

قسم المراقبة الصحية على الاغذية  
كلية الطب البيطرى - جامعة أسيوط  
رئيس القسم : أ.د/توفيق بسيونى

## الخمائر والفطائر فى اللحوم البقرية المفريضة

طلعت الخطيب ، حسن ، عبد الرحمن

أجريت الدراسة علمي ٧٠ عينة من اللحوم البقرية المفريضة جمعت من محلات السوبر  
ماركت فى كلا من مدينتى القاهرة وأسيوط بهدف عزل وتصنيف الفطريات والخمائر المحتمل  
وجودها فى هذه المنتجات والتي تحفظ عند درجة التخمر .

وقد أظهرت النتائج علما أن متوسط العدد الكلى للفطريات والخمائر فى ذلك العينات  
فى الجرام الواحد منها هو  $10 \times 4$  و  $30 \times 6$  بالترتيب . كما تم عزل وتصنيف الفطريات  
والخمائر بنسب متفاوتة وأنواع مختلفة .

وقد تمت مناقشة النتائج وتأثير الفطريات والخمائر المعزولة علمي هذا المنتج ولذلك  
مناقشة أهمية الفطريات المعزولة علمي الصحة العامة .

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## MOULD AND YEAST HAZARD IN FROZEN GROUND BEEF (With 4 Tables)

By  
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### SUMMARY

Seventy samples of retail packages of frozen ground beef were subjected to mycological examination. The total mould count per gram ranged from  $10^2$  to  $4 \times 10^4$  and the yeast count from  $10^2$  to  $4 \times 10^5$ . Twelve mould and eleven yeast genera could be isolated and identified, the predominant mould genera were, Penicillium, Mucor, Aspergillus, Cladosporium and Geotrichum, while the predominant yeast genera were; Torulopsis, Rhodotorula, Candida, Debaryomyces and Saccharomyces. The isolated mould and yeast genera were further identified, and the significance of occurrence of such microorganisms were discussed.

### INTRODUCTION

Mould and yeast comprise a large group of microorganisms which are ubiquitous in nature and affected our food supply as a result of their contamination. They are responsible for a major portion of food deterioration in developing countries. Their presence in meat and meat products are regarded more or less as indicator of the hygienic conditions under which these products are produced and stored lead finally to either spoilage or foodborne mycotoxicosis. Genus Penicillium, Mucor, Thamnidium and Cladosporium were the more liable mould genera to grow on chilled and frozen meat (HADLOK, 1970).

This study was planned to throw light on the mycoflora of the frozen ground beef, of public health importance.

#### Analytical procedures:

50 grams of the thawed ground beef were carefully and aseptically homogenized in waring-blender with 450 ml sterile peptone solution to give 0.1 dilution, from which a serial 10-Fold dilutions were made up to  $10^6$ . Duplicate plates of acidified Malt extract agar and Czapek-Dox agar media were used for counting and isolation of both moulds and yeasts (A.P.H.A. 1966).

#### Identification of moulds:

This was carried out according to RAPER and THOM (1949); KULIK (1968) and SAMSON, et al. (1976) for genus Penicillium; RAPER and FENNELL (1965) and SAMSON, 1979 for genus Aspergillus; while ARX (1967) ZYCHA, et al. (1969) BARNETT and HUNTER (1972) and SCHIPPER (1978) for other genera.

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Identification of yeast:

This was carried out according to LODDER and KREGER (1952); LODDER (1971) and ARX, et al. (1977).

**RESULTS**

The results are tabulated in Tables (1, 2, 3, 4 and 5).

**DISCUSSION**

The results given in Table (1) revealed that the total mould count/g sample lies between  $10^2$  and  $4 \times 10^4$  with a mean value of  $6 \times 10^3$  and the yeast count lies between  $10^2$  and  $4 \times 10^4$  with a mean value of  $4 \times 10^4$ . The frequency percentages of the isolated mould genera were given in Table (2) and revealed that the predominant mould genera were; Penicillium; Mucor; Aspergillus, Cladosporium and Geotrichum with percentages of 121 (32.4%); 70(18.7%), 61(16.3%); 40(10.7%) and 30(8.0%) respectively. While other mould genera which include Alternari alternaria; Fusarium; Thielaviopsis; Verticillium; Trichothecium and Trichoderma lies with percentages less than 5%.

The identification of Penicillium species as given in Table (4) revealed that the following penicillium species could be identified, P.frequentans, P.verrucosum var. cyclopium, P.citrinum, P.corylophilum, P.verrucosum var. verrucosum, P.pururogenum, P.brevicompactum, P.rogulosum, P.capsulatum, P.diversum and P.tardum with percentages of 30(8.0%), 25(6.6%), 18(4.8%), 14(3.7%), 12(3.2%), 5(1.3%), 4(1.1%), 4(1.1%), 3(0.8%), 3(0.8%) and 3(0.8%) respectively. The identification of Aspergillus species revealed that A.niger, A.flavus var. columnaris, A.terreus, A.flavus Link, A.parasiticus, and A.candidus could be isolated with the following percentages 21(5.6%), 17(4.5%), 10(2.7%), 7(1.9%), 4(1.1%) and 2(0.5%) respectively. Mucor attenuatus could be isolated with frequency percentage of 50(13.5%) and is considered the more predominant mould species which was isolated from the examined frozen ground beef, on the other hand Mucor mucedo percentages was (5.3%). The results obtained in this study are nearly similar with those reported by ABD EL-RAHMAN, et al. (1984); AYRES (1960); FRANK (1967); HADLOK (1970, 1971 and 1972); HADLOK and SCHIPPER (1974); HADLOK, et al. (1975 and 1977). JAY (1978); LEISTNER, et al. (1965) and LEISTNER and AYRES (1976).

The results obtained in Table (3) revealed that the predominant yeast genera in frozen ground beef were; Torulopsis, Rhodotorula, Candida, Debaryomyces, Saccharomyces with percentages of 81(21.3%), 79(20.7%), 72(18.9%), 63(16.5%) and 37(9.7%) respectively, while Endomyces, Trichosporon, Pichia, Hansenula Cryptococcus and Bullera lies with percentages less than 5%. The identification of yeast genera as given in Table (5) revealed that; genus Torulopsis including the following species; T.colliculosa, T.candida, T.stellata, T.globosa and T.glabrata have the percentages of 22(5.8%), 20(5.2%), 17(4.5%), 12(3.1%), and 10(2.6%) respectively.

Genus Rhodotorula could be identified into Rh.mucilaginoso, Rh.glutinis and Rh.aurantiaca with percentages of 30(7.9%), 27((7.1%) and 22(5.8%) respectively. genus Candida into C.pelliculosa var. cylindrica, C.brumptii, C.pseudotropicalis, C.zeylanoides, C.parapsilosis and C.Krusei with percentages of 18(4.7%), 16(4.2%), 13(3.4%), 10(2.6%), 10(2.6%) and 5(1.4%) respectively. Genus Debaryomyces into D.subglobosus, D.nicotianae, D.hansenii, and D.vini with percentages of 20

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(3.2%), 18(4.7%), 15(3.9%), and 10(2.6%) respectively. Genus Saccharomyces into S.cervisia, S. carlesbergensis, S.rouxii, and S.veronae with percentages of 15(3.9%), 10(2.6%), 7(1.8%) and 5(1.4%) respectively. Two species of genus Endomyces could be identified; E.capsularis and E. bispora with percentages of 11(2.9%) and 5(1.4%) respectively. Moreover, the following yeast species could be identified; Pichia membranaefaciens, Hansenula subpelliculosa, Bullera alba, Cryptococcus albidus, and Trichosporon cutaneum with percentages of 8(2.0%), 7(1.8%), 2(0.6%), 6(1.6%) and 10(2.6%) respectively.

From the results obtained in this study it is obvious that, the mycoflora of the frozen ground beef consists mainly of species of the following mould and yeast genera; Penicillium, Mucor, Aspergillus, Cladosporium and Geotrichum, Torulopsis, Rhodotorula, Candida, Debarymyces, Saccharomyces, Endomyces and Trichosporon. Most of the isolated mould and yeast species were discussed by various investigators as spoilage organisms of meat and meat products. Moreover these microorganisms play a dangerous role in human mycosis and mycotoxicosis (BOSENBERG and EBERHARDT, 1969; MOSEL, 1977 and RIETH, 1973). The existence of mould in nature under sever ecological environments as being able to withstand more unfavourable conditions than other microorganisms render their destruction or elimination a serious problem encountered by food scientists, consequently all meat products which are spoilt through mould & yeast must be totally condemned. Moreover mould and yeast must be considered as coliforms and Enterobacter as indicators of meat sanitary quality, and of the hygienic status of meat processing plants.

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Table (1)  
Minimum, maximum and mean values of mould  
and yeast count in frozen ground beef

	Mould	Yeast
Minimum	$10^2$	$10^2$
Maximum	$4 \times 10^4$	$4 \times 10^5$
Mean	$6 \times 10^3$	$4 \times 10^4$

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Table (2)  
Frequency percentages of isolated mould genera

Mould genera	Frequency	%
penicillium	121	32.4
Mucor	70	18.7
Aspergillus	61	16.3
Cladosporium	40	10.7
Geotrichum	30	8.0
Alternaria	15	4.0
Other genera	37	9.9
Total	374	100.0

Table (3)  
Frequency percentages of isolated yeast genera

Yeast genera	Frequency	%
Torulopsis	81	21.3
Rhodotorula	79	20.7
Candida	72	18.9
Debaryomyces	63	16.5
Saccharomyces	37	9.7
Endomyces	16	4.2
Trichosporon	10	2.6
Pichia	8	2.1
Hansenula	7	1.8
Cryptococcus	6	1.6
Bullera	2	0.6
Total	381	100.0

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Table (4)  
Frequency percentages of identified Mould and yeast species in frozen ground beef

Mould species	Frequency	%	Yeast species	Frequency	%
<u>Penicillium</u> species:			<u>Endomyces</u>	11	2.9
<u>P.frequentans</u>	30	8.0	<u>capsularis</u>		
<u>P.verrucosum</u> var.	25	6.6	<u>Endomyces bispora</u>	5	1.4
<u>cyelopium</u>			<u>Saccharomyces</u>	15	3.9
<u>P.citrinum</u>	18	4.8	<u>cervisiae</u>		
<u>P.corylophilum</u>	14	3.7	<u>S.carlesbergensis</u>	10	2.6
<u>P.verrucosum</u> var.	12	3.2	<u>S.rouxii</u>	7	1.8
<u>verrucosum</u>			<u>S.veronae</u>	5	1.4
<u>P.purpurogenum</u>	5	1.3	<u>Pichia</u>		
<u>P.brevicompactum</u>	4	1.1	<u>membranaefaciens</u>	8	2.0
<u>P.rogulosum</u>	4	1.1	<u>Hansenula</u>	7	1.8
<u>P.capsulatum</u>	3	0.8	<u>subpelliculosa</u>		
<u>P. diversum</u>	3	0.8	<u>Debaryomyces</u>		
<u>P.tardum</u>	3	0.8	<u>subglobosus</u>	20	5.2
<u>Aspergillus</u> species:			<u>D.nicotianae</u>	18	4.7
<u>A.niger</u>	21	5.6	<u>D.hansenii</u>	15	3.9
<u>A.flavus</u> var.			<u>D.vini</u>	10	2.6
<u>columnaris</u>	17	4.5	<u>Bullera alba</u>	2	0.6
<u>A.terreus</u>	10	2.7	<u>Cryptococcus</u>		
<u>A.flavus</u> link	7	1.9	<u>albidus</u>	6	1.6
<u>A.parasiticus</u>	4	1.1	<u>Torulopsis</u>	22	5.8
<u>A.candidus</u>	2	0.5	<u>colliculosa</u>		
<u>Mucor attenuatus</u>	50	13.5	<u>T.candida</u>	20	5.2
<u>Cladosporium</u>			<u>T.stellata</u>	17	4.5
<u>herbarium</u>	40	10.7	<u>T.globosa</u>	12	3.1
<u>Geotrichum</u>			<u>T.glabrata</u>	10	2.6
<u>candidum</u>	30	8.0	<u>Candida</u>		
<u>Mucor mucedo</u>	20	5.3	<u>pelliculosa</u> var.	18	4.7
<u>Alternaria</u>			<u>cylindrica</u>		
<u>alternaria</u>	15	4.0	<u>C.brumptii</u>	16	4.2
<u>Fusarium</u> species	10	2.7	<u>C.pseudotropicalis</u>	13	3.4
<u>Thielaviopsis</u>	10	2.7	<u>C.zeylanoides</u>	10	2.6
<u>Verticillium</u>	8	2.1	<u>C.parapsilosis</u>	10	2.6
<u>Trichothecium</u>	7	1.9	<u>C.krusei</u>	5	1.4
<u>Trichoderma</u>	2	0.5	<u>Trichosporon</u>		
			<u>cutaneum</u>	10	2.6
			<u>Rhodotorula</u>		
			<u>mucilaginoso</u>	30	7.9
			<u>Rh.glutinis</u>	27	7.1
			<u>Rh. aurantiaca</u>	22	5.8
Total	347	100.0	Total	381	100.0

