Protective Efficacy of Microbial and Mycotoxin Feed Additives Against Contaminated Feed with Ochratoxin in Broiler Chicken

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Abstract

The study was designed to investigate the protective efficacy of some additives on ration naturally contaminated with ochratoxin in broiler chicks. Seven ration samples were randomly collected for the detection of ochratoxin using a fluorometer. Ninety, one-day-old broiler Ross-308 chicks were divided into three groups (A, B, and C with 30 birds in each, 3 replicates per group). Group (A) chicks received a ration containing 5.3 ppb ochratoxin (control positive), Group (B) chicks received 5.3 ppb ochratoxin and HASCS, Avi Bac., Pro power Byg35, while Group (C) chicks received a ration free from either ochratoxin or treatments (control negative). Clinicopathological signs, growth performance, Hematological, and biochemical studies were recorded. Serum biochemical analysis results confirmed hepatotoxic and nephrotoxic hazard, which manifested by significant increases in GGT, ALT, Uric acid, cholesterol, Total bilirubin, and a non-significant increase of creatinine that was associated with a significant decrease in hemoglobin, lymphocyte heterophile basophile, monocyte and eosinophile. In conclusion, the evaluated feed additive has a significant protective effect against the ochratoxin hepatotoxic and nephrotoxic effect on growing broiler chicks.

Keywords: Broilers, Ochratoxin, Probiotic, Prebiotic, feed additives, HASCS.

Introduction

Mycotoxins are low-molecular-weight secondary metabolites produced by more than 200 different fungal species. Trichothecenes, ochratoxin A(OT), fumonisins, zearalenone, and aflatoxins have all been linked to cancer ***(Ali et al., 2005; Alcaide-molina et al., 2009).*** Analyses of grain and feed samples from around the world have shown that grains with extraordinarily high concentrations of mycotoxins, despite the generally low level of mycotoxin contamination ***(Streit et al., 2013).*** Mortality and a

significant drop in poultry productivity, manifested by evident clinical indications and post-mortem lesions, may arise from acute instances caused by the consumption of high quantities of mycotoxins. Subcutaneous hemorrhage in broilers and immunosuppression are just two examples of the nonspecific changes that can occur as a result of chronic mycotoxicosis, which is typically caused by low-level consumption of fungal metabolites and leads to a significant loss in performance. Poultry has been proven to be susceptible to its toxicity namely (nephrotoxicity, hepatotoxicity, teratogenicity, and immunotoxicity ***(Hameed et al., 2017; Bhatti et al., 2019; Wang et al., 2019).*** Ochratoxin primarily affects the kidneys, where it causes nephrotoxicity ***(Simarro et al., 2004).*** Young broiler chicks were found to be particularly susceptible to ochratoxin's effects ***(Gianni et al., 2010).*** Binding and immobilizing mycotoxins in the gastrointestinal system, nutritionally inert adsorbents are the most well-known method for mycotoxin detoxification ***(Magnoli et al., 2011)***. For the quickest results in ration screening, the fluorometer is the tool of choice ***(Michael et al., 2006)***. Both Penicillium and Aspergillus mycotoxin production were stymied by a *Lactobacillus spp*. mixture ***(Boranic, 2000)***. Mycotoxins can be bound by HASCAS ***(Kilany et al., 2020)***. The goal of this study was to examine the hepatotoxic and nephrotoxic effects of ochratoxin in broiler chicks and to assess the preventive efficiency of certain feed additives, either microbial or mycotoxin binder.

Material and Methods

Ration analysis for the presence of mycotoxins

Starter and growing ration analyzed for the presence of ochratoxin were detected in ration samples by fluorometer according to ***(Rodríguez et al., 2013).***

Feed additives against Aflatoxin and Ochratoxin:

A- "HASCS" 100%: contains Hydrated Aluminum sodium calcium silicate. **Flow gard** Manufacture date (10/2020), Expiry date (10/2023), Lot Nu 02, Reg-Nu 1/315, Origin USA

B- Probiotic: Lactobacillus acidophilus 10gm 1.5/1011 CFU/kg, Lactobacillus plantarum 5, gm 9.8 × 1011, Bifidobacterium bifidum, Bacillus subtilis fermentation, Aspergillus oryzae fermentation extracts. **AVI5 Bac** manufacture Date (01/2021), expiry Date (01/2024), Lot Number 01, Reg-Number in Egypt 8797, USA origin.

C- Inactive dried brewer's yeast (*Saccharomyces cerevisiae*) 100% [vitamins, minerals, Amino Acids]. **Bgy35** manufacture date (1/2021), Expiry date (1/2023), Lot Number 05, Reg-Number in Egypt 2/54, USA origin.

D- : Yeast cell wall (*Saccharomyces cerevisiae*) 300

gm**,** Mannan oligosaccharide 170 gm, Beta-glucans 130gm, Dried breweris yeast 300gm, Diatomaccous earth 400gm, Humic acid. **Pro-power** manufactured date (1/2021), Expiry date (1/2023), lot number 090, Reg-Number 8490, origin USA

Birds and experimental design

The present investigation was carried out on 90 -one-day-old Ross-308 healthy broiler chicks. chicks were distributed in three equal groups (A, B, and C with 30 birds in each group in 3 replicates). Group (A) healthy chicks received a ration containing 5 ppb ochratoxin from 1 to 35 days of age, Group (B) chicks received 5ppb ochratoxin and feed additives HASCS, Avi Bac., Pro power, and Byg35, while Group (C) chicks received ration free from ochratoxin. All chicks were individually weighed at the beginning of the experiment and on a weekly basis, at the end of 1st, 2nd, 3rd, and 4th week, post-ochratoxin supplementation, Body weight, weight gain, and feed conversion rate (FCR) were recorded according to ***Jindal et al. (1994)***.

Hematological and biochemical analysis:

We used the same technique published in the literature ***(Natt and Herrick 1952)*** to count the number of red blood cells and the total number of leukocytes in the blood. The prior technique ***(Schalm, 1962)*** for measuring differential leukocytic count and hemoglobin concentration was used. Commercial test kits (Randox co. UK) were used to determine biochemical markers such ALT, GGT, and bilirubin. Creatinine "kinetic" (Human, Germany), glucose (SPINREACT, Spain), uric acid (Spain), and cholesterol (Spain).

Immunological studies (Humoral immunity assay):

The Total protein and albumin assays were performed with commercial kits as per manufacturer instruction (STANBIO kits, Texas, USA)**.** The IgG and IgM assays performed with commercial ready use kits as per manufacturer instruction, where the Immunoglobulins IgG Elisa kits obtained from Bethyl Laboratories, Inc. USA, Cat. No. E33104 and the IgM Elisa kits obtained from Bethyl Laboratories, Inc**.** USA, Cat. No. E33102.

Statistical analysis:

The obtained data were analyzed by using the computerized SPSS program version 16 according to ***(Tambane and Dunlop, 2000).***

RESULTS

Ochratoxin level in rations:

Rations analysis using fluorometer revealed the presence of ochratoxin in all samples (Table-1)

Ochratoxin induced a significant reduction in body weight besides a significant increase in feed conversion rate as shown in Table-2.

Growth performance (BW, FI, FCR):

Body weight (BW): Group A showed a significant decrease in body weight gain compared to other groups B and C, while both groups B, and C showed a significant increase than A with non-significant differences between each other (Table-2/ Figure-1).

Feed conversion ratio (FCR): It was calculated according to the feed consumption in relation to body weight, weekly among groups. Feed intake at the first week was 160 gm ration/bird, in 2nd week was 600 gm ration/bird, at 3rd week was 1000 gm ration/bird and at 4th week was 2800 gm ration/bird. Group A in all weeks of the experiment showed a significant increase in FCR in compared to other groups B and C, while there is no significance differecne between B and C (Table-2/ Figure-2).

Heamatological studies :

The result of Hb and lymphocytes showed a highly significant increase in group (B) followed by group (A) in the 14th and 30th of the experiment as shown in Table-3. On the 14th day of the experiment, Monocytes numbers showed a significant increase in group (B), with a non-significant difference between group (C) and group (A); While on the 30th day of the experiment group (A) showed a significant decrease, with no significant difference between group(B) and (C) as shown in Table-3. Heterophils numbers showed a highly significant difference between the three groups at the 14th day of the experiment, group (C) showed the highest significance difference followed by group (B), and group (A)was the lowest; While in the 30th day of the experiment group(A) showed a significant decrease, with no significant difference between group (B) and (C) as shown in Table-3. Results of Eosinophils and Basophils numbers on 14th day of the experiment showed a significant increase in Group (B), with no significant difference between group (C) and (A); While on the 30th day of the experiment Group (A) showed a significant decrease with no significant difference between group (B) and (C) as shown in Table-3.

Biochemical studies:

The result of GTT (U/I), ALT (U/I), Total bilirubin (mg/dl), Direct Bilirubin (mg/dl), and uric acid (mg/d) levels showed a significant increase in group A, with the non-significant difference between group B and C in both 14th and 30th day of the experiment (Table-4). While group A showed a significant decrease in Cholesterol (mg/dl) and Glucose (mg/dl); with non-significant differences between groups B and C in both 14th and 30th days of the experiment(Table-4). Creatinine (mg/dl) level showed a non-significant difference between all groups on the 14th and 30th day of the experiment (Table-4).

Immunological studies:

Group A showed a significant decrease in total protein, while

groups B and C no significance between each other on both 14th and 30th day of the experiment (Table-5). Group C showed a significant increase in Albumin on the 14th day of the experiment followed by group A, While group B showed a non-significant difference between group A and C. in the 30th day of the experiment group B showed a significant increase in albumin level followed by group A (Table-5). Globulin levels showed a a non-significant difference between all groups on the 14th and 30th day of the experiment (Table-5). IgG (mg/ml) level showed a significant decrease in Group A in comparison with groups B and C; while group B showed a significant increase in IgG with groups A and C on both the 14th and 30th day of the experiment (Table-5). IgM (mg/ml) level showed a significant decrease in Group A; while group B showed a significant increase in IgM; But group C showed a non-significant difference with groups A and B on both 14th and 30th days of the experiment (Table-5).

Table (1): *aflatoxins and ochratoxins concentrations (mg/kg) in tested sample assayed by fluorometer.*

Sample Number	Type of ration	Concentration (mg/Kg ration)
		ochratoxin
1	Starter	1.5
2	Grower	2.1
3	Grower	5.3
4	Starter	2.3
5	Starter+ Grower	4
6	Starter + grower	1.9
7	Starter + Grower	4.8
Permissible limit		5 ppm

Table (2): *Effect of ochratoxin and treatment on body weight (gm) and FCR in broiler parameter*

	1st week		2nd week		3rd week		4th week	
	Body weight	FCR	Body weight	FCR	Body weight	FCR	Body weight	FCR
Group (A)	189.6 ± 4.10^{b}	1.50 ± 0.04^{a}	402.1 ± 8.0^{b}	2.91 ± 0.14^{a}	689.10 ± 8.70^{b}	3.00 ± 0.12^{a}	1394.6 ±2 0.10^{b}	2.00 ± 0.05^{a}
Gproup (B)	237.9 ± 5.3^{a}	1.09 ± 0.023^{b}	814.5 ± 9.9^{a}	0.98 ± 0.15^{b}	1635.8 ± 10.9^{a}	1.04 ± 0.18^{b}	2457.4 ± 40.2^{a}	1.14 ± 0.45^{b}
Gproup (C)	243.50 ± 4.20^{a}	1.13 ± 0.03^{b}	837.2 ± 8.1^{a}	1.02 ± 0.2^{b}	1661.3 ± 12.30^{a}	1.04 ± 0.02^{b}	2464.7 ± 22.10^{a}	1.13 ± 011^{b}

(ab) Means within the same row carrying different superscripts are sig. different at P< 0.05.

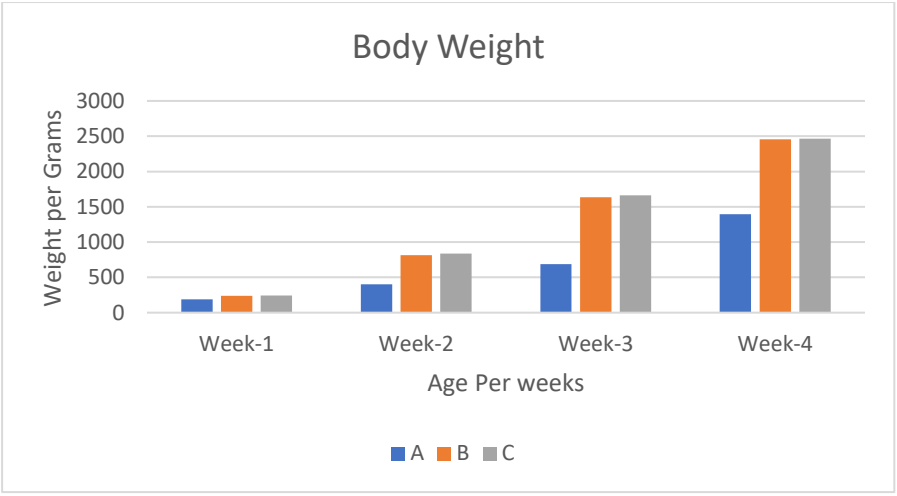

Figure1: Body weight results for groups A, B, and C on 14th and 30th day of experiment.

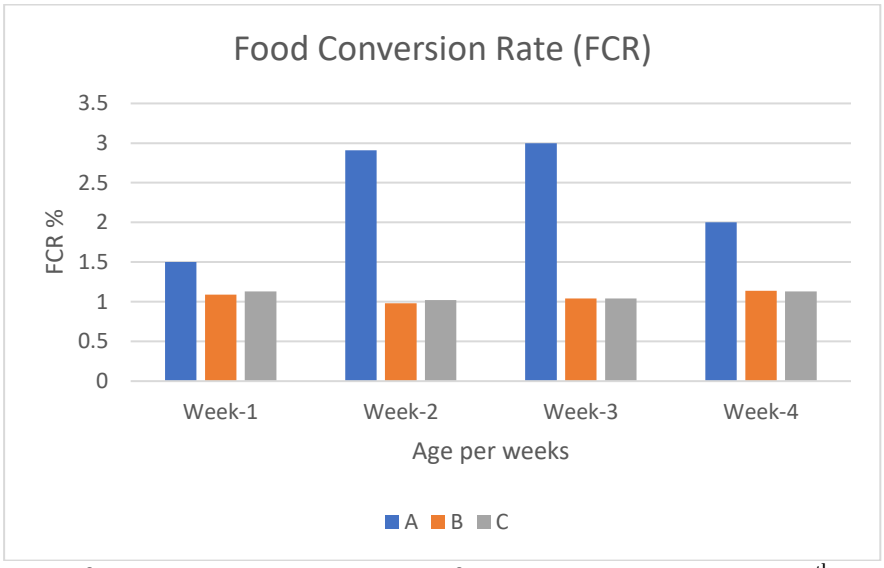

Figure 2: feed conversion ratio results for groups A, B and C on 14th and 30th day of experiment.

Table (3): *The result of Hb and lymphocytes in 14th and 30th of the experiment*

	Groups	14th day of experiment		30th day of experiment	
		Mean ± SE	**SD**	**Mean ± SE**	**SD**
Hb	**A**	8.03 ± **0**.088[b]	0.15	8.2 ± 0.11[c]	0.2
	B	11.8 ± 0.43[a]	0.75	11.9 ± 0.11[a]	0.2
	C	6.17 ± 0.12[c]	0.21	10.5 ± 0.23[b]	0.4
Lymphocytes	**A**	17.3 ± 0.35[b]	0.6	17.3 ± 0.17[c]	0.3
	B	25.1 ± 0.17[a]	0.3	25.03 ± 0.17[a]	0.3
	C	12.2 ± 0.11[c]	0.2	22.13 ± 0.2[b]	0.35
Monocytes	**A**	0.6 ± 0.011[b]	0.02	0.62 ± 0.02[b]	0.04
	B	0.89 ± 0.02[a]	0.04	0.88 ± 0.03[a]	0.06
	C	0.6 ± 0.01[b]	0.02	0.80 ± 0.05[a]	0.08
Heterophils	**A**	8.4 ± 0.2[c]	0.35	8.4 ± 0.35[b]	0.6
	B	12.83 ± 0.5[b]	0.85	12 ± 0.46[a]	0.8
	C	16.1 ± 0.4[a]	0.75	13 ± 0.74[a]	1.0
Basophils	**A**	0.23 ± 0.02[b]	0.03	0.23 ± 0.006[b]	0.01
	B	0.32 ± 0.02[a]	0.04	0.32 ± 0.01[a]	0.02
	C	0.23 ± 0.01[b]	0.03	0.3 ± 0.017[a]	0.03
Eosinophils	**A**	0.57 ± 0.02[b]	0.03	0.57 ± 0.02[b]	0.03
	B	0.78 ± 0.01[a]	0.03	0.79 ±0.023[a]	0.04
	C	0.56 ± 0.01[b]	0.02	0.75 ±0.2[a]	0.03

[(ab)] Means within the same row carrying different superscripts are significant. different at P< 0.05.

Table (4): *The result of GTT (U/I), ALT (U/I), Total bilirubin (mg/dl), Direct Bilirubin and uric acid.*

	Groups	14th day of experiment		30th day of experiment	
		Mean ±SE	SD	Mean ±SE	SD
GTT (U/I)	**A**	30.18 ± 0.6[a]	1.04	39.52 ± 0.88[a]	1.53
	B	25.27 ± 0.61[b]	1.05	27.27 ± 0.49[b]	0.85
	C	24.83 ± 0.35[b]	0.6	28.37 ± 0.55[b]	0.94
ALT(U/I)	**A**	12.1 ± 0.17[a]	0.3	18.77 ± 2.11[a]	3.65
	B	9.83 ± 0.43[b]	0.75	10.5 ± 0.21[b]	0.36
	C	8.97 ± 0.35[b]	0.6	9.25 ± 0.591[b]	1.02
Total bilirubin (mg/dl)	**A**	0.47 ± 0.02[a]	0.036	1.037 ± 0.2[a]	0.35
	B	0.35 ± 0.02[b]	0.03	0.427 ± 0.01[b]	0.022
	C	0.297 ± 0.009[b]	0.015	0.457 ± 0.03[b]	0.045
Direct Bilirubin (mg/dl)	**A**	0.06 ± **0**.003[a]	0.005	0.087 ± 0.01[a]	0.015
	B	0.034 ± **0**.002[b]	0.004	0.032 ± 0.001[b]	0.001
	C	0.031 ± **0**.001[b]	0.002	0.0543 ± 0.01[b]	0.019
Cholesterol(mg/dl)	**A**	123.7 ± 0.88[b]	1.53	112.33 ± 5.5[b]	9.609
	B	128.7 ± 1.45[a]	2.52	135.33 ± 2.33[a]	4.04
	C	127.3 ± 0.88[a]	1.53	134.33 ± 3.7[a]	6.43
Glucose (mg/dl)	**A**	244 ± 2.082[b]	3.6	217.3 ± 4.3[b]	7.51
	B	267.3 ± 5.044[a]	8.74	275.67 ± 2.9[a]	5.13
	C	283 ± 4.36[a]	7.55	283 ± 4.36[a]	7.55
Uric acid(mg/d)	**A**	11.87 ± 0.17[a]	0.29	13.2 ± 0.72[a]	1.26
	B	10.54 ± 0.2[b]	0.42	9.6 ± 0.295[b]	0.51
	C	9.74 ± 0.32[b]	0.56	8.72 ± 00.34[b]	0.59
Creatinine(mg/dl)	**A**	0.48 ± 0.006[a]	0.01	0.45 ± 0.022[a]	0.038
	B	0.42 ± 0.007[a]	0.011	0.44 ± 0.017[a]	0.03
	C	0.337 ± 0.01[a]	0.025	0.5 ± 0.103[a]	0.18

[(ab)] Means within the same row carrying different superscripts are significant. different at $P< 0.05$.

Table(5): *Serum immunological results for groups A,B, and E on the 14th and 30th day of the experiment*

	groups	14th day of experiment		30th day of experiment	
		Mean ±SE	SD	Mean ±SE	SD
Total protein (gm/dl)	**A**	2.16 ± 0.138^{b}	0.24	2.18 ± 0.13^{b}	0.23
	B	2.62 ± 0.061^{a}	0.11	3.29 ± 0.330^{a}	0.57
	C	2.91 ± 0.034^{a}	0.06	3.11 ± 0.1^{a}	0.16
Albumin (gm/dl)	**A**	1.33 ± 0.3^{b}	0.11	1.33 ± 0.06^{b}	0.11
	B	1.64 ± 0.048^{ab}	0.08	2.30 ± 0.3^{a}	0.55
	C	1.74 ± 0.046^{a}	0.08	1.817 ± 0.05^{ab}	0.085
Globulin (gm/dl)	**A**	1.06 ± 0.019^{a}	0.03	1.053 ± 0.02^{a}	0.038
	B	0.95 ± 0.032^{a}	0.05	1.34 ± 0.09^{a}	0.15
	C	1.16 ± 0.032^{a}	0.05	1.27 ± 0.119^{a}	0.21
IgG (mg/ml)	**A**	0.63 ± 0.012^{c}	0.02	0.63 ± 0.011^{c}	0.02
	B	1.087 ± 0.009^{a}	0.01	1.087 ± 0.01^{a}	0.015
	C	1.13 ± 0.006^{b}	0.01	1.03 ± 0.01^{b}	0.01
IgM (mg/ml)	**A**	0.23 ± 0.006^{b}	0.01	0.187 ± 0.03^{b}	0.049
	B	0.35 ± 0.012^{a}	0.02	0.34 ± 0.01^{a}	0.015
	C	0.33 ± 0.025^{ab}	0.04	0.263 ± 0.03^{ab}	0.047

$^{(abcd)}$ Means within the same row carrying different superscripts are significant. different at $P< 0.05$.

Discussion

Mycotoxins belong to the environmental chemical agents that exert toxic effects on animals and poultry ***(Bennett and Klich, 2003).*** However, mycotoxin produces many side effects that can cause serious disorders as a negative impact on the immune system and immunomodulatory properties ***(Rasostits, et al., 2000)***. Ration analysis using fluorometer revealed the presence of mycotoxin (aflatoxin - ochratoxin) in all analyzed samples and 6 samples found mycotoxin under the permissible limit but 1 sample above the permissible limit Nearly similar results were observed by ***Anjum et al. (2012)*** who reported that the incidence of ochratoxin in poultry rations was 78% and within the permissible limit. Ochratoxin contamination in poultry feed has occurred with quantities ranging between 10 ppb and >100 ppb ***(Donna et al., 2017).*** In the current work, it has been noticed that chicks who received ochratoxin revealed a significant reduction in body weight gain besides an increase in feed conversion rate (FCR) when compared with healthy control

broilers. This change in body performance may be due to the cumulative toxic effect of ochratoxin ***(Kaneko, 1989)***. The obtained data about body weight agree with ***Santin, et al. (2002)*** who mentioned that ochratoxin induces a significant decrease in body weight and weight gain and increase in feed conversion rate. Similar finding found that ochratoxicosis induce a significant decrease in body performance ***(Hatab, 2003; Hanif et al., 2008),*** retardation in body weight and feed intake, and increase feed conversion rate ***(Sakhare, et al. 2007).*** Our result was reported previously by ***El-Barkouky et al. (2010)*** and ***Sigamani and Ganne (2010)*** whom stated that ochratoxin induce reduction in digestion of nutrient and malabsorption of nutrients. Reduction in body weight and elevation in feed conversion rate may be due to anorexia, inadequate digestion, and absorption ***(Mir and Dwivedi, 2010).*** In addition, ***El-Afifi, et al. (2013)*** stated that ochratoxin induce significant reduction in body weight and elevation in feed conversion rate compared with control diet. Our results coordinate with those reported *by* ***Elbayoumi et al. (2014)*** reported that chicken-fed ration contaminated with ochratoxin revealed a significant decrease in body weight and an increase in feed conversion rate. In addition, ***Ram et al. (2015)*** stated that ochratoxin on broilers induced a reduction in body performance this finding fitted closely with the data previously obtained by ***Ahmed et al. (2021)*** who mentioned that broiler chickens feed in ration contaminated with ochratoxin showed a significant decrease in live body weight, body weight gain, feed consumption and increase in feed consumption rate. While Group(B) in treated ration with HASCS as chemical anti-mycotoxins binder, Propower as prebiotic, BYG as yeast extracts, AVI5 bac as probiotic explained the protective effects of different feed additives as growth promoting and or as protective factors against mycotoxins. Clinicopathological signs and mortalities were more prominence in group A (fed higher mycotoxins ration) in compared to other treated groups, it showed increased water consummation and a decrease in feed intake leads to significant weight loss, diarrhea, dullness, stunting growth, ruffled poor appearance and broken feather, paleness, trembling ataxia, lameness, paralysis of leg and lameness gasping, prostration and death; similar results detected by ***Okoye et al. (1988); Khan et al. (1990); Rao and Joshi (1993); lesson et al. (1995) and Kubena et al. (1998).*** Frugality, increased water intake, anorexia, and death were all mentioned by multiple researchers as being commonplace during aflatoxicosis. According to studies by ***Kubena et al. (1998), Hussain et al. (2008), and Khan and Zahoor (2014)***, drinking more water during toxicity may be an

attempt to prevent dehydration and make up for fluids lost through diarrhea. Hemorrhages in various organs/tissues, an enlarged liver with a distended gallbladder, an expanded kidney with an accumulation of urates, decreased bone hardness, and poor pigmentation were all seen in Group A birds after death. **Khan et al. (2014)** found similar abnormalities in the livers of layer breeders. Acutely intoxicated birds are depressed, dehydrated, and often polyureic and die in acute renal failure; survivors will be poorly feathered, have delayed sexual maturity, increased clotting times, anemia, and immunosuppression, according to research published by ***Resanovic (2009),*** and ***Dragan et al. (2011)*** the mycotoxins are one of the major factors suppressing poultry productivity causing substantial losses among Birds due to decrease body weight, reduced feed efficiency (FCR) decrease immunity of the birds leading to decreased resistance to infectious diseases, liver damage, bile duct proliferation, kidney damage. The treated groups showed no obvious clinical signs and postmortem lesions compared with group (A) similar findings were clarified by lesion score and lesion score index, the best group was(B)respectively. In addition to no mortalities were recorded in both groups D and E all over the experiment period attributed to the usage of AV15 and BGy35 to myotoxic ration, Similar results were obtained with ***Bueno et al. (2006); El-Nezami et al. (2000);*** and ***Gratz et al. (2007)*** when added probiotic and prebiotic additives, these additives could prevent the absorption of mycotoxins during their passage in the gastrointestinal tract and eliminate in the feces. Also, ***Peltonen et al. (2000); Peltonen et al. (2001)*** reported that probiotic microorganisms had a wide range of binding capacities to mycotoxins. Group A showed a significant decrease in body weight and a significant increase in feed conversion ratio all over the experimental period, this result agreed with ***Tessari et al. (2006); Jakhar and Sadana (2004); Dos Anjos et al. (2016)*** they all reported a significant decrease in body weight of broiler chicks below 21 days of age fed up to 5 mg/kg mycotoxin. ***Duff et al. (1987)*** explained that Growth inhibition is linked with malabsorption syndrome, as confirmed by the presence of hypocarotenoidemia. **Fuller (1992) and Koenen et al. (2004)** reported that treated Groups with different feed additives and probiotics showed an increase in body weight, FCR, decreased in morbidity, and mortality rate; this was due to immunomodulatory agents by activating specific and non-specific host immune response in chickens, which in turn help in prevention and control of various infectious diseases. Blood samples in group A showed a significant decrease in Blood hematology

(Hb,lymphocyte, monocytes, basophils, and eosinophils) similar findings were detected by ***Oguz et al. (2000), Verma et al. (2003),*** and ***Del Bianchi et al. (2005)*** that attributed to liver and kidney alteration. Also, ***Resanovic, et al. (2009)*** reported that Survivors of mycotoxicosis will be anemic, poorly feathered, delayed sexual maturity, increased clotting times, and were immunosuppressed. Serum biochemicals GGT, ALT, total bilirubin, direct bilirubin, uric acid creatinine showed a significant increase in group A received ochratoxin; While serum cholesterol and glucose were significantly decreased; similar results detected by **Shannon et al. (2017)** and **Jassar and Ealwant (1993)** explained that treated of ration by some additives (HSCAS, AV15 and BGY 35) counteract the mycotoxin effect. The serum immunological studies (total protein, albumin, globulin, IgM, and IgG showed significant decrease in group A than group B. This result agreed with ***Casas and Dobrogosz (2000)***, while ***Lofary and Frayssinet (1970)*** explained the decrease in serum total protein, albumin, and globulin in the case of fed mycotoxins ration were due to decrease feed utilization by the intestine and metabolism by the liver in addition to the effect of the toxin on the kidneys which leads to descending of albumin. also, agreed with ***Fuller (1992); Koenen et al. (2004)*** who explained that the addition of feed metabolites can act as an immunomodulatory agent by activating specific and non-specific host immune responses in chicks, which in turn help in the prevention and control of various infectious diseases.

Conclusion

From the result of present work, it can be concluded that, mycotoxicosis is one of the dangerous diseases that leads to great losses in poultry production Antimycotoxin feed additives have a positive role, and it must be added to the feed. Using the "biological synthetic, yeast extract with probiotics" as feed additives protect the chicks from the negative effect of mycotoxicosis.

References

Ahmed, M., Mohamed A.; Ehab, K.; Ehab, M; (2021) Problems of Some Mycotoxins in Broiler Farms in Egypt. KVMJ, 20 (1):6-11.

Alcaide-Molina, M., Ruiz-Jiménez, J., Mata-Granados, J. M. & Luque de Castro, M. D. (2009) High through-put aflatoxin determination in plant material by automated solid-phase extraction on-line coupled to laser-induced fluorescence screening and determination by liquid chromatography–triple quadrupole mass spectrometry. Journal of Chromatography A, 1216: (7), 1115-1125.

Ali, N., Hashim, N. H., Saad, B., Safan, K., Nakajima, M. & Yoshizawa, T. (2005) Evaluation of a method to determine the natural occurrence of aflatoxins in commercial traditional herbal medicines from

Malaysia and Indonesia. Food and Chemical Toxicology, 43: (12), 1763-1772.

Anjum M.; Khan S.; Sahota A. and Sardar R. (2012) Assessment of Aflatoxin B1 in commercial poultry feed and feed ingredients. J. of Animal & Plant Sciences, 22(2)68-72.

Bennett, J. and Klich, M., 2003. Mycotoxins. Clin. Microbiol. Rev. 16, 497–516.

Donna, M.; Lambert, F. and Coretta, A. (2017) A Limited Survey of Aflatoxins in Poultry Feed and Feed Ingredients in Guyana. Vet. Sci., 4, 60(2) 231-239.

D'Mello, J. P. F., C.M. Placinta and A.M.C. Macdonald (1999) Fusarium mycotoxins: a review of global implications for animal health, welfare, and productivity. Animal Feed Science and Technology . Volume 80, Issues 3–4, 30 August 1999, Pages 183-205.

El-Barkouky E, Abu-Taleb A, El-Menawey M and Hatab M. (2010) Effect of Saccharomyces cerevisiae and vitamin C supplementation on broiler performance subjected to ochratoxin A contamination. Egyptian Poultry Sci 30: 89–113.

El-Afifi, T.; Amel A.; Assia M.; Abdel - Salam. A. and M. El-Meleigy K (2013) effect of probiotic bacteria on aflatoxicosis in broiler chickens , growth performance , serum parameters and histopath-ological. J.Animal and Poultry Prod., Mansoura Univ., Vol.4 (1): 17 - 35, 2013**.**

Elbayoumi, K.; Hoda M.; Zeinab M.; Eman R. and Bosila, A (2014) Effect of mycotoxin contaminated ration on performance parameters and immune response of broiler chickens against different doses of bivalent inactivated AI-ND vaccine.. World Applied Sci J. 32 (8) 1587-1594**.**

Gianni, B.; Anna, N. and Giuseppe, P.(2010) Effects of Ochratoxin A on Livestock Production. Toxins, 2, 1796-1824.

Guillamont, E.; Lino, C.; Baeta, M.; Silveira, M. and Vinuesa, J. (2005) Acomparative study of extraction apparatus in HPLC analysis of ochratoxin A in muscle. Anal Bioanal Chem.383(4):570-575.

Hanif N, Muhammad G, Siddique M, Khanum A, Ahmed T, Gadahai J and Kaukab G. (2008) Clinico-pathomorphological, serum biochemical and histological studies in broilers fed ochratoxin A and a toxin deactivator (Myco- fix Plus). British Poultry Science 49: 632 –42.

Hatab M. (2003) 'Determination of the toxic effects of ochratoxin A on broiler performance and immune system response by the use of nuclear techniques.' M. Sc. Thesis, Faculty of Agriculture Cairo University, Egypt, p 336.

Howlett J.; Betteridge V.; Champ M., Craig S.; Meheust A., and Jones J. (2010) The definition of dietary fiber-discussions at the ninth vahouny fiber symposium: Building scientific agreement. Food Nutr. Res. 2010;54:5750.

Jindal, N., Mahipal, S. and Mahajan, N. K. 1994. Toxicity of aflatoxin B1 in broiler chicks and its reduction by activated charcoal. *Research in Veterinary Science*, 56: (1), 37-40.

Kaneko, J. J. (1989) Clinical Biochemietry Of Domestic Animals.4thEd.,P.365-391, Academic Press,Inc.New York,London ,Tokyo.

Magan, N. and Aldred, D.(2005) Conditions of formation of ochratoxin A in drying, transport and in

different commodities. Food Add. Contam. 1, 10–16.

Magnoli, A. P., Monge, M. P., Miazzo, R. D., Cavaglieri, L. R., Magnoli, C. E., Merkis, C. I., et al. 2011. Effect of low levels of aflatoxin B1 on performance, biochemical parameters, and aflatoxin B1 in broiler liver tissues in the presence of monensin and sodium bentonite. Poultry Science, 90: (1), 48-58

Mir, M. and Dwivedi, P. (2010) Immunopathology of Ochratoxicosis - A in New Zealand White Rabbits. Vet Scan .J. 5(1): 54.

Natt, M.P. and Herrick, C.A. (1952). A New Blood Diluent for Counting the Erythrocytes and Leucocytes of the Chicken. Poultry Science 31:735.

Ram, S.; Mandal, A.; Mamta, S. and Avishek, B. (2015) Effect of varying levels of dietary ochratoxin. Indian J. of Animal Sci. 85 (3): 296–300,

Rasostits, O.; Gay, C.; Blood, D. and Hinchcliff, K. (2000): "Veterinary medicine." Pp. 1684-1688. W.B. Saunders Co. Ltd., London.

Rodríguez A. Rodríguez M., Andrade M. and Cordoba M. (2013) Detection of mycotoxin in foods. Microchemical J. 110, 48.

Sakhare P, Bhandarkar G and Kurkure N (2007) Effect of Toxiroak® polyherbal feed supplement during induced aflatoxicosis, ochratoxicosis and combined mycotoxicoses in broilers. Veterinarski Arhiv 77: 129–46.

Santin E, Paulillo A, Maiorka P, Alessi A, Krabbe E and Maiorka A. 2002. The effects of ochratoxin/alumi-nosilicate interaction on the tissues and humoral immune response of broilers. Avian Pathology 31: 73–79.

Schalm, O.W. (1962). Practical Veterinary Hematology. Can Vet J 3:116.

Sigamani, M. and Ganne, V. (2010) Effect of Ochratoxin A on Body Weight, Feed Intake and Feed Conversion in Broiler Chicken.. British Poultry Sci,51:12–18.

Simarro,A.; Bull, S. ;Doelen, M. and Gremmels, J. (2004): Metabolism-mediated cytotoxicity of ochratoxin A. Toxicology in Vitro , 18, 3, 271-277

Smith,J.;Solomons,G.;Lewis,C. and Anderson, S.(1995): The role of mycotoxi-ns in human and animal nutrition and health. Nat. Toxins, 3 (4); 187- 192.

Streit E., Christina S., Michael S., Karin N.,Rudolf K. and Gerd S.(2013): Multi-Mycotoxin Screening Reveals the Occurrence of 139 Different Secondary Metabolites in Feed and Feed Ingredients, *Toxins* 2013, *5*(3), 504-523.

Tambane and Dunlop (2000): Statistics and Data Analysis from Elementary to Inter-mediate. Prentic Hall Ajitc. Tampbne Dorothy Dunlop, 2000.

Violeta,E.;Gheorghe, P.;Elena,P.;Luiza, B. And Monica, P.(2010) Alteration of some Biochemical and Haematological Parameters in Dairy Cows Due to the Intake of Myco-toxin Contaminated Feeds. Animal Science and Biotechnologies J. , 43 (1) 100 – 104.

Watts,C.;Chen,Y.;Ledoux,D.;Broom head,J.and Bermudez,A.(2003) Effects of multiple mycotoxins and a Hydrated sodium calcium Aluminosilicate in poultry. International J. of Poultry Science, 2 (6) 372–378.

الدور الوقائى للاضافات الميكروبية ومضادات السموم الفطرية ضد الأعلاف الملوثة بالأوكراتوكسين في دجاج التسمين

تأثير الاوكراتوكسين على معدل النمو في كتاكيت التسمين
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صممت الدراسة لبحث الدور الوقائي لبعض الإضافات على الاعلاف الملوثة طبيعياً بالأوكراتوكسين في كتاكيت التسمين. جمعت سبع عينات من الاعلاف عشوائيا للكشف عن سموم الاوكراتوكسين باستخدام جهاز الفلوميتير. تم تقسيم دجاج التسمين روس -308 البالغ من العمر تسعين يومًا إلى ثلاث مجموعات . تلقت كتاكيت المجموعة (أ) علف يحتوي على 5.3 جزء في البليون من ochratoxin ، تلقت كتاكيت المجموعة 5.3 (B) جزء في البليون من ochratoxin مع اضافات علفية للسيطرة على السموم و هى HASCS و Avi Bac. المجموعة الثالثة تلقت اعلاف خالية من السموم الفطرية.
لمدة 35 يوم متتاليه من اليوم الاول حتى اليوم 35 من العمر كل الكتاكيت في كل المجموعات يتم وزنها عند بداية التجربة وعند نهاية الاسبوع الأول ,الرابع والسادس من بداية التجربة لتعيين تأثير الاوكراتوكسين على وزن الجسم ومعدل التحويل الغذائي تشير نتائج الدراسة أن السموم الفطرية ادت الى وجود نقص معنوي في وزن الجسم المكتسب وزيـادة معنوية في معدل التحويل الغذائي. تم تسجيل العلامات المرضية السريرية ، وتحليل الدم وظهر فيه انخفاض كبير في الهيموجلوبين و الخلايا الليمفاوية ، واظهر تحليل كيمياء الدم الحيوية ارتفاع انزيمات الكبد و الكلى التى اكدت على تسمم الكبد وتسمم الكلى ، والتي اؤكدت من خلال الزيادات الكبيرة في GGT، ALT ، حمض اليوريك ، الكوليسترول ، إجمالي البيليروبين ، واظهرت الدراسة زيادة غير معنوية في الكرياتينين فإن المضافات العلفية المقيمة لها تأثير وقائي معنوي ضد تأثير تسمم الكبد والأوكراتوكسين الكلوي على نمو فراخ اللاحم. نستخلص من هذه الدراسة أن السموم الفطرية أحدثت نقص معنوي على وزن الجسم وزيادة معنويه معدل التحويل الغذائي، وان استخدام الإضافات العلفية كان له تأثير إيجابي معنوي على معدلات الاوزان ومعامل التحويل.