

قسم طب الحيوان والطب الشرعي والسموم •
كلية الطب البيطري - جامعة أسيوط •
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بقايا الأفلاتوكسين في علائق الدواجن المستخدمة في مزارع إنتاج البيض بمحافظة أسيوط

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يعد الأفلاتوكسين من أهم السموم الفطرية المعروفة في وقتنا الحاضر ، وذلك لمقدرته الشديدة على إحداث السرطان في الأنسان والحيوان • ولقد تبين وجود الأفلاتوكسين في غذاء كل من الأنسان والحيوان في جميع أنحاء العالم • وأوضحت الأبحاث السابقة التي أجريت بجمهورية مصر العربية أن أكثر من ٥٠% من فطر الاسبراجيلاس المعزول من الفسول السوداني يعتبر منتج جيد للأفلاتوكسين نتيجة للظروف المناخية حيث ترتفع درجة الحرارة والرطوبة. وتقل العناية بطرق التصنيع والتخزين • وأجريت هذه الدراسة لاستبيان مدى وجود الأفلاتوكسين في علائق الدواجن المستخدمة في مزارع إنتاج البيض بمحافظة أسيوط •

وقد تم في هذا البحث إجراء مسح شامل لسبعة مزارع لإنتاج البيض خاصة وحكومية وهي مزرعة ريفا - مزرعة بني مر - مزرعة الحاج بمنقباد - مزرعة اسلام بابوتيج - مزرعة الواسطي مزرعة الجيش - مزرعة الكوكبان بواقع عشرة عينات من كل مزرعة من العلائق المقدمة للدواجن وقد تم فحصها لاستبيان وجود الأفلاتوكسين (G_1 ، G_2 ، B_1 ، B_2) باختبار السيلكاجيل الطبقة الرقيقة ، ودلت النتائج على أن :

- ٨٥,٧% من مجموع العينات المفحوصة قد احتوت على الأفلاتوكسين بمستويات مختلفة تراوحت بين ٣,٥ و ٥٣,٥ ميكروجرام لكل كيلو جرام عليقة •
- ب - كل العينات الموجبة احتوت على الأفلاتوكسين B_1 ، عينة ٢٢ (٣٦,٦%) احتوت على أفلاتوكسين B_2 ، عينة ٣٦ (٦٠%) قد احتوت على أفلاتوكسين G_1 ، ٧ عينات (١١,٦%) احتوت على أفلاتوكسين G_2 •
- ج - بلغت المتوسطات الكلية للأفلاتوكسين ($B_1 + B_2 + G_1 + G_2$) لمزارع الجيش بمنقباد والكوكبان واسلام بابوتيج والحاج بمنقباد والواسطي وريفا وبني مر (ميكروجرام/كيلو جرام) $30,16 \pm 4,99$ ، $26,25 \pm 3,77$ ، $26,15 \pm 2,24$ ، $5,24 \pm 2,24$ ، $22,32 \pm 5,70$ ، $3,20 \pm 5,15$ ، $64 \pm 53,74$ ، 53 على التوالي •

نتيجة لهذه الدراسة التي اثبتت وجود الأفلاتوكسين بأنواعه الأربعة في علائق المزارع الداجنة محل الدراسة في محافظة أسيوط ، يمكن إرجاع وجود هذه السموم الفطرية بنسبة مرتفعة في علائق الدواجن الى سوء التخزين ونمو الفطر في الأجواء الرطبة وذات الحرارة المتوسطة (٢٥ - ٤٥ °م) أو لاحتمال نمو الفطر أصلا على النباتات المستخدمة في توكيين العلائق قبل حصادها ، مما ينصح معه دراسة هذه العوامل في بيئتنا المصرية لتلافى الخسائر الناجمة عن وجود هذه السموم في العلائق الحيوانية مما يترتب عليه تهديد صناعة الدواجن في مصر والتي تعتبر من أهم مصادر البروتين الحيواني في بلدنا ومعظم بلدان العالم •

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**AFLATOXINS RESIDUES IN RATIONS OF CHICKENS' LAYING
FLOCKS IN ASSIUT PROVINCE**
(With One table and 4 Photo Illustration)

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SUMMARY

In the present investigation, a pilot study was carried out to screen 70 feed samples for the presence of aflatoxins residues by silica gel thin-layer chromatography. Feed samples were collected from various laying chicken farms in Assiut Province. Out of 70 feed samples, 60 (85.7%) were found to contain aflatoxins. Aflatoxin B₁ was detected in all positive samples, B₂ in 22 samples (36.6%), G₁ in 36 samples (60%) and G₂ in 7 samples (11.6%). The lowest aflatoxins level in positive samples was 3.6 µg/Kg while the highest was 53.0 µg/Kg. Of the 60 positive feed samples 40, 10, 2, 2, and, 2 were involved in compound meal, white corn, brane, horse bean, barley and maize respectively.

INTRODUCTION

The study of fungal toxins and its causative diseases dates back to the Fifteenth Century as ergot invaded grain crops releasing ergotism in man and animals. Mycotoxins have been implicated as caustive agents in a number of disease syndrom known as "Animals Mycotoxicosis" (GEORGE, 1979).

The aflatoxins are a group of hepatotoxic agents, produced by the mold *Aspergillus flavus* or related species of *Aspergillus parasiticus*. There have been several individual aflatoxins isolated, but only six are closely monitored according to their toxicity and occurrence in natural products as B₁, B₂, G₁, G₂, M₁, and M₂. These compounds are very similar in structure and were individually named either from their characteristic blue or green fluorescence on TLC plates (HARTLEY *et al.*, 1963), or from their occurrence in milk of mammals ingesting aflatoxin B₁ contaminated feed which are known as M₁ and M₂ (ALLCROFT *et al.*, 1966). Aflatoxins have been detected in feedstuffs by many authors at different areas in the world (DE INOGH, *et al.*, 1964; COOMES *et al.*, 1965; CHRISTENSEN *et al.*, 1973; FANDIALAN and ILAG, 1973; STOLAFF, 1976; ENAMI, 1977; BRYDEN *et al.*, 1980; SANLI *et al.*, 1982, and ABD EL'HALEEM, 1983). However, no systematic in-depth survey has been conducted in Egypt. On the other hand, EL-KHADEM *et al.* (1975) had reported that more than 50% of the *Aspergillus flavus* strains were isolated from peanuts in Egypt. In Egypt consideration of the temperature-humidity climates and conditions of foodstuffs production, storage and processing, led to the contamination of foodstuffs by aflatoxins (GIRGIS *et al.*, 1977).

Therefore the present study may distinguish the aflatoxins residues in poultry feed of egg producing farms in the vicinity of Assiut province.

MATERIAL and METHODS

1- Sampling :

total of 70 feed samples, were collected separately in clean plastics bags from various governmental and private farms in Assiut province (Bany-Mur, Refa farm, and Military farms for egg production) and (El-Kawkabane farm in Manquabad, El-Wasta farm, Islame farm in Aboteag, and El-Hag farm in Manquabad laying chicken ones). Ten feed samples from different locations in each examined farm were selected.

2- Standard aflatoxins :

Aflatoxins B₁, B₂, G₁, and G₂, were kindly supplied by Dr. Douglas, L.P., Food and Drug Administration, U.S.A. Dept. of Health, Education and Welfare, Washington, U.S.A.).

3- Determination of aflatoxin :

Residues in feed samples were carried out according to that described in Association of official analytical chemistry methods (1975).

RESULTS

Aflatoxins in chicken meals :

Out of 70 feed samples, 60 (85.7%) were found to contain aflatoxins. Aflatoxin B₁ was detected in all positive samples (100%) B₂ in 22 samples (36.6%), G₁ in 36 samples (60%) and G₂ in 7 samples (11.6%).

The mean levels of total aflatoxins in feed samples of each examined farm were obtained as: (36.16 $\mu\text{g/Kg} \pm 4.99$) in Military farm, (29.25 $\mu\text{g/Kg} \pm 3.77$) in El Kawkaban farm, (26.15 $\mu\text{g/Kg} \pm 5.24$) in Islame farm, (22.4 $\mu\text{g/Kg} \pm 5.32$) in Manquabad farm, (15.6 $\mu\text{g/Kg} \pm 2.2$) in El Wasta farm, (5.15 $\mu\text{g/Kg} \pm 0.64$) in Refa farm and (0.53 $\mu\text{g/Kg} \pm 0.53$) in Bany Mur farm.

These results are tabulated and photo illustrated (I, II, III and IV).

It was revealed that 60 out of 70 feed samples collected from poultry farms screened by TLC methods were contaminated with aflatoxins at a varying levels ranging between 3.5-53 $\mu\text{g/Kg}$ total aflatoxin. Of the 60 positive feed samples 40 were compound meal (yellow corn, cottonseed, feed additives and concentrates), 10 were white corn, 2 were crushed horse bean, 2 were barley, 2 were maize and 4 were bran. The results of positive samples that contained aflatoxin were 90% in compound meal, 100% in bran, white corn, crushed horse bean, barley, and maize samples, while LAFONT and LAFONT (1970) demonstrated aflatoxins in 167 out of 380 feed samples.

DISCUSSION

The toxicity of fungi, considerable hazards to health associated with liver damage and carcinogenicity. Contamination of pasture and agricultural products with such fungi causes an economic losses. The climate of tropical and subtropical countries with such fungi causes conditions for mould growth and subsequently toxin production. Our study illustrated favourable concerning aflatoxins residues among poultry farm ration in Assiut province.

AFLATOXINS RESIDUES IN RATIONS

SCHROEDER and BOLLER (1973) reported that, groundnuts, cottonseed, rice and sorghum from Texas were sampled over a 3-year period really, Aflatoxins were found in groundnut and cottonseed and in two years the later duration in rice and sorghum. 12.7 percent of 306 samples of feedstuffs, feed additives and concentrates, were contaminated with aflatoxin B₁ (STREZLECK and GASIOROWSKA, 1974). SHREEVE *et al.* (1975) surveyed feedstuffs for mycotoxins in Britain along two years who detected mycotoxins in 13 out of 131 feed samples. Later on in poland 8.7% of 150 samples examined yielded aflatoxins (JUSZKIEWICE and PISKOKA, 1977).

The high incidence of aflatoxins detected in our examined feed samples (85.7%) in comparison with the previous low figures recorded in the north half of the world, can be attribute to the subtropical climate (high temperature, and moisture) and bad storage conditions.

Our results are supported by the findings obtained by HORVANTH *et al.* (1982) who recorded a highly contaminated Egyptian groundnut lot by aflatoxins up to 80%.

It seems obvious from this study that approximately 85.7 percent of the feed samples were contained detectable levels of aflatoxins with some as high as 53 µg/Kg total aflatoxins. This level exceed the maximum permissible limit recommended by FDA in U.S.A for aflatoxin in animal feed as 20 ppb (GEORGE, 1979).

In view of the known carcinogenic properties of aflatoxin (TOUCHSTONE, 1979) detection of these compounds in Egyptian animal feed demonstrates potential health hazards to man and animal. Moreover, the presence of relatively low concentration of aflatoxins (3.5-53 µg/Kg) in different Egyptian feedstuffs may result in chronic aflatoxicosis which represents a diagnostically difficult problem to the Veterinarian since many of the syndromes are vague and easily confused with other established diseases.

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Table (1): Quantitative determination of aflatoxins ($\mu\text{g}/\text{Kg}$) in laying chicken's meal of Assiut province flocks farms.

Farm name	B ₁	B ₂	G ₁	G ₂	Total
Military	23.18 \pm 3.60	1.87 \pm 0.496	4.76 \pm 1.025	0.35 \pm 0.23	30.16 \pm 4.99
El-Kawkaban	20.23 \pm 2.40	1.8 \pm 0.34	6.527 \pm 1.06	0.695 \pm 0.36	29.252 \pm 3.77
Islame	19.777 \pm 3.50	1.61 \pm 0.64	4.536 \pm 1.31	0.23 \pm 0.22	26.153 \pm 5.24
El-Hag	18.72 \pm 4.001	0.444 \pm 0.304	3.238 \pm 1.256	Non	22.402 \pm 5.32
El-Wasta	12.144 \pm 1.60	Non	3.340 \pm 0.807	0.175 \pm 0.174	15.659 \pm 2.2
Refa	5.15 \pm 0.64	Non	Non	Non	5.15 \pm 0.64
Bany-Mur	0.53 \pm 0.53	Non	Non	Non	0.53 \pm 0.53

Mean \pm S.E.

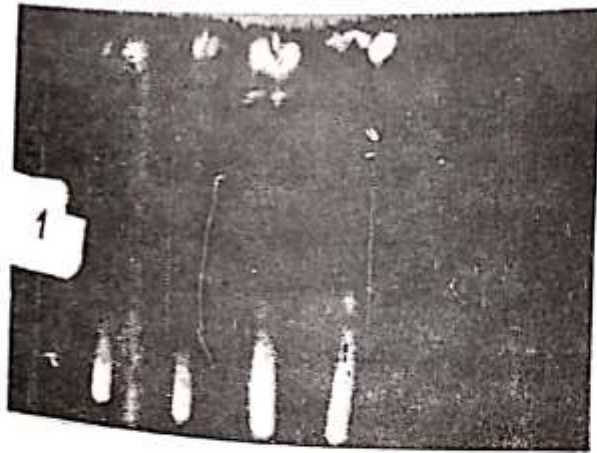


Photo illustration (1): Feed ext. from Military farm. 1,2,3 are sample spot (3.5, 5, 6.5 ul),
 4, is sample (5.5 ul) plus aflatoxin G₁ std. (5 ul) 5, 6, 7 are afl. G₁
 stds. (3.5, 5, 6.5 ul).
 Sample No. 7.



Photo illustration (2): Feed ext. from Islame farm 1, 2, 3 are sample spot, 4 is sample ext.
 plus afl. G₁ std. 5, 6, 7 are afl. G₁ stds.
 Sample No. 10.

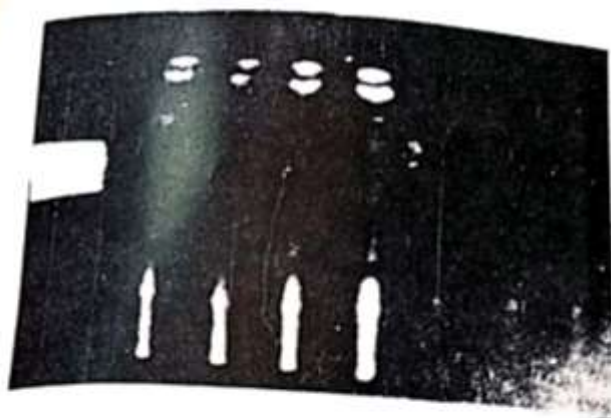


Photo illustration (3): Silica gel TLC plate of feed extract from El-Wasta farm, Spot 1,2,3 are sample ext., Spot 4 is sample ext. plus G_1 std. Spot 5, 6, 7 are aflatoxin G_1 std. Sample No. 4.



Photo illustration (4): Feed ext. from El-Wasta farm 1,2,3 are sample Spots 4 is sample Spot plus G_1 std. 5,6,7 are afl. G_1 stds. Sample No. 3.