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MYCOLOGICAL AND MYCOTOXICOLOGICAL EVALUATION OF TURKEY CARCASSES MARKETED AT SHARKIA PROVINCE

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SUMMARY

A total of one hundred and twenty five samples of muscles (meat), hearts, gizzards, livers and kidneys of turkeys carcasses (25 samples of each) were collected from Sharkia province, and examined mycologically and mycotoxicologically. The mean value of mould count/g was 1.1 X 10^2, 3.4 X 10^2, 1.8 X 10^4, 3.6 X 10^2 and 7.9 X 10^2, while for yeast count/g was 1.3 X 10^2, 3.0 X 10^2, 1.8 X 10^3, 1.96 X 10^3 and 3.7 X 10^2 for muscles, hearts, gizzards, livers and kidneys, respectively. Aspergillus species mainly *A.flavus, A. ochraceous* and *A.niger, Penicillium sp., Fusarium sp., Cladosporium sp.* and *Mucor species* were identified while Candida species namely *C.albicans, C. parpsilosis* and *C.tropicalis* and *Rhodotorula* species were the yeast isolates. Aflatoxin B_1 residues were detected at mean levels of 19.9, 19.0, 9.47, 9.28 and 5.43 in gizzards, livers, muscles, kidneys and hearts, respectively. The public health hazards of moulds , yeasts and mycotoxins contamination as well as the suggestive measures to improve the quality of turkey carcasses were discussed.

INTRODUCTION

Fungi are widely distributed all over the surrounding environment, thus, are regarded among biological contaminants of poultry as well as turkeys carcasses and their organs (muscles, hearts, gizzards, liver and kidneys) (Saleh et al., 1990). Fungal pollution of carcasses may be due to the nature of turkey rearing, mishandling during evisceration, processing, utensils uses, surrounding air, water and even during transportation (Saleh, 1999). Fungal count is considered as a standard test for checking the general sanitary condition in developing countries (Foster et al., 1953) Heavy economic losses may occur owing to the purification process and/or fat rancidity of

turkeys carcasses by fungi, therefore, these carcasses are considered to be of inferior quality, unmarketable and unfit for human consumption (Gracey, 1981).

The main hazard of fungi are mycotoxin production including aflatoxins, ochratoxins, fusarium toxins, penicillium toxins and others. Several studies revealed that long term administration of low doses of mycotoxins in feeds by turkeys, poultry and other feed animals resulted in appreciable quantities of mycotoxins in meats and internal organs especially livers, hearts and kidneys (Ragheb, 1994; Hassan, 1998 and Elgazar, 2002). From the public health point of view, mycotoxins are dangerous due to their carcinogenic effects, liver destruction, encephalomalacia, kidney failure and haematobiotic system lesions in human being consumed turkeys or other meat contained mycotoxins residues (Deger, 1976; Hassan et al., 1997 and Waffia and Hassan, 2000).

Therefore, the aim of this work was to examine turkey carcasses for fungal and mycotoxins contamination and to suggest the sanitary measures for preventing these contaminations and producing high quality turkey carcasses.

MATERIALS AND METHODS

1- Materials:

(A): Samples:

Twenty five turkey carcassess were randomly collected from some different localities at Menyet Elkamih and Zagazig city, Elsharkia province. Muscles, hearts, gizzards, livers and kidneys were examined mycologically and for mycotoxins residues.

(B): Standard mycotoxins:

Aflatoxins, Ochratoxin, T-2 toxin, zearlenone, citrinin standards were purchased from Sigma Chem. Comp., USA.

II- Methods:

1- Total mould and yeast count was done according to Collins and Lyne (1984).

2- Isolation and identification of moulds were done according to Raper and Fennel (1965), A.P.H.A. (1966), Samson et al. (1981), Pitt and Hocking (1985) and Koneman et al. (1992) and for yeasts according to Refai et al. (1969) and Looder and Kreger (1970).

3- Estimation of mycotoxins residues in turkey muscles of meat and organs: 25 grams of each samples were extracted with 100 ml (methanol : H_2O) and chloroform for 5 min in a high speed blender. After evaporation of chloroform the residues were analyzed for the presence of mycotoxins by using TLC procedures (Gimeno, 1979) or by flurometer methods (Ahmad et al., 2000).

RESULTS

Table (1): Statistical analytical results of total mould colony count/ g of turkey muscles and organs.

Samples	No. of examined Samples	+ve samples		Min.	Max.	Mean
		No.	%			
Muscles	25	10	40	1 X 10	$3 X 10^2$	$1.1 X 10^2$
Hearts	25	14	56	$2 X 10^2$	$5 X 10^2$	$3.4 X 10^2$
Gizzards	25	25	100	$3 X 10^2$	$7 X 10^4$	$1.8 X 10^4$
Livers	25	15	60	$1 X 10^2$	$5.9 X 10^2$	$3.6 X 10^2$
Kidneys	25	16	64	$2.9 X 10^2$	$3 X 10^3$	$7.9 X 10^3$

Table (2): Statistical analytical results of total yeast colony count /g of turkey muscles and organs.

Samples	No. of examined Samples	+ve samples		Min.	Max.	Mean
		No.	%			
Muscles	25	6	24	1 X 10	$3 X 10^2$	$1.3 X 10^2$
Hearts	25	12	48	$2 X 10^2$	$4 X 10^2$	$3 X 10^2$
Gizzards	25	16	64	5 X 10	$8 X 10^3$	$1.8 X 10^3$
Livers	25	10	40	2 X 10	$6 X 10^2$	$1.96 X 10^2$
Kidneys	25	10	40	4 X 10	$1 X 10^3$	$7 X 10^2$

Table (3): Prevalence of moulds in turkey muscles and organs

Isolates	Muscles		Hearts		Gizzards		Livers		Kidneys	
	No.	%	No.	%	No.	%	No.	%	No.	%
Aspergillus flavus	5	20	2	8	4	16	6	24	6	24
Asp. fumigatus	-	-	-	-	2	8	2	8	-	-
Asp. glaucus	-	-	-	-	1	4	-	-	-	-
Asp.niger	2	8	5	20	2	8	2	8	3	12
Asp. ochraceous	2	8	6	24	10	40	4	16	2	8
Asp. candidus	1	4	-	-	-	-	1	4	-	-
Alternaria sp.	2	8	-	-	-	-	1	4	-	-
Cladosporium sp.	5	20	2	8	3	12	5	20	2	8
Fusarium sp.	2	8	3	12	10	40	2	8	-	-
Mucor sp.	3	12	2	8	5	20	2	8	2	8
Penicilliumsp.	7	28	1	4	20	80	8	32	6	24

Table (4): Prevalence of yeasts in turkey muscles and organs.

Isolates	Muscles		Hearts		Gizzards		Livers		Kidneys	
	No.	%	No.	%	No.	%	No.	%	No.	%
Candida albicans	2	8	4	16	9	36	3	12	2	8
Candida parspsilosis	1	4	3	12	3	12	2	8	1	4
Candida tropicalis	-	-	-	-	8	32	8	3	4	16
Rhadotorula sp.	3	12	3	12	2	8	3	12	1	4

* Percentages were calculated in relation to the examined samples of each organs in all tables.

Table (5): Mycotoxins residues in turkey muscles and organs.

Samples	+ve samples		Mycotoxins detected	Min.	Max.	Mean
	No.	%				
Muscles	3	12	Aflatoxoon B_1	9.2	9.47	1.12
Hearts	3	12	Aflatoxoon B_1	1.1	5.43	0.95
Gizzards	6	24	Aflatoxoon B_1	17	19.9	2.08
Livers	3	12	Aflatoxoon B_1	2	19.0	1.54
Kidneys	5	20	Aflatoxoon B_1	1.1	9.28	2.98

Percentages were calculated in relation to the examined samples of each organs in all tables

USSION

sults shown in tables (1) and (2) revealed e mean values of mould and yeast count/g ans of turkeys were 1.1 X 10^2, 3.4 X 10^2, 0^4, 3.6 X 10^2, 7.9 X 10^2 and 1.3 X 10^2, 3 X 1.8 X 10^3, 1.96 X 10^2 and 3.7 X 10^2 for d and yeast counts in muscles, hearts, giz- livers and kidney, respectively. From previ- sults, the mould and yeast counts were high- gizzards which may be contaminated during moval of the epithelial membrane. On the hand, the visceral organs were with higher d and yeast count than muscles and these be due to the mishandling during eviscera- process. The results were substantiated by an et al. (1980), Saleh et al. (1990), Hassan (1997) and Wafia and Hassan (2000).

Table (3) illustrated the prevalence of moulds isolated from examined muscles and organs samples, it is evident that 6 mould genera were recovered from the examined samples namely *Aspergillus, Alternaria, Cladosporium, Fusarium, Mucor* and *Penicillium. Aspergilius flavus, Asp. niger, Asp.* ochraceous, *Cladosporium sp., Mucor sp.* and *Penicillium sp.* were recovered from muscles, hearts, gizzards, livers and kidneys samples with different percents Asp. fumigatus was isolated from gizzards and livers in the same percent (8%). Aspergillus glaucus was isolated from gizzards only in percentage of 4% while Asp. candidus and Alternaria were isolated from muscles and livers in (4% for each) and (8% and 4%), respectively. *Fusarium sp.* was isolated from muscles and organs except kidney samples. Our isolation was in agreement with Refai et al. (1990) and Hassan (1998) who succeeded in the isolation of *Mucor, Asp. niger, Asp. flavus and Asp. fumigatus*

from lungs, livers and hearts of turkeys, hens ducks and rabbits. Also, nearly similar results were recorded by Reece et al. (1985), Marquardt (1996), Hassan (1998) and Sayed et al. (2000).

From public health point of view, Aspergillus sp. may caused allergic toxigenic and pathogenic effects in man (Bullerman, 1979 and Hassan and Mansour, 2003). Penicillium sp. have been associated with pulmonary and urinary tract infections which are responsible for several deaths in man (Barwart, 1981). Cladosporium species are responsible for the formation of black spots on meat and poultry (Bermner, 1977).

However, Yeast species which were isolated from turkey muscles and organs were tabulated in table (4). It revealed that *C. albicans*, *C. parpsilosis* and Rhodotorula species were recovered from the 5 types of the examined samples with different percentages, *C. albicans* was predominately isolated from gizzards at 36%., Candida tropicalis was isolated from gizzards, hearts and livers in percentage of 8.8 and 4%. Candida species was previously isolated from livers and kidneys of turkeys by Mayeda (1961) and Hassan (1998). These Yeast isolates constitute public health hazards, where some isolated Candida species are incriminated in cases of pulmonary infection, urinary tract infection, vaginitis, thrush, arthritis, dermatitis and meningitis (Jawetz et al., 1974 and Washington, 1981).

Inspection of data in table (5) showed that only 20 samples were positive for aflatoxin B_1. The toxin residues can be recognized in gizzards (24%), kidneys (20%), livers, hearts and muscles (12% for each) with mean values of 19.9, 9.28, 19, 5.43 and 9.47 ppb, respectively. Several investigations established that almost 0.1% of aflatoxin B1 ingested with feed by broilers have been deposited in muscles and livers of birds (Mabee, 1972; Rodrick et al., 1977 and Refai, 1988). On the other hand, Richard et al. (1986) found aflatoxin B1 in liver, kidney and gizzard of turkey poults fed diets containing (50 or 150 ppb) aflatoxin from naturally contaminated corn Gizzard was contained high residues among the other organs. Therefore, the occurrence of aflatoxin B_1 in surveyed muscles and organs reflects the contamination of the offered turkey compound feeds with injurious levels of aflatoxin. The carcinogenicity are the essential dangerous effect of mycotoxins to the consumer of the contaminated food (Hassan et al., 2004).

It can be concluded that the variety of mould and yeast species found in the examined turkey carcasses, also the presence of aflatoxin B1 in such products constitute a public health hazard. To control, reduce or eliminate fungal contamination factors which can modify mould development including moisture, aeration, temperature, time and substrates should be controlled during handling and marketing to minimize contamination or bet-

ter free mould product. Also, currently inspection of these products must be recognized to safeguard the health of consumer from the hazards induced by mycotoxins and limiting the economic losses of turkey meat and products from being spoiled on the market.

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