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MYCOLOGICAL EVALUATION OF CAMEL CARCASSES AT KALYOBIA ABATTOIRS

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SUMMARY

A total of 150 swab samples were taken from the surfaces of camel carcasses for mycological examination. The mean value of total fungal count/cm^2 was 1.6×10^3 , 5.2×10^3 and 2.9×10^4 for camel carcasses slaughtered at Benha, Tukh and Moshtohor inspection districts, respectively. Representative of sixteen mould and yeast genera were isolated and identified . *Aspergillus flavus* isolated from camel carcasses could produce aflatoxins B_1 , B_2 , G_1 and G_2 in synthetic medium (YES). Aflatoxins could not be detected in 150 meat samples obtained from the same camel carcasses investigated for surface contamination with moulds. However, inoculation of camel's meat with different concentrations of isolated *A. flavus* spores resulted in production of B_1 , B_2 , G_1 and G_2 aflatoxins in variable amounts according to the period of incubation and concentration of the *A. flavus* spores. The public health importance of the isolates, and some preventive measures were discussed.

INTRODUCTION

Camel meat has a great economical value, constitute an important source of animal protein and is inexpensive (Zaitoun, 1986). The environment inside the slaughter halls including air movements, walls, floors, utensils, hide and intestinal contents of the slaughtered camels are considered the main source of fungal contamination to camel carcasses. A major concern was to evaluate the potential for aflatoxin production in food contaminated with aflatoxigenic moulds and amounts of aflatoxin occuring naturally in food material . It is well known that aflatoxins can contaminate several kinds of human food and capable of causing serious diseases of the liver, kidney, circulatory system, blood forming organs in extremely low quantities . The most alarming aspects was due to the ever increasing epidemiological evidence that chronic absorption of aflatoxins may be related to pirmary hepatoma in humans.

The present work was planned out to estimate the mould and yeast count on camel carcasses, and screening of isolated *A. flavus* strains for

production of aflatoxins in synthetic medium and in artificially contaminated camel's meat.

MATERIAL AND METHODS

Samples:

A total of 150 swab samples were taken from surfaces of camel carcasses at Kalyobia inspection districts and abattoirs, 50 from each of Benha central abattoir, Tuhk provience abattoir and from Moshtohor inspection district for mycological examination. In addition, 150 meat samples were taken from the same camel carcasses and transferred in ice box to the laboratory of Food Hygiene and Control Department, Faculty of Veterinary Medicine, Moshtohor, Zagazig University, Benha branch without undue delayment, where they were analysed for the presence of aflatoxins .

Swabs were taken from the surfaces of camel carcasses for total fungal counts using the technique recommended by Boer De et at., (1979). Counting of fungi was performed and calculated according to APHA (1979).

Isolation and identification of moulds were based on the colonial morphology, growth rate, the microscopic morphology of the isolates using the direct culture mount technique (Koneman et al., 1978). The fungal growth on cultured slide was examined for mycelia, spores and other special fine structures. The identification of moulds was done according to the basis of the morphological descriptions of Raper et al., (1965); Raper and Thom (1968); Larna (1976); Samson et al., (1976); Domsch et al., (1980); Al Doory (1980); Samson et al., (1981) and Rippon (19
Identification of yeasts was performed accord
to Lodder and Kreger - Van Rii (1970); Fing
and Martin (1982), Rippon (1982) and Koner
et al. (1983).

Detection of aflatoxins in camel meat was ca
out according to Bullerman et al. (1969)
Obioha (1979), While screening of *Asperg*
flavus isolates for aflatoxins production
undertaken according to Davis et al. (1967).

For recognition of the opportunity of aflato
production by *A. flavus* strains under
temperatures, 18 sterile glass stoppered co
flasks (500 ml), each containing 100 gram
chopped camel meat mixed with antibiotics
Unites penicillin G and 15 mg flumoquene/g
of chopped camel meat). The chopped camel
antibiotics mixtures were stored overnight at
to allow the antibiotics to become ev
distributed . The flasks were then divided into
groups A and B (9 flasks each). Each group
divided into three subgroups (C_1 , C_2 and
which, inoculated with 1,2 and 3ml of *Asperg*
flavus spore suspension at concentratio
$3.8x10^5$/ml. The inocualted flasks were incul
at 7 ± 1°C and examined for aflatoxins produ
every week after one week (group A) and
two weeks (group B), according to the techn
described by Shaltout (1992).

RESULTS

Table . (1) : Total fungal count / cm^2 of camel carcass surface .

Slaughter area	Min.	Max .	Mean ± SE
Benha	15	2.8×10^4	$1.6 \times 10^3 \pm 0.3 \times 10^3$
Tukh	34	1.8×10^5	$5.2 \times 10^3 \pm 1.7 \times 10^3$
Moshtohor	63	8.2×10^5	$2.9 \times 10^4 \pm 0.5 \times 10^4$

Table (2) : Frequency of isolation of different moulds from surfaces of camel carcasses .

Slaughter area → / Moulds	Benha		Tukh		Moshtohor	
	No.	%	No.	%	No.	%
A.flavus	9	18	12	24	17	34
A. niger	20	40	21	42	28	56
A. ochracheus	5	10	7	14	3	6
A. candidus	-	-	1	2	3	6
A. fumigatus	-	-	-	-	2	4
P. verrucosum var cyclopium	8	16	3	6	13	26
P. nigricans	4	8	1	2	8	16
P. chrysogenum	2	4	3	6	6	12
P. citrinum	-	-	3	6	-	-
P. oxalicum	-	-	1	2	4	8
P. grisoefulvum	2	4	-	-	-	-
P.brevicompactum	1	2	-	-	2	4
P. requforti	-	-	-	-	1	2
P. expansum	-	-	1	2	3	6
Cladosporium spp.	8	16	10	20	6	12
Mucor spp.	7	14	12	24	9	18
Trichoderma spp.	-	-	7	14	8	16
Alternaria spp.	-	-	5	10	6	12
Rhizopus spp.	1	2	-	-	3	6
Geotrichum spp.	-	-	7	14	-	-
Fusarium spp.	5	10	-	-	-	-

A. = Aspergillus P. = Penicillium

Table (3) : Frequency of isolation of different yeasts from surfaces of camel carcasses .

Slaughter area / Yeasts	Benha		Tukh		Moshtohor	
	No.	%	No.	%	No.	%
Candida albicans	8	16	3	6	10	20
C. tropicalis	5	10	7	14	8	16
C. parapasilosis	9	18	11	22	17	34
C.pseudotropicalis	-	-	-	-	9	18
C. solani	-	-	2	4	6	12
C. rugosa	3	6	5	10	10	20
C. lipolytica	-	-	1	2	2	4
Debaromyces spp.	5	10	11	22	8	16
Saccharomyces spp.	5	10	7	14	3	6
Torulopsis spp.	-	-	3	6	-	-
Rhodotorula spp.	3	6	5	10	1	2
Trichosporon spp.	-	-	-	-	2	4
Cryptococcus spp.	-	-	1	2	3	6

C. = Candida

Table (4): Aflatoxins production in synthetic liquid medium (µg / 100 ml) by *A. flavus* .

Slaughter area	No. of isolates investigated	No. of + ve isolates	%	Aflatoxins production µg / 100 ml				
				B_1	B_2	G_1	G_2	Total
Benha	9	5	55.6	5.9	4.3	8.4	3.6	22.2
Tukh	12	9	75.0	7.8	4.6	7.5	3.2	23.1
Moshtohor	17	15	88.2	8.5	3.6	7.8	5.4	25.3

Table (5): Amount of aflatoxins produced in camel meat by isolated *A. flavus* after one week .

Concentration	B_1*	B_2*	G_1*	G_2*
$C_1 \bar{x} \pm$ S. E	5.13 ± 0.10	2.17 ± 0.10	6.03 ± 0.22	2.83 ± 0.14
$C_2 \bar{x} \pm$ S. E	8.53 ± 0.15	3.4 ± 0.12	11.23 ± 0.11	9.37 ± 0.14
$C_3 \bar{x} \pm$ S. E	12.67 ± 0.10	7.1 ± 0.12	20.77 ± 0.21	12.5 ± 0.19

*The increase in the amount of aflatoxins produced was highly significant with the increase in concentration of *A. flavus* spores ($p>0.05$).

$\bar{x}$ = Mean of three readings for aflatoxins produced in each concentration (C_1 , C_2 and C_3) .

Table (6): Amount of aflatoxins produced in camel meat by isolated *A. flavus* after two week** .

Concentration	B_1^*	B_2^*	G_1^*	G_2^*
$C_1 \times \pm$ S. E	11.17 ± 0.07	3.97 ± 0.20	16.2 ± 0.12	5.43 ± 0.10
$C_2 \times \pm$ S. E	13.43 ± 0.10	4.57 ± 0.30	17.33 ± 0.10	6.3 ± 0.21
$C_3 \times \pm$ S. E	18.43 ± 0.14	7.17 ± 0.14	20.4 ± 0.08	10.57 ± 0.14

* Increase in the amount of aflatoxins produced was highly significant with the increase in concentration of spores of *Aspergillus flavus* (P> 0.05) .

**Differences in aflatoxins concentration were significant as a result of incubation time .

DISCUSSION

The results obtained during this investigation (Table 1) revealed that the total fungal counts of camel carcasses at Benha slaughter area ($1.6x10^3$) were relatively lower, than those of Tukh slaughter area. In tum, Tukh slaughter area results ($5.2x10^3$) were relatively lower than those of the Moshtohor inspection district ($2.9x10^4$). This may reflect the sanitary condition of meat production at these slaughter areas. Such findings are in agreement with those reported by Mansour et al. (1990).

Meanwhile, Lotfi et a l. (1986) stated that the sources of contamination of camel meat with fungi were air, water, soil, hands of attendants, utensils, skin and the intestinal contents.

The contamination of camel's meat with repesentative of the different genera of moulds and yeasts (Tables 2&3) may constitute public health hazards to the consumers, as well as may be subjected soon to spoilage. In this regard, Yassien et al. (1989) and Mansour et al. (1990) reported nearly similar results. Moreover Mossel (1977) and Leistner (1984), incriminated meat contaminated with moulds and yeasts as an important source for human mycotoxicosis.

The results achieved during this study in Table 4), proved that 55.6%, 75% and 88.2% of the *A. flavus* strains isaloted from camel's at Benha, Tukh and Moshtohor slaughter areas, respectively were capable to elaborate aflatoxins in Yeast Extract Sucrose medium. The obtained results also illustrated that aflatoxins were not detected in camel's meat contaminated with the different species of moulds and yeasts including the toxigenic *A. flavus* strains. Such results verified the data given by Aziz and Youssef (1991). Hamdy et al. (1993) and Shaltout (1996) who indicated that when the optimum conditions for growth and multiplication of *A. flavus* has been

available, the fungus elaborated aflatoxins. Aflatoxins could not be detected in fresh camel meat, this may be attributed to that the camel feed was free from aflatoxins and the toxigenic moulds on the carcasses required more time to produce their toxins.

When *A. flavus* spores were inoculated at a concentration of $3.8x10^5$ /ml sterile physiological saline into camel meat containing antibiotics and incubated at 7±1°C aflatoxins B_1, B_2, G_1 and G_2 could be elaborated. The results also indicated that the amount of aflatoxins produced was significantly increased by increasing spore concentration and the incubation time (Tables 5 &6). Such findings explorated that camel meat is suitable medium for aflatoxins production when contaminated with toxigenic *A. flavus*. These results agree with those reported by Van Walbeek et al (1969) who found that isolated *A. flavus* could produce detectable amount of afatoxins in less than one week when incubated at 7.5°C. Moreover, the ability of *A. flavus* to produce aflatoxins was greatly influenced by the composition, structural propereties of substrates and storage conditions (Obioha, 1979).

The public health health hazards of aflatoxins were emphasized by Dichter (1984) who reported that aflatoxins possess acute and chronic toxicity at low concentrations and most of them are mutagenic, carcinogenic or teratogenic to a wide range of organisms including man. So the attention to adoption of hygienic measures and instructions in the slaughterhouses, in addition to the rational hygiene in order to minimize the risk of contamination of camel carcasses are of high concern.

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