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التلوث الفطرى للجبن الجاف

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أجريت التجارب العملية على خمسين عينة من الجبن الجاف (الرومى) جمعت من مصادر مختلفة من مدينة القاهرة والجيزة لتحديد مدى تواجد الفطريات والخمائر بها . ودلت النتائج على أن متوسط العدد الكلى للفطريات والخمائر فى تلك العينات هو $169456 \times 10^4 \pm 112492 \times 10^4$ فى الجرام الواحد من الجبن .

واسفر تصنيف الخمائر المعزولة عن الأنواع الآتية :-
كانديدا ، ساكروميسز ، توريوليسز ، رود وتوريولا وكذلك بيكيا .

كما امكن عزل الأنواع الآتية عن الفطريات :
بنسليوم ، اسرجيلس ، نيوروسبورا ، ريزوس ، سيفالوسبوريم ، جينوتريكس ، ميوكور ، سكوبولاريوسسز ، بيوتريكس ، كلاد وسبوريم واليوميسز .
وقد تم مناقشة الأهمية الصحية للفطريات والخمائر التى تم عزلها .

FUNGAL CONTAMINATION OF HARD CHEESE

(With 4 Tables)

By

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SUMMARY

Fifty random samples of hard cheese (Roumy) collected from shops in different localities in Cairo and Giza, were examined for incidence of yeasts and molds.

The maximum total yeast and mold count was 66.9×10^5 , the minimum was 150, with a mean value of $169.456 \times 10^4 \pm 112.492 \times 10^4$ per gram cheese.

The genera *Candida*, *Saccharomyces*, *Torulopsis*, *Rhodotorula* and *Pichia* could be isolated from examined samples at varying percentages ranging from 4.87% to 34.14%, while isolated molds belonged to *Penicillium* spp., *Aspergillus* spp., *Neurospora* spp., *Rhizopus* spp., *Cephalosporium* spp., *Geotrichum* spp., *Mucor* spp., *Scopulariopsis* spp., *Putrichium* spp., *Cladosporium* spp., and *Palliumyces* spp., and could be isolated at different percentages (4.44 to 51.11).

The public health importance and economic significance of existing fungi as well as the suggested measures for improving the quality of the product are discussed.

INTRODUCTION

The presence of molds and yeasts in cheese are objectionable, as they grow at a wide range of temperature and pH values, resulting in spoilage of the product.

Their count is used as an index of storability and sanitary quality of the product.

Many kinds of molds and comparatively very few genera of yeasts are actively proteolytic. Several species of molds do not only cause discoloration but also induces off-flavours in the product.

Some types of yeasts may induce certain defects due to their ability to ferment lactose, others may produce discoloration in cheese (FOSTER *et al.*, 1958).

As hard cheeses are among the most popular dairy products used in our country specially Roumy cheese, therefore this study was planned to investigate the rate of its fungal contamination.

MATERIAL and METHODS

Fifty random samples of locally manufactured hard cheese (Roumy), collected from shops in different localities in Cairo and Giza, were examined for incidence of yeasts and molds.

The technique recommended by BALLY and SCOTT, (1974) was adopted.

Isolated yeasts were purified and identified according to RITH and SCHOENFELD (1959), while molds were identified according to AJELLO and GEORG (1964).

RESULTS

Table (1): Statistical analytical results of total yeast and mold counts/g.

| | Positive samples | | Minimum | Maximum | Mean | S.E.M. \pm |
|--------------------|------------------|----|---------|--------------------|-----------------------|-----------------------|
| | No. | % | | | | |
| Yeast | 41 | 82 | 110 | 61×10^5 | 58.77×10^4 | 20.23×10^3 |
| Mold | 45 | 90 | 40 | 8.10^5 | 96.649×10^4 | 27.835×10^3 |
| Total yeast & mold | 45 | 90 | 150 | 66.9×10^5 | 169.456×10^4 | 112.492×10^4 |

Table (2): Frequency distribution of examined samples based on their total yeast & mold count/g.

| Intervals | Frequency | | | | | |
|---------------|----------------|-------|----------------|-------|--------------------|-------|
| | Yeast | | Mold | | Total yeast & mold | |
| | No. of Samples | % | No. of Samples | % | No. of Samples | % |
| $10^1 - 10^3$ | 8 | 19.51 | 9 | 20.00 | 7 | 15.55 |
| $10^3 - 10^5$ | 19 | 46.34 | 25 | 55.56 | 22 | 48.89 |
| $10^5 - 10^7$ | 14 | 34.15 | 11 | 24.44 | 16 | 35.56 |
| Total | 14 | 100 | 45 | 100 | 45 | 100 |

Table (3): Incidence of isolated yeasts in examined samples

| Isolates | No. of Samples | % |
|--------------------------------|----------------|-------|
| <i>Candida mycoderma</i> . | 6 | 14.63 |
| <i>C. lypolytica</i> . | 5 | 12.19 |
| <i>C. albicans</i> . | 2 | 4.87 |
| <i>C. Pseudotropicalis</i> . | 2 | 4.87 |
| <i>Saccharomyces baillii</i> . | 14 | 34.14 |
| <i>Sac. farinosus</i> . | 10 | 24.39 |
| <i>Sac. cerevisiae</i> . | 5 | 12.19 |
| <i>Torulopsis pinus</i> . | 5 | 12.19 |
| <i>T. inconspicuum</i> . | 10 | 24.39 |
| <i>T. candida</i> . | 4 | 9.75 |
| <i>T. holmii</i> . | 7 | 17.07 |
| <i>Rhodotorula pallida</i> . | 4 | 9.75 |
| <i>Rh. minuta</i> . | 5 | 12.19 |
| <i>Pichia farinosa</i> | 4 | 9.75 |

Table (4): Incidence of isolated molds in examined samples

| Isolates | No. of Samples | % |
|--------------------------------|----------------|-------|
| <i>Penicillium</i> , spp. | 23 | 51.11 |
| <i>Aspergillus niger</i> . | 10 | 22.22 |
| <i>Aspergillus flavous</i> . | 4 | 8.88 |
| <i>Aspergillus fumigatus</i> . | 5 | 11.11 |
| <i>Neurospora</i> spp. | 10 | 22.22 |
| <i>Rhizopus</i> spp. | 7 | 15.55 |
| <i>Cephalosporium</i> spp. | 7 | 15.55 |
| <i>Geotricum</i> spp. | 6 | 13.33 |
| <i>Mucor</i> spp. | 5 | 11.11 |
| <i>Scopulariopsis</i> spp. | 5 | 11.11 |
| <i>Putrichus</i> spp. | 2 | 4.44 |
| <i>Cladsporium</i> spp. | 2 | 4.44 |
| <i>Palliomyces</i> spp. | 2 | 4.44 |

DISCUSSION

YEAST COUNT:

Results presented in Table (1) show that 41 out of 50 samples of hard cheese examined (82%) contained yeasts, with a mean count of $58.77 \times 10^4 \pm 20.23 \times 10^4$ per gram. The highest frequency distribution (46.34%) lies within the range $10^3 - 10^5$ (Table 2).

MOLD COUNT:

Inspection of Table (1) indicates that 90% of examined samples contained molds, with a mean count of $96.649 \times 10^3 \pm 27.835 \times 10^3$ per gram. The highest frequency distribution (55.56%) lies within the range $10^3 - 10^5$ (Table 2).

These findings substantiate what have been reported by BULLERMAN and OLIVIGNI (1974), MUSSOI (1975), and BULLERMAN (1976).

ISOLATED YEASTS AND MOLDS:

It is evident from Table (3) that isolated yeasts belonged to the genera *Candida*, *Saccharomyces*, *Torulopsis*, *Rhodotorula* and *Pichia*.

Different species of yeasts could be isolated at varying percentages ranging from 4.87% to 34.14% (Table 3).

Results given in Table (4) reveal that isolated molds belonging to the genera *Penicillium* spp., *Aspergillus* spp., *Neurospora* spp., *Rhizopus* spp., *Cephalosporium* spp., *Geotrichum* spp., *Mucor* spp., *Scopulariopsis* spp., *Putrichus* spp., *Cladosporium* spp., and *Pallinomyces* spp. could be isolated at varying percentages ranging from 4.44 to 51.11.

Nearly similar findings were reported by BURBIANKA and STEC (1972), JANTEA *et al.* (1972); BULLERMAN and OLIVIGNI (1974); BULLERMAN (1976) and BULLERMAN (1980).

Many species of yeasts and molds find cheese an excellent medium for growth, thus inducing certain undesirable changes such as colour defects, off-flavour, and actual rots (FOSTER *et al.*, 1958; WAUSCHKUHM, 1970; GUEGUEN and LENOIR, 1975 and NAKAE and YONEYA, 1978).

Moreover, some species of yeasts and molds constitute a public health hazard (LIE & MARTH, 1967; OLDHAM *et al.*, 1971; JANTEA *et al.*, 1972; SHIH & MARTH, 1972 and JACQUET and TEHERANI, 1976).

The public health importance of yeasts and molds has been emphasized as certain types of molds produces mycotoxins which were implicated in human cases of food poisoning and liver cancer. Moreover, certain *Candida* species were found to be responsible for cases of intestinal disturbances (IBRAHIM, 1911 and BENHAM, 1957).

Yeasts and molds may reach the product from many different sources. Dirty methods of manufacture and laxity of sterilization are an incentive to their growth and should not be tolerated. Thus in some countries, yeast and mold count is considered the standard test for checking factory sanitation (DAVIS, 1955 and FOSTER *et al.*, 1958).

The results achieved allow to conclude that the sanitary measures adopted during processing, handling and distribution of hard cheese are neglected in most cases. Moreover the objectionable heavy contamination of the product may be responsible for the undesirable changes and inferior quality of the product, that render it unmarketable or even inedible.

Therefore, sanitary control measures should be adopted during production, handling and storage of the product.

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