

قسم : مراقبة الأغذية .  
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رئيس القسم : أ.د / على يوسف لطفى .

### تلوث ثلجات اللحوم بالفطريات

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لقد تم عزل ١٢٦١ فطر من ٢٢٥ مسحة من سطح أرباع اللحوم المستوردة والدواجن المجمدة وكذلك من أرضية وأرفف وجد ران الثلجات بالإضافة الى ٢٥ عينة هواء ، وتصنيف تلك الفطريات أمكن عزل الأصناف الآتية : بنسيليوم ، كلادوسيوريوم ، أسبرجلس ، ميكور ، جيورتركم ، ثامنديوم ، رايزوبس ، باسيلومنسيس ، بوتريتس ، ألترناريا ، تراكوديرما ، فيوزاريوم ، مونيليا ، بوليلاريا ، بالإضافة الى تصنيف كلا من جنس البنسيليوم والاسبرجلس .



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## **MOULD AFFECTIONS OF A MEAT COLD STORE** (With 2 Tables)

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(Received at 12/1/1984)

### **SUMMARY**

1261 mould strains were isolated from 150 swab specimens representing 50 samples each from the surface of beef quarters, packed beef and from frozen poultry, and 100 swab specimens representing 25 samples each from the walls, floor, roofs and air of cold store. The following mould genera which could be isolated: *Penicillium*, *Cladosporium*, *Aspergillus*, *Mucor*, *Geotrichum*, *Thamnidium*, *Rhizopus*, *Paecilomyces*, *Scopulariopsis*, *Botrytis*, *Alternaria*, *Trichoderma*, *Fusarium*, *Monilia* and *Pullularia*. Moreover *Penicillium* and *Aspergillus* species were further identified into the following: *P. verrucosum* var. *cyclopium*, *P. nigricans*, *P. citrinium*, *P. multicolor*, *P. brevicompactum*, *P. oxalicum*, *P. griseofulvum*, *P. expansum*, *P. roqueforti* and *P. albidum*, *A. fumigatus*, *A. flavus*, *A. clavatus*, *A. candidus*, *A. sodywii* and *A. varians*.

### **INTRODUCTION**

Mould affections of meat occur very often due to their ubiquity in the atmosphere in which the meat is handled and stored specially when the ecological parameters of mould growth are present.

During the year 1982 imported beef and frozen poultry which stored together in one cold store were subjected to considerable losses. Therefore trials were carried out to isolate and identify such mould growths.

### **MATERIAL and METHODS**

50 swab specimens were obtained from each of the surface of beef quarters Packed beef and frozen poultry as well as 25 swab specimens obtained from each of walls, floor and roofs. Moreover 25 air samples were obtained from the cold store chamber by settling plate method (NEGULESCU *et al.* 1961).

The samples were cultured by using malt extract agar and Czapeck-Dox-Agar medium. The isolates were identified according to BARNETT and HUNTER (1972), KULIK (1968), RAPER and THOM (1949), RAPER and FENNELL (1965), SAMSON (1979) and ZYCHA *et al.* (1969).

### **RESULTS**

The results were tabulated in tables 1 and 2.



## DISCUSSION

Results given in table (1) revealed that 1261 mould strains were isolated from the collected swab samples obtained from the surface of beef quarters, packed beef and frozen poultry (50 samples of each), as well as from the samples obtained from the cold store chamber which representing walls, floor, roofs and air (25 samples of each). 15 mould genera could be isolated and identified. The number and frequency percentage of isolated mould strains which isolated from the walls were 204 (16.2%), floor 277(22.0%), roofs 154(12.2%) and air samples 167(13. %), while from the surface of beef quarters were 256(20.3%), packed beef 120(9.5%) and frozen poultry 83(6.6%).

The number and frequency percentage of the isolated mould genera as given in Table (1) showed that *Penicillium*, *Cladosporium* and *Aspergillus* were the mostly predominant genera, 378(29.9%), 321(25.5%) and 156(12.4%) respectively, while *Mucor* was 76(6.0%), *Geotrichum* 61(4.8%), *Thamnidium* 43(3.4%), *Rhizopus* 35(2.8%), *Paecilomyces* 35(2.8%), *Scopulariopsis* 34(2.7%), *Botrytis* 34(2.7%), *Alternaria* 30(2.4%), *Trichoderma* 25(2.0%), *Fusarium* 15(1.2%), *Monilia* 10(0.8%), and *Pullularia* with 8(0.6%). These findings were in agreement with those reported by GISSKE (1937), HADLOK (1970), PANASSENKO and TATARENKO (1940), RACOVITA *et al.* (1969) and REFAI and LOOT (1969). The identification of *Penicillium* species as given in Table (2) revealed that the number and frequency percentage were *P.verrucosum* var.*cyclopium* 78(20.6%), *P.nigricans* 53(14%), *P.citrinum* 49(12.9%), *P.multicolor* 41(10.8%); *P.brevicompactum* 39(10.3%), *P.oxalicum* 34(8.9%). *P.griseofulvum* 31(8.2%), *P.expansum* 28(7.4%), *P.roqueforti* 13(3.4%) and *P.albidum* 12(3.2%) in the descending manner. These results are similar to those reported by BROOKS and HANSFORD (1923), PANASSENKO and TATARENKO (1940) and SEMENIUK *et al.* (1937).

The results given in Table (2) revealed also that 156 *Aspergillus* species could be identified into the following, *A.fumigatus* 48(30.7%), *A.flavus* 38(24.4%), *A.clavatus* 26(16.7%), *A.candidus* 23 (14.7%), *A.sodywii* 19(12.2%) and *A.varians* 2(1.3%) in the descending manner.

These findings are nearly similar to those reported by REFAI and LOOT (1969).

From the summarised results obtained in the present study it is clear that the imported meat and cold store chamber are heavily contaminated with mould species which are the main source of contamination of the receiving imported meat either before freezing or during transportation providing that deep freezing has no significant destructive effect upon mould spores as they can resist cold temperature up to -40 C° as stated by FRANK (1966).

Such contamination of imported meat with mould spores may be attributed to the unsatisfactory hygienic measures adopted in handling the meat from the time of their arrival until it reached the cold store.

To avoid such mould growth problems a highly hygienic precautions will be recommended without delay in the loading of the imported meat and to avoid excessive undesirable thawing. Further sanitary rules should be adopted to cover proper transportation of meat through disinfection as well as maintenance of the freezing chambers in order to avoid intermittent freezing of meat cold stores.

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Table (1): Number and type of isolated mould genera

Mould genera	beef	packed	frozen	wall	surroundings		air	Total	
	quarter	beef	poultry meat		floor	roofs		No.	%
Penicillium	62	26	33	80	112	25	40	378	29.9
Cladosporium	60	24	12	70	100	40	15	321	25.5
Aspergillus	26	11	15	20	35	14	35	156	12.4
Mucor	15	15	7	7	5	15	12	76	6.0
Geotrichum	20	13	3	7	2	10	6	61	4.8
Thamnidium	3	2	5	5	8	10	10	43	3.4
Rhizopus	5	2	2	2	3	15	11	35	2.8
Paecilomyces	10	8	3	1	3	6	4	35	2.8
Scopulariopsis	10	7	1	2	7	2	5	34	2.7
Botrytis	15	3	2	3	-	5	6	34	2.7
Alternaria	10	5	-	2	1	5	7	30	2.4
Trichoderma	9	3	-	3	1	3	6	25	2.0
Fusarium	3	-	-	2	-	7	3	15	1.2
Monilia	3	-	-	-	-	2	5	10	0.8
Pullularia	5	1	-	-	-	-	2	8	0.6
Total	256	120	83	204	277	154	167	1261	100.0
and percentage	(20.3%)	(9.5%)	(6.6%)	(16.2%)	(22.0%)	(12.2%)	(13.2%)		

Table (2): Number of isolated and identified *Penicillium* and *Aspergillus* species

Penicillium and Aspergillus species	beef quarter	packed beef	frozen poultry meat	wall	floor	roofs	air	Total No.	%
<u>Penicillium spp.:</u>									
P.verrucosum var.cyclopium	15	6	5	20	25	2	5	78	20.6
P.nigricans	16	3	4	15	20	-	1	53	14.0
P.citrinum	8	2	3	10	15	7	4	49	12.9
P.multicolor	3	3	10	5	16	2	8	41	10.8
P.brevicompactum	-	-	-	12	20	2	5	39	10.3
P.Oxalicum	10	2	3	7	4	3	5	34	8.9
P.gresiofulvum	3	1	4	4	10	2	7	31	8.2
P.expansum	5	3	2	6	5	4	3	28	7.4
P.roqueforti	4	2	1	1	3	-	2	13	3.4
P.albidium	5	2	2	-	-	3	-	12	3.2
<u>Aspergillus spp.:</u>									
A.fumigatus	8	6	5	4	9	6	10	48	30.7
A.flavus	2	1	3	5	10	2	15	38	24.4
A.clavatus	4	-	-	5	8	3	6	26	16.7
A.candidus	5	2	7	4	2	1	2	23	14.7
A.sodywii	19	6	1	-	2	6	2	19	12.2
A.varians	1	1	-	-	-	-	-	2	1.3