

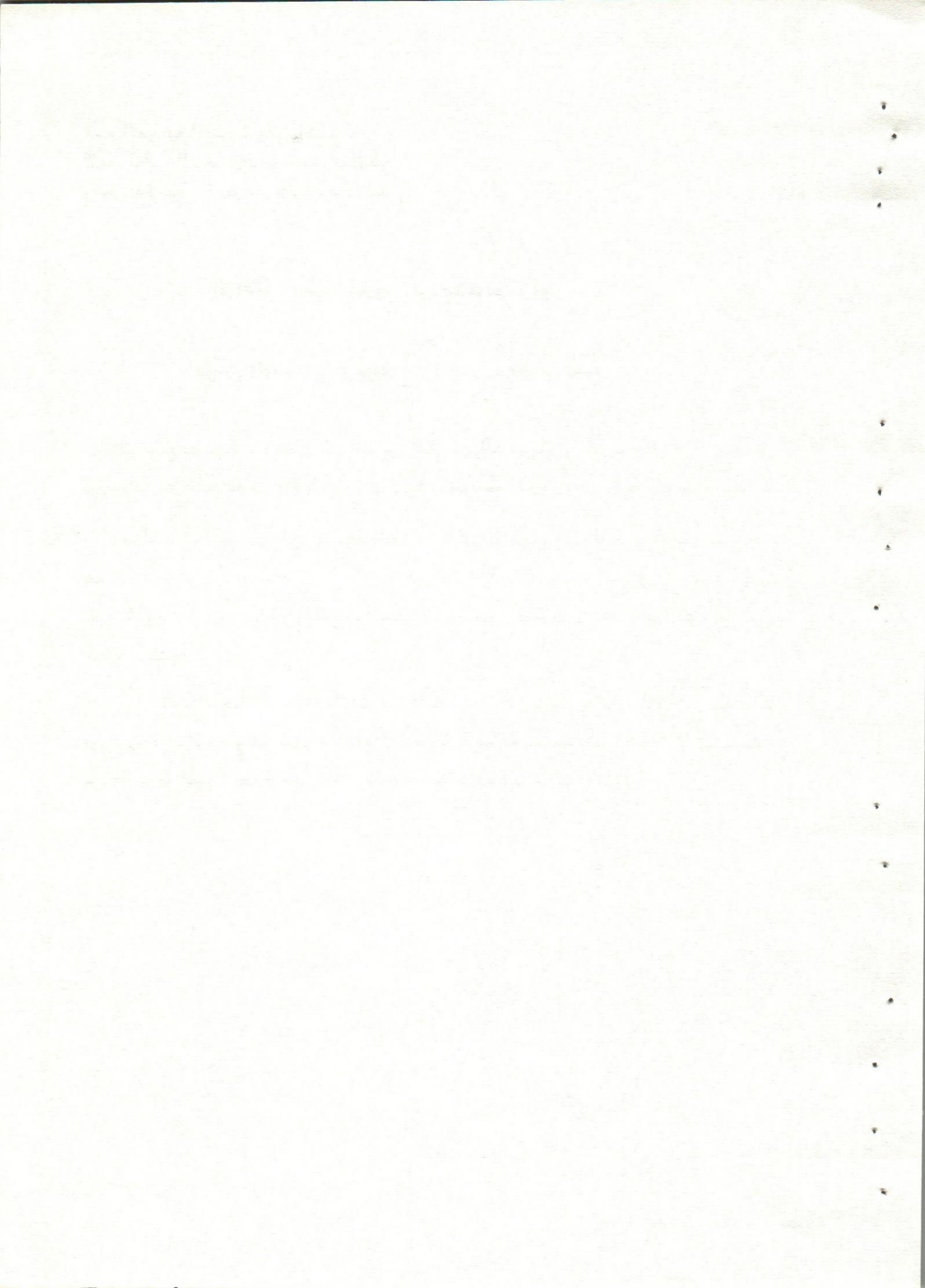
قسم المراقبة الصحية على الأغذية  
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## البكتريا المحبة للبرودة فى منتجات الألبان

توفيق البسيونى ، فوزى أبو الخير ، نجاح محمد

تم جمع عدد ١٠٠ عينة من الجبن القريش والدمياطى والجاف وكذلك الآيس كريم والذبد لمعرفة مدى تواجد الميكروبات المحبة للبرودة فى تلك العينات ودلت النتائج على أن متوسط العدد الكلى للميكروبات المحبة للبرودة هو  $١٠٤ \times ٦١٠$  ،  $٣٢ \times ٦١٠$  ،  $٢٦ \times ٦١٠$  ،  $٣٠٨ \times ٥١٠$  ،  $٨٣ \times ٦١٠$  على التوالي . كما تم عزل عترات الميكروبات المحبة للبرودة بنسب متفاوتة من هذه المنتجات .

كما أثبت البحث أن حفظ الزبد عند درجة - ١٧م قد يطيل فترة صلاحيتها عن درجة الثلاجة ولقد تمت مناقشة الأهمية الصحية لوجود مثل هذه الأنواع من البكتريا على صحة المستهلك وكذلك فسادها لمنتجات الألبان .



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## **PSYCHROTROPHIC BACTERIA IN DAIRY PRODUCTS\*** (With 4 Tables)

By  
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### **SUMMARY**

100 random samples of cheese, butter and ice-cream were collected from Assiut City markets for enumeration and isolation of psychrotrophic bacteria.

The mean psychrotrophic counts were  $1.4 \times 10^6$ ,  $32.1 \times 10^6$ ,  $26 \times 10^6$ ,  $8.3 \times 10^6$  and  $30.3 \times 10^5$  in damietta cheese, kareish cheese, hard cheese, ice-cream and butter respectively. The bacterial genera most commonly found to contain psychrotrophic species are *Pseudomonas*, *Flavobacterium*, *Alcaligenes*, *Acinetobacter*, *Serratia*, *Proteus* and *Coliforms*.

Deep freezing is highly recommended for storage of butter than refrigerator as it prolongs the keeping quality of butter.

### **INTRODUCTION**

Storage of milk and milk products containing some psychrotrophic bacteria for long periods at refrigeration temperature may cause some problems. These problems are related to the growth and metabolic activities of psychrotrophic microorganisms at low temperature.

Recent researches have been directed towards the role played by such organisms in deteriorating the manufactured products of milk through production of proteolytic or lipolytic enzymes during its growth (RICHTER, 1981). Some of these enzymes are heat stable and can withstand milk processing temperatures leading to decrease the keeping quality of milk and milk products. Psychrotrophic bacteria were enumerated and isolated from dairy products by BRUM (1974), COELHO & COELHO (1978), EL-BASSIONY and ABOUL-KHIER (1979) and TEKINSEN & ROTHWELL (1974).

Owing to the fact that these organisms are more or less abundant in nature and are the most common cause of spoilage of refrigerated dairy products, therefore, this work was planned to secure the prevalence of psychrotrophic bacteria in milk products commonly available to the consumer in Assiut City markets as well as the effect of storage temperature on psychrotrophic count in butter.

### **MATERIAL and METHODS**

One hundred samples of cheese, butter and ice-cream were collected from Assiut City markets. Handling and preparation of samples were done according to A.P.H.A. (1972).

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#### Enumeration and identification of psychrotrophic bacteria:

Heart infusion agar was used for psychrotrophic counts and significant number of colonies were picked for identification according to published procedures (COWAN & STEEL, 1974).

#### The effect of storage temperature on psychrotrophic count in butter:

Samples of butter in retail packages were transferred to the laboratory. On arrival to the laboratory, each sample was aseptically transferred to a sterile wide mouth jar. After preparation of samples the initial psychrotrophic count was determined. Each sample was divided into 3 subsamples, the first was stored in refrigerator temperature ( $8\pm 2^{\circ}\text{C}$ ); the second at freezing temperature ( $0^{\circ}\text{C}$ ), while the third one was stored at deep freezing temperature ( $-17\pm 2^{\circ}\text{C}$ ).

The stored samples were examined at time zero and daily for 2 days. Then every week intervals up to 4 weeks for direct enumeration of psychrotrophs.

### RESULTS

All results obtained from the examined samples of dairy products are presented in Tables (1-4).

### DISCUSSION

Table (1) shows the maximum, minimum and average counts of psychrotrophic bacteria recovered from all of the products examined. Presence of large number of such organisms in the examined samples of dairy products reflect the massive contamination and/or the growth of the initial number during cold storage.

The isolated psychrotrophs from dairy products (Tables 2 & 3) were identified as *Pseudomonas* species, *Alcaligenes faecalis*, *Acinetobacter anitratus*, *Flavobacter* species, and *Proteus* species. Coliforms also isolated and identified as *E. coli*, *Enterobacter* species, *Citrobacter* species and *klebsiella* species. Some of these psychrotrophic bacteria cause spoilage of dairy products, others have implicated as a causal agents of food poisoning, while the remainder are pathogenic for man and animals (GYLLENBERG et al. 1963; HOBBS, 1975, and BAILLY & SCOT, 1978).

From results recorded in Table (4) it is clear that storage of butter at deep freezing temperature is highly recommended than refrigerator as it prolongs the keeping quality of butter. Furthermore, both storage temperature and time are important factors in influencing the rate of growth and multiplication of psychrotrophic bacteria in butter.

In conclusion, dairy products can be considered as a good medium for the growth and multiplication of different types of psychrotrophic bacteria which are responsible for their spoilage.

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Table (1): Psychrotrophic count/g. in the examined samples

| Products        | Maximum              | Minimum             | Average              | S.E.M.              |
|-----------------|----------------------|---------------------|----------------------|---------------------|
| Kareish cheese  | 14.2x10 <sup>7</sup> | 0.7x10 <sup>4</sup> | 32.1x10 <sup>6</sup> | 4.5x10 <sup>6</sup> |
| Damietta cheese | 1.5x10 <sup>7</sup>  | 0.1x10 <sup>4</sup> | 1.4x10 <sup>6</sup>  | 1.1x10 <sup>6</sup> |
| Hard cheese     | 6.0x10 <sup>7</sup>  | 1.3x10 <sup>3</sup> | 26.0x10 <sup>6</sup> | 4.9x10 <sup>5</sup> |
| Ice-cream       | 16.6x10 <sup>6</sup> | 6.0x10 <sup>2</sup> | 30.8x10 <sup>5</sup> | 7.3x10 <sup>5</sup> |
| Butter          | 3.2x10 <sup>7</sup>  | 1.0x10 <sup>5</sup> | 8.3x10 <sup>6</sup>  | 2.5x10 <sup>6</sup> |

Table (2): Frequency distribution of isolated psychrotrophs in examined samples

| Isolated organisms          | Kareish cheese |       | Domietta cheese |       | Hard cheese    |       | Ice-cream      |       | Butter         |       |
|-----------------------------|----------------|-------|-----------------|-------|----------------|-------|----------------|-------|----------------|-------|
|                             | No. of isolats | %     | No. of isolate  | %     | No. of isolate | %     | No. of isolate | %     | No. of isolate | %     |
| <i>Pseudomonas</i>          | 19             | 27.93 | 12              | 22.22 | 13             | 23.21 | 20             | 29.41 | 18             | 32.14 |
| <i>Alcaligenes faccalis</i> | 14             | 20.58 | 9               | 16.66 | 11             | 19.64 | 13             | 19.10 | 8              | 14.28 |
| <i>Acinetobacter</i>        | 4              | 5.88  | 7               | 12.96 | 3              | 5.35  | 8              | 11.76 | 3              | 5.35  |
| <i>Flavobacter</i>          | 2              | 2.94  | 3               | 5.55  | 5              | 8.92  | 3              | 4.41  | 2              | 3.57  |
| Coliforms                   | 15             | 22.05 | 9               | 16.66 | 12             | 21.42 | 14             | 20.58 | 16             | 28.57 |
| <i>Proteus spp.</i>         | 8              | 11.76 | 8               | 14.80 | 4              | 7.14  | 7              | 10.29 | 6              | 10.71 |
| <i>Serratia spp.</i>        | 6              | 8.82  | 6               | 11.11 | 8              | 14.28 | 3              | 4.41  | 3              | 5.35  |

Table (3)  
Frequency distribution of isolated coliform in examined samples

| Isolated organisms | Kareish cheese |       | Domietta cheese |       | Hard cheese    |       | Ice-cream      |       | Butter         |       |
|--------------------|----------------|-------|-----------------|-------|----------------|-------|----------------|-------|----------------|-------|
|                    | No. of isolats | %     | No. of isolate  | %     | No. of isolate | %     | No. of isolate | %     | No. of isolate | %     |
| E. coli            | 4              | 26.66 | 2               | 22.22 | 5              | 41.67 | 5              | 35.71 | 5              | 31.25 |
| Entorobacter       | 3              | 20.0  | 3               | 33.33 | 3              | 25    | 3              | 21.43 | 6              | 37.50 |
| Citrobacter        | 6              | 40    | 1               | 11.1  | 4              | 33.3  | 4              | 28.57 | 3              | 18.75 |
| Klebsiolla         | 2              | 13.33 | 3               | 33.33 | -              | -     | 2              | 14.28 | 2              | 12.50 |
| <b>Total</b>       | <b>15</b>      |       | <b>9</b>        |       | <b>12</b>      |       | <b>14</b>      |       | <b>16</b>      |       |

Table (4)  
Effect of storage temperature on Psychrotrophic count/g. in buttr on heart infusion agar

| Time (day) | Storage temperature        |                      |                           |
|------------|----------------------------|----------------------|---------------------------|
|            | (8 ± 2 °C)<br>Refrigerator | (0 °C)<br>Freezing   | (-17±2°C)<br>Deepfreezing |
| Zero       | 4.7×10 <sup>6</sup>        | 4.7×10 <sup>6</sup>  | 4.7×10 <sup>6</sup>       |
| 1          | 13.0×10 <sup>6</sup>       | 8.2×10 <sup>6</sup>  | 16.6×10 <sup>6</sup>      |
| 2          | 69.2×10 <sup>6</sup>       | 55.2×10 <sup>6</sup> | 54.5×10 <sup>6</sup>      |
| 3          | 91.6×10 <sup>6</sup>       | 50.4×10 <sup>6</sup> | 36.1×10 <sup>6</sup>      |
| 16         | 66.6×10 <sup>6</sup>       | 18.4×10 <sup>6</sup> | 7.8×10 <sup>6</sup>       |
| 23         | 53.6×10 <sup>6</sup>       | 6.8×10 <sup>6</sup>  | 7.3×10 <sup>6</sup>       |
| 30         | 35.5×10 <sup>6</sup>       | 3.8×10 <sup>6</sup>  | 2. ×10 <sup>6</sup>       |