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BACTERIOLOGICAL QUALITY OF LOCALLY MANUFACTURED AND IMPORTED BEEF LUNCHEON (With 3 Tables)

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الحالة البكتريولوجية للأنشون البقري المصنع والمستورد

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يعتبر الأنشون من أهم الاغذية المصنعة محليا وعالميا حيث أنه يؤكل عادة بدون طهي سواء للطلاب أو المسافرين أو في المنازل . لهذا تم جمع عدد خمسون عينة عشوائية من الأنشون المصنع محليا والمستورد من محلات مدينة أسيوط للتعرف على الحالة الميكروبيولوجية لها . كانت متوسطات أعداد الميكروبات المحبة للحرارة ، الميكروبات المحبة للملح ، ميكروبات العنقود الذهبي ، الباسيلس سيريس ، الكولسترديوم بيرفرنجز كالآتي :

١.٨ × ١٠ ، ١.٤ × ١٠ ، ٢.٩ × ١٠ ، ١.٦ × ١٠ ، ١.٤ × ١٠ ، ٧.٣ × ١٠ ،
١.٢ × ١٠ ، ٦.١ × ١٠ ، ٨.٦ × ١٠ ، ١.٤ × ١٠ بكتريا/جرام لكل من الأنشون
المصنع محليا والمستورد على التوالي . كانت الميكروبات المحبة للحرارة متواجدة في ٩٠ %
، ٧ ، ٨٦ % في عينات الأنشون المصنع محليا والمستورد على التوالي . كما كانت هذه
الميكروبات المحبة للحرارة متواجدة بأعداد أكثر من ١٠ ، في ٥ % من عينات الأنشون
المصنع محليا بينما لم توجد هذه الأعداد في الأنشون المستورد . تواجدت الميكروبات المحبة
للملح في ١٠٠ % من عينات الأنشون المصنع محليا وفي ٨٣ ، ٣ % في عينات المستورد
منه . كذلك أعداد ٦٠ تواجدت في نسبة ١٠ % من عينات الأنشون المصنع محليا بنسبة ٨٠ % وكذلك
ميكروب الباسيلس سيريس عزل من عينات الأنشون المصنع محليا بنسبة ١٠ %
بنفس النسبة من عينات الأنشون المستورد . ميكروب العنقود الذهبي تم عزله بنسبة ١٠ %
لكل من العينات المحلية والمستوردة ولكن بأعداد قليلة . ميكروب الكولسترديوم بيرفرنجز
عزل بنسبة ٦٥ % ، ٧ ، ٢٦ % من عينات الأنشون المصنع محليا والمستورد على
التوالي . ولقد أثبتت هذه النتائج وجود تباين تام بين كلا النوعين محل الدراسة كما نوقشت
أهمية كل ميكروب على الصحة العامة للمستهلك .

SUMMARY

A total of fifty random samples of locally manufactured and imported beef luncheon were collected from Assiut City. The samples were examined for bacterial quality. The mean values for thermophilic, halophilic, *S.aureus*, *B.cereus* and *C.perfringens* were $1.8 \pm 1.01 \times 10^4$, $1.4 \pm 1.22 \times 10^4$, $2.9 \pm 0.82 \times 10^4$, $1.6 \pm 1.3 \times 10^3$, $1.4 \pm 0.86 \times 10^3$, $7.3 \pm 0.9 \times 10^3$, $1.2 \pm 1.1 \times 10^4$, $6.1 \pm 1.1 \times 10^3$ and $8.6 \pm 0.8 \times 10^3$, $1.4 \pm 0.97 \times 10^2$ CFU/g for local and imported luncheon samples, respectively. Thermophiles were detected in 90 and 86.7% of local and imported luncheon samples. Thermophilic counts of 10^6 were present in 5% of local luncheon samples while this count could not be detected in any of the imported samples. Halophiles were recorded in 100% and 83.3% of local and imported luncheon samples, respectively. Also, the counts of 10^6 were reported in 10% of local luncheon samples only. *Bacillus cereus* was isolated from 80% of both local and imported types. The counts of 10^5 and more were enumerated in 10% of local luncheon samples only. *S.aureus* was recovered from 10% of both local and imported samples but in low numbers. *Clostridium perfringens* could be isolated from 65% and 26.7% of the examined local and imported luncheon samples, respectively. The present study point out that a quite variable bacterial quality was found between the two examined types. The public health aspects of the investigated microorganisms in luncheon were declared.

Key words: Bacteriological quality of locally manufactured and imported beef luncheon.

INTRODUCTION

Luncheon meats are types of meat products which have been cured and subjected to a mild heat process sufficient to yield pasteurized, cooked products. They are not generally heated further by the consumer which would destroy most of the contaminating microflora before consumption.

Bacillus cereus has been implicated as responsible agent in many of foodborne intoxications (Banwart, 1989, Cliver, 1990 and Granum, 1997). *B.cereus* and other *Bacillus* spp. could be isolated from the

examined local and imported corned beef samples (Darwish *et al.* 1991, Farag, 1995 and Asku and Ergun, 1997).

Evidences to implicate *Clostridium perfringens* as a potential food poisoning was reported by Mohl *et al.* (1988). *C.perfringens* could be detected in 8.3% and 40% of the examined luncheon meat as reported by Youssef (1984) and Edris (1992) respectively.

S.aureus count in luncheon meats in Canada exceeds 1×10^3 in 20% of 30 positive samples out of 159 samples. Aerobic plate count exceeds 5×10^3 g in 46.5% of the samples examined by Duitschaever (1977). *S.aureus*, *B.cereus* and *C.perfringens* were present in doses infective to the consumers in 8.42, 7.89 and 5.07 % in ready to eat meats in Latin America (Almeida *et al.*, 1997).

Total bacterial numbers and other counts have been used not only as indices of safety but also as an important indication of the sanitary condition. Salem (1998) found that the imported canned luncheon beef samples had mean thermophilic count of 1.2×10^2 while the total anaerobic count was $8.7 \times 10/g$.

Egyptian Organization for standardization (E.O.S.) (1992) stated that the canned luncheon must be free from yeasts, moulds, non spore forming bacteria, pathogenic bacteria and the number of aerobic spore formers must not exceed $10^2/100$ g.

The bacteriological quality of luncheon meats depends on the quality of raw materials, sanitation during production and maintenance of the refrigeration chain from processor to consumer. A need for these information on the bacterial quality of luncheon meats as they appear on the retail markets in Assiut City prompted this study.

MATERIALS and METHODS

Fifty random luncheon samples (20 of local retail package and 30 of imported canned types) were collected from the markets in Assiut City. The samples were dispatched to the laboratory with a minimum of delay where they were subjected to the bacteriological evaluation. Portions of 10g of each sample were aseptically placed in stomacher (Lab. blender 400, Seward Medical U.A., C Hause, London) with 90 ml of sterile saline solution and homogenized for 1 min. Further decimal serial dilutions were made in sterile saline solution and duplicate portions were mixed or spread on the corresponding media for bacteriological quality.

Thermophilic counts per gram, was estimated using the standard plate count agar in duplicate plates and were aerobically incubated at 55 C for 48 h. (ICMSF, 1986). Halophilic counts per gram, was done by using the halophilic agar (Muller, 1986) and the plates were incubated aerobically at 37 C for 48 h.

S.aureus count was performed by using Baird Parker agar according to the method of Baird-Parker (1962) and Finegold and Martin (1982). *Bacillus cereus* count was done as the method recommended by Lancette and Harmon (1980). *Clostridium perfringens* isolation and enumeration was carried out according to the method of Beerns *et al.* (1986).

RESULTS

The results were tabulated in Tables 1-3.

DISCUSSION

The summarized results in Table 1 illustrated that the mean value of thermophilic, halophilic, *B.cereus*, *S.aureus* and *C.perfringens* counts in locally manufacture luncheon were $1.8 \pm 1.01 \times 10^4$, $2.9 \pm 0.82 \times 10^4$, $1.2 \pm 1.1 \times 10^4$, $1.4 \pm 0.86 \times 10^3$ and $8.6 \pm 0.8 \times 10$ CFU/g. While in the imported luncheon type the corresponding values of the aforementioned microorganisms were $1.4 \pm 1.2 \times 10^4$, $1.6 \pm 1.3 \times 10^3$, $6.1 \pm 1.1 \times 10^3$, $7.3 \pm 0.9 \times 10$ and $1.4 \pm 0.97 \times 10^2$ CFU/ g, respectively.

Thermophiles were recovered from 90% out of 20 samples of local luncheon type. About 20% of the samples of the all samples had thermophilic count exceeded 10^5 CFU /g and 85% of all samples were in the range of 10^3 - 10^6 CFU /g. While in the imported luncheon examined type, thermophiles were detected in about 87% of the samples. Nearly 57% of all samples were in the range of 10^3 10^5 CFU/g. No samples had 10^6 CFU/ g (Table 2).

Halophilies were detected in 100% and 83.3% of the examined local and imported luncheon types, respectively. About 90% and 36.3% of local and imported luncheon samples, respectively had 10^3 to 10^5 CFU/g. 10% of local luncheon had 10^6 CFU/g while this high count was not detected in the imported luncheon type.

A difference in the bacterial quality between the two types of luncheon was observed (Table 2). Comparing the two types, local type contributed 5 % of contaminated samples and had thermophilic counts of

10^6 in contrast to imported type which non of the samples had this count.

The presence of high bacterial count may be attributed to contamination of flesh used for luncheon manufacture. Mincing machine, grinders and equipment and knives, in addition to additives and spices lead to marked increase in bacterial population. Considering that the heat treatment for luncheon manufacture should be sufficient to reduce the microbial population in the raw product materials and to eliminate the pathogenic ones. Therefore, the presence of this high bacterial count indicates insufficient heat treatment.

Bacillus cereus was recovered from 80% of the both total analyzed local and imported luncheon type. These findings are in agreement with Darwish *et al.* (1991), Farag (1995), Asku and Ergun (1997). A range of 10^4 to 10^5 CFU/g was recovered in the examined local and imported luncheon type in 25 and 26.7% respectively. Counts of 10^5 and more were required for food poisoning (Cliver, 1990) were recorded in local luncheon only and in 10% of the examined samples. Higher counts of *B.cereus* (1×10^6) in local luncheon were reported by Abd-Alla (1994). The sources of *B.cereus* are the additives and spices as well as neglected sanitary measures during processing. *Bacillus cereus* has a proteolytic and lipolytic effect.

S.aureus was recovered from 10% of the examined local and imported luncheon. In positive samples a range of 10 to 10^3 CFU/g in both types were recorded. These results are not agree with that recorded by Duitschaever (1977) and Abd-Alla (1994). Small numbers of *S.aureus* do not assure food safety because the organism can grow and produce enterotoxin and then die off during storage or be killed during processing (heat) of the food, preformed toxin, however, usually will remain in the meat (National Academy of Science, 1985).

C.perfringenes could be isolated from 65 and 26.7% of the examined local and imported luncheon samples respectively. Lower findings (8.3% and 40%) were recorded in local luncheon by Youssef (1984) and Edris *et al.* (1992) respectively. The highest frequency distribution of the positive local samples was 25% with count range 3-23 CFU/g while in the imported ones was 16.7% with range of 1100- <1100 CEU/g (Table 3).

In conclusion the bacterial quality of the examined two types of luncheon is quite variable and the imported one is better than than that of the local type.

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Table (1): The summarized results of microbial quality of local and imported luncheon.

	Thermophilic		Halophilic		B. cereus		Staph. aureus		C. perfringens	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
No. of the samples (%)	18 (90)	26 (86.7)	20 (100)	25 (83.3)	16 (80)	24 (80)	2 (10)	3 (10)	13 (65)	9 (26.7)
Mean ± S.E	1.8 ± 1.0 $\times 10^4$	± 1.2 $\times 10^4$	± 0.8 $\times 10^4$	± 1.3 $\times 10^4$	± 1.1 $\times 10^3$	± 1.1 $\times 10^3$	± 0.9 $\times 10^3$	± 0.9 $\times 10^3$	± 0.8 $\times 10^3$	± 0.9 $\times 10^2$

Table (2): Frequency distribution of thermophilic, halophilic, B. cereus and Staph. aureus count in local and imported luncheon.

Interval	Thermophilic						Halophilic						B. cereus						Staph. aureus					
	Local		Imported		Local		Imported		Local		Imported		Local		Imported		Local		Imported		Local		Imported	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
< 10	0	0	4	13.3	0	0	5	16.7	4	20	6	20	18	90	27	90	0	0	0	0	0	0		
$10^1 - < 10^2$	2	10	3	10.0	0	0	6	20	1	5	4	13.3	1	5	2	6.7	0	0	0	0	0	0		
$10^2 - < 10^3$	1	5	3	10.0	0	0	8	26.7	1	5	3	10	0	0	1	3.3	0	0	0	0	0	0		
$10^3 - < 10^4$	7	35	4	13.3	7	35	6	20	7	35	9	30	0	0	0	0	0	0	0	0	0	0		
$10^4 - < 10^5$	6	30	13	43.3	8	40	4	13.3	5	25	8	26.7	0	0	0	0	0	0	0	0	0	0		
$10^5 - < 10^6$	3	15	3	10.0	3	15	1	3.3	2	10	0	0	1	5	0	0	0	0	0	0	0	0		
10^6	1	5	0	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Table (3): Frequency distribution of *C. perfringens* counts in local and imported luncheon.

Interval	Local		Imported	
	No.	%	No.	%
< 3	7	35	21	70
3 - 23	5	25	4	13.3
28-39	0	0	0	0
40-110	4	20	0	0
110->1100	0	0	0	0
1100 - < 11100	4	20	5	16.7

