Effect of using low levels of Aflatoxine (B_1) on body weight and Relative weights of carcass yield of meal Fawbro Broiler chicken

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Abstract

The current study was conducted in the poultry farm of the animal production department Iraqi Atomic Energy Organization during the period from 8 \ 10 \ 2000 to 2 \ 12 \ 2001.

Male broiler breeder chicks were fed diet containing (0, 0.075, 0.25, 0.5, 0.75, 1.5 and 3) mg aflatoxine / kg feed from 1 day to 7 weeks of age. The objective of this study was to evaluate the effect of low levels of aflatoxine B1 on body weight relative weights and various processing parameters. All aflatoxine dose levels significantly ($p < 0.05$) decreased live weight, feed efficiency and increased mortality. Only 3.0 mg / kg significantly decreased dressing weight while chilled carcass weight being significantly decreased at 1.5 and 3.0 mg / kg; Percentage of carcass yields reflects the aflatoxine induced a reduction in dressed weight. Breast yield (%) was decreased significantly by aflatoxine. Aflatoxine leads to decrease carcass yield with a high meat to bone ratio and increase carcass yields with low meat to bone ratio. In general, aflatoxine B_1 reduced growth and feed efficiency, Moreover, Poor pigmentation and fatty liver can result from low level chronic aflatoxine B_1.

تأثير استخدام مستويات منخفضة من الذيفان الفطري (B_1) على وزن الجسم والأوزان النسبية لقطعيات الذبيحة لذكور أمهات فروج اللحم (فاوبرو)

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الخلاصة

أجريت هذه الدراسة في حقل الدواجن التابع لقسم الإنتاج الحيواني في منظمة الطاقة الذرية العراقية للفترة من 8 / 10 / 2000 ولغاية 2 / 12 / 2001 .

أفراخ لحم ذكور من نوع فاوبرو غذيت على علائق حاوية (0 ، 0.075 ، 0.25 ، 0.50 ، 0.75 ، 1.5 ، 3.0) ملغم افلاتوكسين B_1 / كغم علف من عمر يوم ولغاية سبعة أسابيع . هدف هذه الدراسة هو تقييم تأثير المستويات المنخفضة من الذيفان الفطري (B_1) على وزن الجسم والأوزان النسبية لصفات الذبيحة . أشارت النتائج إلى حدوث انخفاض معنوي في وزن الجسم وكفاءة التحويل الغذائي وزيادة معدل الهلاكات مع كل مستويات الافلاتوكسين . المستوى العالي فقط قلل من الوزن الصافي بينما وزن الذبيحة المزال منها الأحشاء الداخلية انخفض معنوياً فقط عند المستوى 1.5 و 3 ملغم افلاتوكسين / كغم علف . النسبة المئوية لقطعيات الذبيحة قد انعكست , الافلاتوكسين المضاف خفض من وزن الذبيحة . النسبة المئوية لقطعية الصدر انخفضت بواسطة الافلاتوكسين . الافلاتوكسين ادى الى انخفاض قطعيات الذبيحة ذات الارتفاع في نسبة اللحم الى العظم و زيادة انخفاض قطعيات الذبيحة ذات الانخفاض في نسبة اللحم الى العظم . على العموم , الافلاتوكسين B_1 خفض النمو وكفاءة التحويل الغذائي , علاوة على ذلك , الاصطباغ السيئ والكبد ألدهني كان نتيجة للمستويات المنخفضة ولفترة طويلة من الافلاتوكسين B_1 .

Introduction

Aflatoxine (AF), a group of closely releated extremely toxic chemicals are produced by strains of *Aspergillus flavus* and *Asperillus parasiticus* and can occur as natural

contaminates of poultry feed (1). The toxicity of AF to poultry has been well documented, as indicated by (2). AF cause sever economic losses in poultry and live stock industries. In recent years there has been much concern about the effect of AF on animals consuming feed containing AF, the consumption of feed contining AF by poultry has been associated with deceased growth and feed efficiency (3 and 4) and enlarge liver, spleen and kidney (5). The majority of these studies on the effect of AF in broiler chickens as subcute studies in which AF was feed at moderate to high level (0.25 to 10 ppm) from 0 to 3 weeks of age, However broiler chicken may be exposed to lower level of AF for a long time at subcute level. Therefore, this study was conducted to evaluate the effect of low levels of AF (B) from one day old chicks to market age (7wks) on body weight and relative weights of carcass parts of Fawbro broiler chcken.

Materials and Methods

The current study was conducted in the poultry farm of the animal production department Iraqi Atomic Energy Organization during the period from 8 \ 10 \ 2000 to 2 \ 12 \ 2001.

Male broiler chicks (male broiler chicks) were individually weight, wing banded and housed in litter base floor pens, and maintained from 1 day to 7 weeks of age at a density of 0.08 m^2 / bird. This study was designed to consist three replicate (pens) of 25 bird per pen at each of the seven treatment (0, 0.075, 0.25, 0.5, 0.75, 1.5 and 3.0) mg AF / kg feed, these chicken were maintained under continuos lighting with feed and water available *ad libitum*. AF was produced through a rice fermentation by *Aspegillus flavus* as described by (6) and modified by (7). Fermented rice has been autoclaved, dried and grounded to a powder. The AF content measured by spectrophotometer using the method of (8 and 9).

The rice was then is dorporated into the commercially prepared broiler starter and finisher rations. At 7 weeks of age the chickens were bled and plasma was collected. The chicken were then dressed, scalde and defeathered. The carcass quality parameters of crooked keel, fleshing breast blisters conformation, and feather follicle infection were evaluated. The chicken were placed in ice water chiller tank overnight and finally cut up into parties for parties yield determination. The various cuts were made as described by the method of (10). Plasma carotenoids were measured by the method of (11) and liver lipid was determined by the method of (12). Data were statistically analyzed using the general linear model procedure (13). Means showing significant differences were compared using Duncans new multiple range test (14). Statistical significance was accepted at level ($P < 0.05$).

Results and discussion

The effect of AFB_1 on live weight, feed efficiency and mortality are presented in table (1). These data demonstrated that AF at all levels significantly decreased live weight, feed efficiency, and increased mortality. The data show numerical increase in mortality with increase of AFB_1. The reduction in growth rate and increment in mortality indicated that the toxicity of AF is markedly increased when feed is contaminated with these mycotoxin. This enhanced toxicity during AF and interaction with environmental stress (15), pathogenic agent (16 and 17) and dietery difficiencies (18). The effect of AF on dressed and chilled eviscerated weight and yield (%) are presented in table (2). Dressed weight was taken as weight after exsanguinations and

defeathering. These data demonstrated that AFB_1 at all levels significantly decreased live weight, dressed and chilled eviscerated weight. This differences may reflect decreased moisture uptake by the AF treat birds or a greater percentage of viscera. Table (2) indicated that only the highest dose of AF used (3.0 ppm) significantly decreased carcass yield. AF increased significantly and slightly the yield of drums, thighs, backs and wings table (3). This is contrast to the AF induced decreased in breast yield, because uniform removal of necks from chicken varying in size was difficult and in consistent. These data suggest that AF influence muscle weight to a greater degree than skeletal weight by decreasing the yield of breast and increasing the yield of parts with smaller meat to bone ratio. AF induced growth depression would account for the decrease observed in parts dimensions. The effect of AF on drum length, breast width are presented in table (4). Furthermore the effect of AF at the lower level is more pronounced significantly decreasing drum length and breast width at all treatment levels.

The effect of AF on liver lipid and plasma carotenoid act as an indicators of the degree of pigmentation of broiler chickens. Only 3.0 ppm AF induce significant decreased the carotenoid and increased liver lipid. Liver lipid was significant decreased at low level dose of AF B_1 subcute induced a hypocarotenoidemia and hepatic hyperlipemia (4). The hypocarotinoidemia induced by AF is apparent in experiment, as 3.0 pmm significantly deceased plasma carotenoid level. These data provide the only clue to possible additional stressor. Some degree of hepatic hyperlipidemia was evidient with asignificant increase in liver lipid seen with a slow dose of AF B_1 from 1 day old age through 7 weeks. These chronic, low level of AF showed the difficulty in establishing a " safe " level of AF is to reduce the yield of parts with low meat – bone ratio and also these data demonstrated that under pigmentation and fatty liver of broiler chicken can occur in birds during chronic aflatoxicosis. Finally these data indicated that significant economy can be a result when broiler chicken are exposed to chronic low level of AF.

Table (1) Effect of low level of aflatoxine B_1 on live weight, feed effeciency and mortality of Fawbro broiler chickens

Aflatoxine mg / kg	Live weight g	Feed effeciency	Mortality %
0.000	1760 ± 126 a	2.4 ± 0.26 a	8 ± 0.16 a
0.075	1599 ± 18.0 b	3.9 ± 0.28 b	14 ± 0.5 b
0.250	1572 ± 14.0 b	3.7 ± 0.34 b	23 ± 0.6 c
0.500	1543 ± 15.0	4.1 ± 0.42	25 ± 0.7

	c	b	c
0.750	1521 ± 20.0 c	4.8 ± 0.40 c	30 ± 0.3 d
1.500	1295 ± 19.0 c	5.4 ± 0.44 cd	30 ± 0.3 d
3.000	1153 ± 21.0 d	6.0 ± 0.52 d	32 ± 0.3 d

a, b, c, & d values with different superscipts within coloumn signicantly (P < 0.05) differ values represents the mean ± SEM of three relicates 25 chicken per replicate.

Table (2) Effect of low level of chronic aflatoxine B_1 on dressed, chilled eviscerated and yield % (chilled eviscerated weight / live weight)

Aflatoxine mg / kg	dressed weight g	chilled eviscerated	yield %
0.000	1496.0 ± 16.7 a	1284.2 ± 24 a	73.0 ± 0.96 a
0.075	1343 ± 14.0 b	1164.07 ± 26 b	72.8 ± 1.31 a
0.250	1274.10 ± 22.0 c	1131.84 ± 23 b	72.9 ± 1.39 a
0.500	1234.40 ± 29.0 cd	1103.25 ± 27 bc	71.9 ± 1.34 a
0.750	1014.16 ± 31.0 d	1096.64 ± 22 c	72.1 ± 1.30 a
1.500	984.2 ± 26.0 e	929.81 ± 25 d	71.8 ± 1.38 a
3.000	807.1 ± 33.0 f	793.26 ± 27 e	68.8 ± 1.42 b

A - f values with different superscipts within coloumn signicantly (P < 0.05) differ values represents the mean ± SEM of three relicates 25 chicken per replicate.

Table (3) Effect of low level of aflatoxine B_1 on percentage of main carcass yield

Aflatoxine mg / kg	Drum yield %	Thigh yield %	Breast yield %	Wing yield %	Back yield %	Neek yield %
0.000	12.45 ± 0.40 b	14.8 ± 0.03 c	25.86 ± 0.2 a	13.22 ± 0.10 b	19.95 ± 0.16 b	7.11 ± 0.19 a
0.075	12.57 ± 0.26 b	15.0 ± 0.34 bc	25.52 ± 0.3 b	13.33 ± 0.10 b	19.93 ± 17 b	6.69 ± 0.13 b
0.250	12.58 ± 0.25 b	15.06 ± 0.28 bc	25.58 ± 0.28 ab	13.36 ± 0.14 b	19.84 ± 0.12 b	6.67 ± 0.16 b
0.500	12.60 ±	15.04 ±	25.25 ±	13.30 ±	20.06 ±	7.03 ± 0.16

	0.28 ab	0.26 bc	0.26 c	0.15 b	0.14 b	b
0.750	12.63 ± 0.24 ab	15.1 ± 0.25 b	25.29 ± 0.25 cd	13.28 ± 0.18 b	20 ± 0.16 b	7.08 ± 0.17 a
1.500	12.63 ± 0.29 ab	15.6 ± 0.22 a	25.05 ± 0.25 cd	13.10 ± 0.13 b	21.24 ± 0.16 a	6.83 ± 0.17 a
3.000	12.79 ± 0.27 a	15.7 ± 0.19 a	24.76 ± 0.25 d	13.70 ± 0.16 a	21.33 ± 0.18 a	6.80 ± 0.15 a

a, b & c values with different superscipts within coloumn signicantly (P < 0.05) differ values represents the mean ± SEM of three relicates 25 chicken per replicate.

Table (4) Effect of low level of aflatoxine B_1 on plasma carotenoids and liver dry weight

Aflatoxine mg / kg	Plasma carotenoids mg / ml	dry weigh tof Liver(%)
0.000	1.34 ± 0.08 a	17.80 ± 0.40 b
0.075	1.29 ± 0.06 a	19.61 ± 0.36 c
0.250	1.26 ± 0.13 a	19.76 ± 0.30 c
0.500	1.28 ± 0.09 a	19.96 ± 0.42 c
0.750	1.23 ± 0.12 a	22.49 ± 0.48 b
1.500	1.20 ± 0.16 a	22.40 ± 0.46 b
3.000	0.86 ± 0.19 b	26.40 ± 0.64 a

a, b, c, & d values with different superscipts within coloumn signicantly (P < 0.05) differ values represents the mean ± SEM of three relicates 25 chicken per replicate.

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