International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 21-04-2019; Accepted: 23-05-2019
www.medicalsciencejournal.com
Volume 5; Issue 6; June 2019; Page No. 147-149

Effect of graded level of crude aflatoxin on growth parameters of broiler chickens

Paul Ekpo[1], Ukam Uno[2*], Clement Effiong[3], Francis Otera[4]
[1, 4] Department of Genetics and Biotechnology, University of Calabar, Calabar, Nigeria
[1, 2] Department of Biology, Cross River State College of Education, Akamkpa, Nigeria
[3] Department of Microbiology, University of Calabar, Calabar, Nigeria

Abstract
Background and objective: Globally, the growing demand for poultry products cannot be overemphasized. Hence, this study was conducted to determine the effect of graded levels of aflatoxin B1 on growth parameters of broiler chickens.
Materials and methods: Thirty day-old broilers were used for this study. The birds were house in pens and allowed free access to feed and water. At two weeks of age, the birds were divided into six groups. Group A served as control while groups B, C, D, E and F received 0.25, 0.5, 1.0, 2.0 and 4.0mg/kg body weight of crude aflatoxin B1 orally. Data were obtained on body weight and linear body measurements. Data obtained were analyzed using analysis of Variance (ANOVA) test at 5% level of significance.
Results: Result obtained revealed that there was a significant reduction in the body weight gain of birds treated with aflatoxin B1 when compared with the control. More so, linear body measurements: shank length, keel length, thigh length, drum stick length, body length, body width and height, significantly reduced in aflatoxin treated birds when compared with the control. The effect of aflatoxin B1 was dose dependent.
Conclusion: Findings of this study clearly show that aflatoxin B1 has significant negative effect on growth parameters in broiler chickens in a dose dependent manner.

Keywords: Aflatoxin B1, broilers, chicken, growth performance

1. Introduction
Contamination of agricultural products and commodities is a global phenomenon with great implications in public health. Despite the dangers posed by the contamination of these commodities to human health when consumed, it also has great economic impact on farmers who depend on them as a source of livelihood [1].
Aflatoxins are secondary metabolites formed by certain fungi growing on food and animal feed usually belonging to the genus *Aspergillus flavus* and *Aspergillus parasitus* and can also occur as natural contaminants of poultry feed [-3]. Contamination of cereals and grains and their related products with aflatoxins causes food and feed-borne intoxication in human and animals [3]. Aflatoxin contamination in agricultural commodities is now well recognized as a public health hazard [4]. The main factors responsible for the mycotoxins production are improper control of moisture content and temperature [5].
Aspergillus species, common toxigenic molds, are widely distributed in air, soil, organic materials and plant parts all over the world. Among these, three species *Aspergillus flavus*, *A. parasiticus* and *A. nomius* have received major consideration due to their ability of producing potent toxins [6]. Mycotoxins are found in feed as secondary metabolites produced by molds during their life span and are serious global problem with high economic impact. Approximately 25% of world's food supply is contaminated with mycotoxins annually [7].
Studies have shown that aflatoxin contamination can result in adverse effects on egg shell quality, immune suppression, carcinogenesity as well as increase in relative weight of liver, kidney, heart, gizzard, spleen and pancreas in broilers [8-9].
In view of the impact of aflatoxin contamination on the health of consumers of poultry products as well as its economic implication, this study was carried out to determine the effect of graded doses of aflatoxin B1 on the growth performance of broiler chickens.

2. Materials and methods
2.1 Location and duration of study
This study was conducted in the department of Genetics and Biotechnology, University of Calabar, Calabar and lasted from December, 2018 to April, 2019.

2.2 Experimental animals
Thirty day-old broiler chicks were obtained from University of Calabar farm, University of Calabar, Calabar. The birds were house in pens. They were allowed free access to feed and water. They were administered with antibiotics, multivitamins, anticoccidal drugs and vaccines prior to treatment.

2.3 Aflatoxins B1 preparation
Aspergillus flavus were obtained from the Department of Microbiology, University of Nigeria, Nsukka and confirmed using the methods of Rodrigues *et al.* [10] Aflatoxin was produced by culturing *A. flavus* on starter mash in line with the procedure described by Shotwell *et al*. [11] Presence of aflatoxins B1was checked by thin layer chromatography [12].

2.4 Experimental design and procedure
At two weeks of age, the birds were divided into 6 groups of 5 birds each using a completely randomized design (CRD). Group A served as control while groups B, C, D, E, and F received 0.25, 0.5, 1.0, 2.0 and 4.0 mg/kg of crude aflatoxin B1.

2.5 Data collection and analysis
At the end of each week, the birds were starved for four hours after which their body weight and linear measurements were taken. Weekly weight gain was calculated using the formula: weight gain = final weight – initial weigh[7]. Data obtained was analyzed using analysis of variance (ANOVA) and significant means were separated using least significance difference (LSD) test at p = 0.05.

3. Results
Results obtained revealed aflatoxin B1 significantly affected the weight and linear body measurements of the birds. The total weight gain of the birds significantly decreased from 1216g in the control group to 1044g in group F treated with 4.0mg/kg body weight of aflatoxin B1 which indicated dose dependent reduction in the weight gain of the birds treated with aflatoxin B1 (Table 1). Aflatoxin treatment also caused a significant dose dependent reduction the linear body measurements of the birds as presented in Table 2. Results obtained showed that shank length, keel length, thigh length, drum stick length, body length, body width and height significantly decreased in groups of birds treated with the graded doses of aflatoxin B1 when compared to the control (Table 2).

4. Discussion
Results obtained from this study revealed that body weight gain of bird were significantly lowered by aflatoxin treatment when compared with the control group. This suggests that aflatoxin B1 might have impaired some biochemical processes underlying growth and development in the treated bird and the magnitude of such effects depend on the doses of aflatoxin they are exposed to. This assertion is in agreement with the findings of Miazzo *et al*. [13] Dixon *et al*. [14] and Pizzolitto *et al*. [15] who observed that dietary aflatoxin B1 induced negative changes in growth parameters of broilers. The deleterious effect of aflatoxins on the weight of the treated birds may be due to anorexia, impaired general health and inhibitory effect of aflatoxin on protein synthesis and lipogenesis [11, 16].

Results also showed a dose dependent reduction in linear body measurement of birds treated with aflatoxin when compared to the control which is similar to the reports of Idaluor *et al*. [17] This could be attributed to chronic aflatoxicosis as a result of the treatment as observed by Raisbeck *et al*. [18] Reduction in growth parameters may also be as a result of irregularities in protein, carbohydrate and lipid metabolism [7].

Therefore, feed used for subsistent and commercial poultry farming should be screened for contaminations in view of its health implication. More so, the detailed mechanism of action and pathways of aflatoxin contamination should be examined in future researches.

Table 1: Weight of birds treated with graded doses of aflatoxin B1

Parameters	Treatments					
	Control	0.25mg/kg	0.5mg/kg	1.0mg/kg	2.0mg/kg	4.0mg/kg
Initial weight (g)	440.0^{a}±9.54	452.0^{a}±8.98	440.0^{a} ±10.04	440.0^{a}±11.02	440.0^{a}±10.03	440.0^{a}±9.98
Final weight (g)	1656^{a}±12.98	1652^{a} ±13.43	1644^{a} ±14.00	1588^{b}±13.24	1556^{b}±13.32	1496^{c}±14.01
Wight gain (g)	1216^{a}±12.12	1212^{a} ±13.23	1204^{a} ±12.23	1148^{b}±15.43	1116^{b}±13.25	1044^{c}±13.43

Means followed with different case superscripts are significantly different at p = 0.05

Table 2: Linear body measurement of broilers treated with graded doses of aflatoxin B1

Parameters	Treatments					
	Control	0.25mg/kg	0.5mg/kg	1.0mg/kg	2.0mg/kg	4.0mg/kg
Shank length (m)	7.20^{a}±1.20	6.60^{b}±1.09	6.40^{b}±1.11	6.40^{b}±1.27	6.40^{b}±1.77	5.60^{c}±1.91
Keel length (m)	10.40^{a}±0.98	9.40^{b}±0.80	8.60^{c}±1.09	9.60^{b}±1.01	8.20^{c}±1.10	7.40^{d}±1.07
Thigh length (m)	11.20^{a}±0.88	10.00^{b}±0.87	10.40^{b}±0.97	9.20^{c}±0.69	9.40^{c}±1.07	8.40^{d}±1.00
Drum stick length (m)	11.40^{a}±0.98	10.40^{b}±0.97	10.20^{b}±0.87	9.40^{c}±0.99	9.40^{c}±1.05	8.60^{d}±0.87
Body length (m)	29.20^{a}±4.86	28.60^{b}±3.97	28.80^{b}±3.68	28.20^{b}±3.20	28.20^{b}±3.09	27.40^{c}±2.19
Body width (m)	39.0^{a}±4.08	38.40^{a}±3.87	36.00^{b}±5.01	35.60^{c}±3.97	33.40^{d}±3.86	30.40^{e}±2.76
Height (m)	23.8^{a}±2.54	23.60^{a}±3.11	23.60^{a}±2.90	23.60^{a}±3.12	23.40^{a}±2.14	22.20^{b}±3.08

Means followed with different case superscripts are significantly different at p = 0.05

5. Conclusion
Results obtained from this study provides evidence that aflatoxin have significant negative effect on growth parameters in broilers in a dose dependent manner.

6. References

1. Reddy KRN, Salleh B, Saad B, Abbas HK, Abel CA, Shier WT. An overview of mycotoxins contamination in foods and its implications for human health. Toxin Rev. 2010; 29: 16-39.
2. Tedesco D, Steidler S, Galleti S, Tameni M, Shabanpour O, Ravarotto L. Efficacy of aflatoxins B1 in broiler chicks. Poultry Sci. 2004; 83(9):1839-1843.
3. Lesson S, Diaz G, Summers JD. Poultry metabolic disorders and mycotoxins. University Books, Ontario, 1995.
4. Whitlow LW, Hagler WM. Mycotoxins in feed. Feedstuff. 2005; 77:69-79.
5. Singh R, Mandal AB. Efficacy of fumaric and citric acids in preventing biosynthesis of aflatoxins in poultry feed with variable moisture content. Ind. J. Ani. Sci. 2014; 84(4):453-456.
6. Jia R, Ma Q, Fan Y, Ji C, Zhang J, Liu T, Zhao L. The toxic effect of combined aflatoxins and zearalenone in naturally contaminated diets on laying performance, egg quality and mycotoxins residues in of layers and

the protective effect of *Bacillus subtilis*. Bio. Prod. 2016; 27:250-255.
7. Mahmood S, Younus M, Aslam A, Anjum AA. Toxicological effects of aflatoxins B1 on grouth performance, humoral immune response and blood profile of Japanese quails. The J. Ani. Plant Sci. 2017; 27(3):833-840.
8. Oguz H, Hadimli HH, Kurtoglu V, Erganis O. Evaluation of humoral immunity of broilers during chronic flatoxin (50 and 100bbp) and clinoptilolite exposure. Revue Med. Vet. 2000; 154:483-486.
9. Kubena LF, Harvey RB, Bailey RH, Buckley SA, Rottinghaus GE. Effect of a hydrated sodium calcium aluminosilicate (T-bind) on mycotoxicosis in young broiler chicken. Poul. Sci. 1998; 77:1802-1809.
10. Rodrigues P, Vanancio A, Kozakiewicz Z, Lima N. A polyphasic approach to the identification of aflatoxigenic and non-aflatoxigenic strains of *Aspergillus flavi* isolated from Portuguese almonds. Microbiol. 2009; 129:187-193.
11. Chang W, Xie Q, Zheng A, Zhang S, Chen Z, wang J, Liu G, Cai H. Effects of aflatoxins on growth performance and skeletal muscles of Cherry Valley meats male ducks. Animal. Nutr. 2016; 2(3):186-189.
12. Truckess MW, Stack MF, Nesheim S, Albert RH, Romer TR. Multifunctional column coupled with liquid chromatography for determination of aflatoxins B1, B2, G1, G2 in corn, almonds, Brazil nuts, peanuts and pistachio nuts: collaborative study. J. AOAC Int. 1994; 6:1512-1521.
13. Miazzo R, Peralta MF, Magnoli C, Salvano M, Ferrero S, Chiacchiera SM, *et al.* Efficacy of sodium bentonite as a detoxifier of broiler feed contaminated with aflatoxins and fumonisin. J. Food Sci. 2005; 71(5):51-56.
14. Dixon K, Kannewischer BI, Tonorio-Arvide MG, Barrentos-Valazquez AL. Aflatoxins sequestration in animal feed by quality-labelled smectite clays: an introductory plan. Appl. Clay Sci. 2007; 40(5):201-208.
15. Pizzolitto RP, Armando MR, Salvano MA, Dalcero AM, Rosa CA. Evaluation of *Saccharomyces cerevisiae* as an anti-aflatoxicogenic agent in broiler feedstuff. Poul. Sci. 2013; 12(4):1655-1663.
16. Kiran MM, Demet O, Ortatatli M, Oguz H. The preventive effect of polyvinyl-polypyrrolidone on aflatoxicosis in broilers. Avian Pathol, 1998, 250-255.
17. Idahor, K, Yakubu A, Egahi JO, Gwaza DS, Ahmadu GB, Thani AP. Growth performance, carcass charisteristics and cost benefits of four broiler strains on restricted feeding regimen in North Central Nigeria. J. Ani. Sci. 2013; 3(9):449-456.
18. Raisbeck MF, Rottinghaus GE, Kendall JD. Effects of naturally occurring mycotoxins in ruminants. In: Mycotoxins and animal foods, Smith, J.E. and R.S. Henderson (Eds.). CRC Press, Boca Raton, 1991, 647-677.