85 ± 0.13 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	75.51 ± 5.65 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05
Group2	720.00 ± 19.66 P_{2-3}>0.05 **P_{2-4}<0.05** **P_{2-5}<0.05**	24.50 ± 2.25 P_{2-3}>0.05 P_{2-4}>0.05 P_{2-5}>0.05	47.00 ± 5.62 P_{2-3}>0.05 P_{2-4}>0.05 P_{2-5}>0.05	2.21 ± 0.11 P_{2-3}>0.05 P_{2-4}>0.05 P_{2-5}>0.05	68.01 ± 3.01 P_{2-3}>0.05 P_{2-4}>0.05 **P_{2-5}<0.05**
Group3	795.00 ± 70.23 P_{3-4}>0.05 **P_{3-5}<0.05**	25.00 ± 3.93 P_{3-4}>0.05 P_{3-5}>0.05	65.00 ± 6.74 P_{3-4}>0.05 P_{3-5}>0.05	2.42 ± 0.11 P_{3-4}>0.05 P_{3-5}>0.05	70.02 ± 1.88 P_{3-4}>0.05 P_{3-5}>0.05
Group 4	775.00 ± 14.05 **P_{4-5}<0.05**	22.50 ± 0.56 **P_{4-5}<0.05**	54.00 ± 6.74 P_{4-5}>0.05	2.23 ± 0.30 P_{4-5}>0.05	69.68 ± 2.26 P_{4-5}>0.05
Group 5	1000.00 ± 84.27	27.00 ± 1.69	46.50 ± 5.62	2.92 ± 0.16	80.74 ± 4.52

The values representsMean±SE

The effect of mycotoxins in body weight of (G2) and (G4) was very obvious, these groups recorded decrease in bodyweight (P<0.05) in comparison with control group. But, at the same time the weight of (Toxicom) group (G1) is not affected in comparison with the control (P>0.05).The effect of mycotoxins with vaccine was very clear after 14 days of second IBD vaccine in (G2) and (G4) which recorded decrease in Leukocytes 10^9/L count (P<0.05) in comparison with (G3), but the (Toxicom) group was not affected(P>0.05). The decrease in Erythrocytes10^{12}/L count and hemoglobin was very clear also in (G2) and (G4) (P<0.05) in comparison with the control, but the (Toxicom) group was not affected in comparison with control (P>0.05) There were differences in

thrombocytes count and hemoglobin but these differences were not significant as shown in Table (3).

Table (3): The values after (14) days after second IBD vaccine

	Body Weight/ g	Leukocytes 10^9/L	Thrombocytes 10^9/L	Erythrocytes10^{12}/ L	Hemoglobin
Group 1	1145.00 ± 70.23 **P_{1-2}<0.05** P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	30.00 ± 1.12 P_{1-2}>0.05 P_{1-3}>0.05 **P_{1-4}<0.05** P_{1-5}>0.05	54.50 ± 14.61 P_{1-2}>0.05 P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	2.74 ± 0.13 **P_{1-2}<0.05** P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05	75.38 ± 5.65 **P_{1-2}<0.05** P_{1-3}>0.05 P_{1-4}>0.05 P_{1-5}>0.05
Group2	947.05 ± 53.37 P_{2-3}>0.05 P_{2-4}>0.05 **P_{2-5}<0.001**	27.50 ± 1.69 **P_{2-3}<0.05** P_{2-4}>0.05 P_{2-5}>0.05	44.00 ± 4.49 P_{2-3}>0.05 P_{2-4}>0.05 P_{2-5}>0.05	2.21 ± 0.11 P_{2-3}>0.05 P_{2-4}>0.01 **P_{2-5}<0.01**	60.97 ± 1.13 **P_{2-3}<0.05** P_{2-4}>0.05 **P_{2-5}<0.05**
Group3	1197.50 ± 50.56 P_{3-4}>0.05 P_{3-5}>0.05	34.50 ± 1.69 **P_{3-4}<0.01** P_{3-5}>0.05	49.50 ± 4.49 P_{3-4}>0.05 P_{3-5}>0.05	2.45 ± 0.27 P_{3-4}>0.05 P_{3-5}>0.05	68.68 ± 0.75 P_{3-4}>0.05 **P_{3-5}<0.05**
Group 4	1007.50 ± 106.74 **P_{4-5}<0.05**	26.00 ± 1.12 P_{4-5}>0.05	52.00 ± 6.74 P_{4-5}>0.05	2.37 ± 0.16 **P_{4-5}<0.05**	66.00 ± 2.63 **P_{4-5}<0.05**
Group 5	1295.00 ± 22.47	31.00 ± 4.49	62.50 ± 8.99	2.88 ± 0.10	80.40 ± 4.52

The values representsMean±SE

Conclusion

The results of this study clearly demonstrated that mycotoxicosis cause loss of body weight in broiler chickens .Furthermore, mycotoxicosis can be influenced by supplementation the (Toxicom) to the contaminated diet. Supplementing of (Toxicom) with a dose 5g/kg ration essentially negated the effects of mycotoxins on blood picture of broiler chickens.

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