DETECTION OF AFLATOXIN RESIDUES IN DUCKS IN EXPERIMENTAL AFLATOXICOSIS*

K. Latha, Mammen. J. Abraham[1], K. M. Ramachandran[2], P. K. Ismail[3] and K. Narayanankutty[4]

Centre of Excellence in Pathology
College of Veterinary and Animal Sciences
Mannuthy - 680 651, Thrissur, Kerala

Abstract

In this investigation, the residues of aflatoxin in edible tissues of ducks were detected on experimental feeding of aflatoxin at different dose levels viz. 5 ppb, 20 ppb, and 40 ppb. Ducks were disposed at two month intervals. Aflatoxin residues were detected in the liver, muscle, pooled samples of kidney and blood of birds maintained on feed contaminated with aflatoxin at levels of 20 and 40 ppb during the fourth, sixth and eighth month. No residual toxin could be detected in birds treated with aflatoxin at a level of 5 ppb throughout the experiment. At dose level of 10 ppb, no aflatoxin residue could be detected by the second and fourth month, but during the sixth and eighth month negligible amount of residues could be detected in the liver and muscle.

Key words: *Aflatoxin, duck, residues*

Aflatoxin is a mycotoxin that is hepatotoxic, mutagenic, carcinogenic and immunosuppressive to poultry. Hepatotoxic, carcinogenic and immunosuppressive effects of aflatoxin are also manifested in humans if they happen to consume aflatoxin contaminated milk, meat and egg. Nowadays duck meat is widely consumed by most people and therefore an aflatoxin B_1 residue in edible tissues poses a grave concern for food safety. Considering the above facts, the present study was undertaken to detect the residual aflatoxin in the muscle, liver, kidney and blood of ducks.

Materials and Methods

One hundred and twenty four male desi ducks of one month of age were divided into five groups of which group I served as control. Ducks of the remaining four groups were fed with aflatoxin at the daily dose rate of 5, 10, 20 and 40 ppb aflatoxin /kg of feed. Ducks were disposed at second, fourth, sixth and eighth month of the trial. During disposal muscle, liver, pooled kidney and blood samples were collected for the detection of aflatoxin residues. Toxin residues in muscle, liver, pooled samples of kidney and blood were determined by the modified Pon's method (Pons *et al.*,1966) using Thin Layer Chromatography (TLC). For quantification, the plate was scanned flurometrically using Hitachi-3000 model computerized fluorescence-spectrophotometer at a wave length of excitation 365mm and emission 420mm. Results obtained from the TLC scanning were randomly checked by analyzing the samples with High Performance Liquid Chromatography (HPLC) using pump Hitachi L-7100 model (Merck Pvt. Ltd.,). For this, the extract from the Pon's method was further purified through column chromatography using chloroform as the eluting solvent. The aliquot from this purified extract was applied onto C-18 column. Methanol, acetonitrile and water (23:22:25) system was used as the mobile phase. Aflatoxin content in the effluent was scanned by fluorescent spectrophotometer

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1. *Associate Professor*
2. *Since deceased*
3. *Professor (Retd.)*
4. *Senior Scientist, AICRP on Poultry for Eggs, Mannuthy*

with computer attachment. Statistical analysis of the data obtained during the course of the studies was carried out according to Snedecor and Cochran (1985).

Table. Average (Mean ± S.E) Aflatoxin B1 Residues in tissues(ppb)

Treatment groups	Toxin level (ppb)	Observation period in months							
		2		4		6		8	
		Liver	Muscle	Liver	Muscle	Liver	Muscle	Liver	Muscle
Group I	0	-	-	-	-	-	-	-	-
Group II	5	-	-	-	-	-	-	-	-
Group III	10	-	-	-	-	0.602± 0.46[a]	1.883± 0.075[a]	2.406± 0.62[a]	2.416± 0.23[a] 6.2± 0.20[b]
Group IV	20	1.05	-	2.65± 0.97[a]	3.1± 1.57[a]	3.263± 0.79[b]	2.347± 0.18[a]	6.277± 0.66[b]	9.963± 1.I5[c]
Group V	40	2.30	-	4.633± 1.23[b]	2.1± 2.1[b]	6.580± 0.64[c]	5.870± 0.I0[b]	9.170± 0.74[c]	
F-value			6.478**	12.0473**	6.478**	12.043**	6.478**	12.0473**	6.478**
CD			3.38	2.27	3.38	2.27	3.38	2.27	3.38

Mean bearing the same superscript are not significantly different ** P<0.01

Results and Discussion

The values are presented in the table. No residual levels of aflatoxin were detected at the second month except in one sample of the liver each belonging to groups IV and V. At the fourth month of the study, no aflatoxin residues could be detected in the groups II and III whereas in groups IV and V, aflatoxin residues were found in the liver and muscle. The dose dependent aflatoxin residues detected in the pooled samples of kidney and blood were 2.9 and 0.63 respectively in group IV and 3.63 and 1.62 respectively in group V.

At sixth and eighth month of the treatment, aflatoxin residues were found in the liver and muscle. The dose dependent aflatoxin residues detected in the pooled samples of kidney were 3.2, 3.95, 4.93 and in blood were 1.9, 2.3, 2.9 respectively in groups III, IV and V. The results of the random samples cross checked by the HPLC method were similar to the corresponding TLC values. The detection of aflatoxin residues in the edible tissues of ducks in the present study is a convincing evidence for the public health involvement of aflatoxin contaminated animal feeds. Similarly aflatoxin residues were detected in edible tissues by Blaha (1982), Chao and Liu (1988) and Maryamma et al. (1992). The results obtained in the present study showed that the residual aflatoxin present in the muscle, liver, kidney and blood at the highest dose level (40 ppb) in the eighth month was below the levels set by the FDA and FAO (20 ppb and 30 ppb).

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