Mycological Investigations in Beef and Chicken Luncheon

فحص الحالة الميكولوجية في لانشون اللحوم والطيور

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Abstract

A total of 40 samples of beef and chicken luncheon (20 samples for each) were collected from different markets in Giza city. Samples were subjected to mycological investigations. Beef luncheon were highly contaminated than chicken luncheon (3.1×10^3 /g $\pm 0.3 \times 10^3$) and (4.0×10^2 /g $\pm 0.2 \times 10^2$), respectively.

Seven mould genera were isolated from examined samples. The majority of which were *Aspergillus* (19.7% and 18.1%) and *Penicillium* (18.9% and 15.7 %), while, *Mucor* (7.1% and 4.7%), *Cladosporium* (4.7% and 3.9%) and other genera were also isolated but in lower percentages from beef and chicken, respectively.

The predominant identified species of *Aspergillus* were; *A. niger* (18.7% and 14.5%), *A.flavus* (18.7% and 12.5%) and *A. ochraceous* (6.3% and 6.3%) in the two products, respectively.

The main identified *Penicillium species* were; *P. citrinium* (20.6% and 13.6%), *P. expansum* (11.4% and 13.6%) and *P. verrucosum* (6.8% and 6.8%), from yhe same products, respectively.

Examination for mycotoxin production revealed the detection of ochratoxin A at a higher level (mean 21.0 and 27.0 ng /kg) from 2 (10%) samples of beef luncheon and one (5%) sample of chicken luncheon, respectively. Aflatoxin B1 (mean 15.3 and 9.8 ng / kg) was detected in 4 (20%) samples of beef luncheon and 3 (15%) samples of chicken luncheon, respectively. Other mycotoxins (AFB2, AFG1, AFG2 and T-2) were detected but in minor levels. Public health significance of the identified mould species and the detected mycotoxins were discussed.

Materials and Methods

The following conventional standardizing methods were carried out according Hoekstra (1996).

1-Sampling

A total of 40 samples of luncheon collected from different markets in Qena Province; 20 each of beef and chicken meat. The samples transported in an insulated ice bag to the laboratory without delay. Ten-fold dilutions up to 10^6 using sterile peptone water (0.1%) were prepared. Malt extract and Czapeck's- Dox agar (pH: 4.5) used for plating. The plates incubated at 25° C for 7 days and examined daily for detection of mould colonies.

2-Isolation and identification

Detected colonies in Petri dishes were inoculated with sterile mycological needles into sterile slope agar (2 % Malt extract agar, pH: 7.0) and incubated at 25° C for 5 days. The summation of inoculated Malt extract slopes multiplied by correspondent dilutions was expressing the total mould count per one-gram (TMC/g) of the sample. Identification of mould species carried out on pure cultures based on 3-point method and slide-culture technique. These methods of differentiation between mould species mainly depending on their taxonomic information and morphology of the colony, as well as, pigmentation of the reverse surface and fungus structure, according to Egmond et al. (1996) and Samson and Hoekstra (1996).

3- Detection of mycotoxins

25 gm of each sample were homogenized with 100 ml of chloroform for 5 min in a high speed blender. Extraction was repeated three times. The combined chloroform extract was washed by distilled water, dried over anhydrous sodium sulphate, filtered and concentrated to near dryness on a rotator- evaporator. The residue was diluted with chloroform to one ml. The chloroform solution was analyzed for the presence of aflatoxins, ochratoxin A and T- 2 toxin by using thin- layer chromatographic procedures (Gimeno, 1979).

The aflatoxin level was analyzed and confirmed using trifluoroacetic acid derivative formation (A.O.A.C., 1984). Ochratoxin A were quantitatively determined according to Scott *et al.* (1972) and Nesheim *et al.* (1973), while T- toxin was quantity determined by the method of Schroeder and Kalton (1975).

Table 1: Total mould count of the examined luncheon samples

Sources	+ve sample	Total mould count / 1 g

	No.	%	Min.	Max.	Mean.	SE
Meat luncheon	**9**	**45**	**$1x10^2$**	**$6x10^3$**	**$3.1x10^3$**	**$0.3x10^3$**
Chicken luncheon	**4**	**20**	**3x10**	**$8x10^2$**	**$4x10^2$**	**$0.2x10^2$**

Table (2) isolated mould genera in examined luncheon samples.

Samples / Mould genera	Beef luncheon		chicken luncheon		Total	
	No.	F%	No.	F%	No.	F%
Acromonium	1	0.8	0	0.0	1	0.8
Alternaria	2	1.6	2	1.6	4	3.2
Aspergillus	25	19.7	23	18.1	48	37.8
Cladosporium	6	4.7	5	3.9	11	8.6
Fusarium	2	1.6	2	1.6	4	3.2
Mucor	9	7.1	6	4.7	15	11.8
Penicillium	24	18.9	20	15.7	44	34.6
Total	69	54.3	58	45.7	127	100

Table 3: Aspergillus species in examined luncheon samples.

Samples Aspergillus spp.	Beef luncheon		Chicken luncheon		Total	
	No.	F%	No.	F%	No.	F%
A.candidus	1	2.1	2	4.2	3	6.3
A. flavus	9	18.7	6	12.5	15	31.2
A. fumigatus	1	2.1	2	4.2	3	6.3
A. nidulans	0	0.0	1	2.1	1	2.1
A.niger	9	18.7	7	14.5	16	33.3
A.ochraceous	3	6.3	3	6.3	6	12.5
A.terreus	2	4.2	2	4.2	4	8.3
Total	25	52.1	23	47.9	48	100

Table 4: Penicillium species in examined luncheon samples

Samples Penicillium spp.	Beef luncheon		Chicken luncheon		Total	
	No.	F%	No.	F%	No.	F%
P. citrinium	9	20.6	6	13.6	15	34.1
P. claviformi	1	2.3	1	2.3	2	4.5
P.corymbiferum	2	4.5	2	4.5	4	9.1
P.digitorium	0	0.0	1	2.3	1	2.3
P. expansum	5	11.4	6	13.6	11	25.0
P. rubrum	4	9.0	1	2.3	5	11.4
P. verrucosum	3	6.8	3	6.8	6	13.6
Total	24	54.6	20	45.4	44	100

Table 5: Detected mycotoxins (ng /kg) in examined luncheon samples (mean values).

Samples	Beef luncheon		chicken luncheon	
Type of toxin	+ ve samples	Concentra-tion (ng/kg)	+ve samples	Concentra-tion (ng/kg)
Aflatoxin B1	4(20%)	15.3	3(15%)	9.8
Aflatoxin B2	1(5%)	2.5	1(5%)	1.0
Aflatoxin G1	0.0	0.0	1(5%)	10.2
Aflatoxin G2	0.0	0.0	1(5%)	2.8
Ochratoxin A	2(10%)	21.0	1(5%)	27.0
Trichothecene (T- 2)	0.0	0.0	1(5%)	12.0

Conclusion

Aflatoxins are considered as potent carcinogens and known to cause death in sheep and cattle, as well as, may be involved in some human disease conditions **(Atlas-Ronald, 1995).**

This group is one of the most potent mycotxins that produced by *Aspergillus flavus* and related strains. More specifically, AFB1 is one of the most potent aflatoxins.

They are responsible for liver cancer in laboratory animals and even human beings. They have been linked to a wide variety of human health problems.

The FDA has established maximum allowable level of total aflatoxins in food commodities at 20 parts per billion **(Bullerman, 1979** and **Bahgat, 1999).**