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Microbiological criteria of local manufactured beef luncheon

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Abstract

A total number of 105 samples of local beef luncheon sold in different local markets in Alexandria city were subjected to microbial analysis for assessment of their safety and quality. The results showed that the incidence of Staphylococcus aureus was 49.5 % in beef luncheon, while Salmonellae was not be detected. The mean values of aerobic bacterial count, coliforms count, Enterobacteriaceae count and mould and yeast count were 7.06x104 ± 1.4x104, 2.3x105 ± 1.4x105,8.5x103 ± 3.3x103 and 6.6x105± 1.6x105, respectively. The samples were subjected to mycological examination to evaluate the fungal load of beef luncheon. The results showed that the most predominant species were Penicillium (41%), Asperigellus (25%), Paecilomyces (10%), Fusarium (7%), Trichoderma (9%), Cladosporium (5%), Alternaria alternate (2%), Helminthesporium (1%) and Syncephalostrum (1%). This study showed the degree of contamination of beef luncheon, in addition to the public health importance of such contaminates had been discussed.

1. INTRODUCTION

In recent years, there has been a steady increase in the production and consumption of processed meat products worldwide because of their high nutritive value. However, processed meat products may at time constitute a public health hazard due to the possible presence of foodborne pathogenic bacteria which cause illness, intoxication and sometimes death (Rajic et al., 2007). In case of the luncheon meat, consumption will be in sandwiches, salads and other dishes without a cooking step. The introduction of bacteria during the slicing and packaging of luncheon meat at super-markets may represent an additional concern to the food safety (Mottin et al., 2011). S. aureus is a facultative anaerobe, non-motile, spherical and Gram positive cocci resistant to heat and radiation. It can be transferred to meat through skin of animal, hide, equipment and infected persons (Jay et al., 2005 and Prescott et al., 2005). Nausea, vomiting, abdominal cramping and prostration are the most common signs of S. aureus food poisoning (Food intoxication type) (Sea and Bohach, 2007). Coliforms belong to family Enterobacteriaceae, they are short Gram negative rods, non-spore forming and ferment lactose to lactic acid and gas. Some of these pathogens cause gastroenteritis and diarrhea especially Enteropathogenic E. coli (EPEC) (Jawtez et al. 2008). Moulds contaminate meat and meat products during slaughtering and transportation of the animal or during processing of meat products through the use of contaminated equipment or contaminated additives (Flanniga and Hui, 1976; Misra, 1981 and Abdel Rahman, 1987).

The aim of this work was to evaluate the microbial quality of beef luncheon sold in different supermarkets in Alexandria city and to investigate their hygienic significance, and isolate some of food poisoning microorganisms as S. aureus and Salmonellae.

2. MATERIALS AND METHODS

A total of 105 random samples of beef luncheon were collected from different supermarkets in Alexandria city. The samples were transferred directly to the laboratory in an insulated ice box under complete aseptic condition and subjected for microbial examinations.

Microbial examination

1- Preparation of the sample:

25 grams of the examined samples were aseptically transferred into a sterile blender flask containing 225 ml of sterile buffered peptone water and homogenized for 2.5 minutes to make of 1/10 dilution. One ml of homogenate was transferred with sterile pipette to another tube containing 9 ml of sterile buffered peptone water, from which tenth fold serial dilutions were prepared up to 10-6.

1.1. Aerobic bacterial count:

Pour plate method was adapted using standard plate agar. Incubation had been done at 37oC for 24 hours (APHA, 1992).

1.2. Enterobacteriaceae count:

Violet red bile glucose agar medium has been used, according to the method of Gork (1976).

1.3. Coliforms count:

Violet red bile agar medium has been used, according to ISO 4832 (2006).

1.4. Mould and yeast count:

By using Sabouraud‘s dextrose agar media according to the method of Koburger and Farahat (1975).

1.4.1. Identification of the isolated moulds:

Mold isolation was done according to Samson et al., (1995). All positive cultures were purified by subculturing on Sabouraud’s dextrose agar medium (SDA) and then incubated at 25oC for 3-5 days and examined macroscopically and microscopically by using solutip technique

1.5. Isolation and identification of S. aureus:

Surface spread method has been used; the medium used was Baired Parker agar. Incubation at 37oC for 24- 48 hours (ICMSF, 1978). Suspected colonies were kept in a sterile semisolid for further identification: Morphologically according to Thatcher and Clark, (1978). Biochemical reactions were carried out according to Baily and Scott, (1987).

1.6. Isolation and identification of Salmonellae:

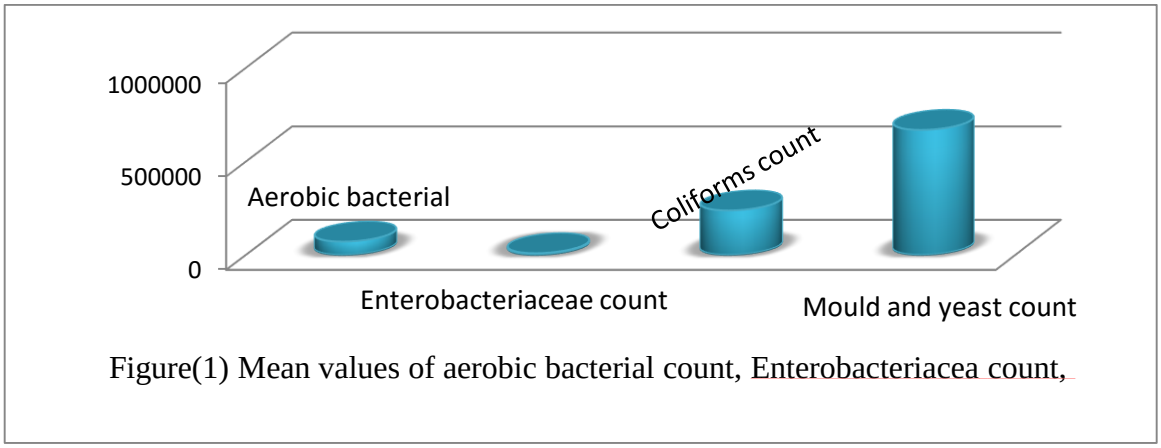
Salmonella-Shigella agar (SS agar) and Brilliant green agar have been used (Edel et al., 1993). The suspected colonies were taken on semisolid for further identification, morphologically according to Thatcher and Clark (1978) and biochemically according to Finegold and Martin (1982).

3. Results and Discussion

Table (1): Statistical analytical results of aerobic bacterial count, Enterobacteriaceae count, coliforms count and mould and yeast count (cfu /g) of the examined beef luncheon samples.

Paramater	Minimum	Maximum	Mean ± SEM
Aerobic bacterial count	5X10	$1.7X10^6$	$7.06X10^4 \pm 1.4X10^4$
Enterobacteriaceae count	5X10	$3X10^5$	$8.5X10^3 \pm 3.3X10^3$
Coliforms count	$1X10^2$	$1.0X10^7$	$2.3X10^5 \pm 1.4X10^5$
Mould and yeast count	$1X10^2$	$1.7X10^7$	$6.6X10^5 \pm 1.6X10^5$

Number of examined samples = 105 SEM= Standard error of mean



Figure(1) Mean values of aerobic bacterial count, Enterobacteriacea count,

Table (2) Incidence of *S. aureus* and Salmonellae in examined beef luncheon samples. (N=105) ND = Not detected

Microorganism	No and % of positive samples of beef luncheo	
	No	%
S. aureus	52	49.5
Salmonella	ND	Not detected

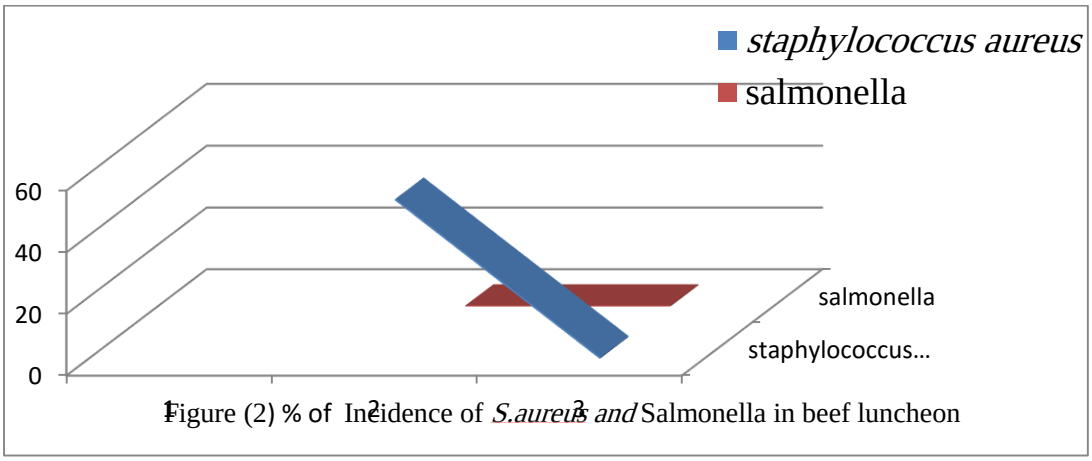
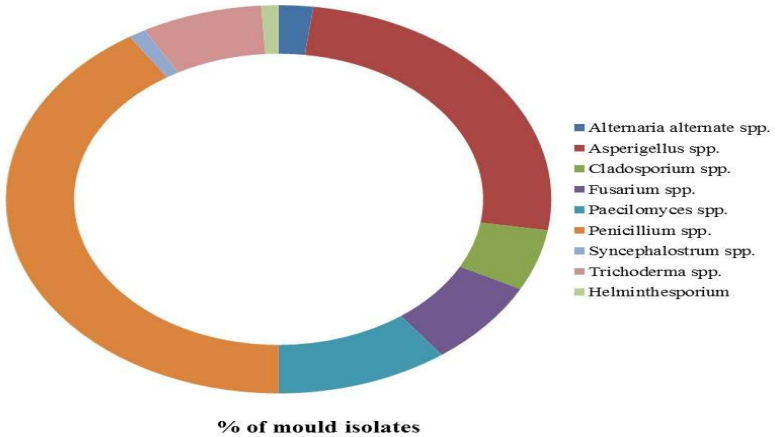


Figure (2) % of Incidence of *S.aureus and* Salmonella in beef luncheon

Table (3) Incidence of mould species isolated from beef luncheon samples. (N=105)

Mould Isolates	No and % of the mould isolates in beef luncheon	
	No	%
Alternaria alternate spp.	2	1.9
Asperigellus spp.	26	24.7
Cladosporium spp.	5	4.7
Fusarium spp.	7	6.6
Helmithesporium	1	0.9
Paecilomyces spp.	11	10.4
Penicillium spp.	43	40.9
Syncephalostrum spp.	1	0.9
Trichoderma spp.	9	8.6



Aerobic bacterial count:-

Data in Table (1), Fig. (1) showed that the aerobic bacterial count (cfu/g) of the examined beef luncheon samples ranged from 5x10 to $1.7x10^6$, with a mean value $7.06x10^4 \pm 1.4x10^4$ cfu/g. The result did not agree with the maximum acceptable limit of APC stipulated by Egyptian Standard (E.S.) (1114/2005) by which the maximum level of aerobic bacterial count of the beef luncheon should not be higher than 10^4. They were nearly similar to the results reported by (Darweesh, (2008); Gaafar, (2009) and Ibrahim, (2009) which were $9.24x10^5$, $9.24x10^4$ and $3.7x10^4$, respectively. While lower than results that was reported by (Gab allah, (1990) and Saleh, (1991) which were $17.2x10^5$ and $4.7x10^6$, respectively.

Enterobacteriaceae count:-

In Table (1), Fig. (1), data showed that the Enterobacteriaceae count of the examined beef luncheon samples ranged from 5x10 to $3x10^5$ with a mean value $8.5x103 \pm 3.3x10^3$ (cfu/g).These results are higher than the acceptable limit of E.S. 1114, (2005) by which it should not by higher than 10^2. Nearly similar to what was reported by (Gafaar, 2009) which was $3.08x10^3$ (cfu/g) and lower than Amal (2004) which was $1.6x10^4$ cfu/g.

Coliforms count:-

From data In Table (1), Fig.(1) , the coliforms count of the examined beef luncheon samples ranged from $1x10^2$ to $1.0x10^7$ (cfu/g) with a mean value $2.3x10^5 \pm 1.4x10^5$ cfu/g. These results were higher than the acceptable limit of E.S. 1114, (2005) as its maximum level was 10^2. Lower results are reported by Amal, (2004); Darweesh, (2008) and Ibrahim, (2009) which were $8.4x10^2$, $4.08x10^2$ and $3.7x10^2$ (cfu/g), respectively.

Mould and yeast count:-

Data in Table (1), Fig. (1), showed that the results of mould and yeast count of the examined samples of beef luncheon ranged from $1x10^2$ to $1.7x10^7$ (cfu/g) with mean value $6.6x10^5 \pm 1.6x10^5$ (cfu/g),The results were nearly similar to that obtained by Gafaar (2009) which was $1.18x10^3$, but lower results are recorded by Darweesh (2008) which was $1.18x10^2$ cfu/g. The higher count of mould and yeast might be due to spices and additives which were added to the beef luncheon.

***Staphylococcus aureus*:-**

Data in table (2), Fig. (2). showed that the incidence of *S. aureus* in the examined samples of beef luncheon was 49.5% which is not accepted with E.S. 1114, (2005), as it should be free. This result was nearly similar to the result reported by Ismail et al., (2013) which was 32%. Lower results were reported by Torkey, (2004) and Ibrahim, (2009) which were 15% and 22.8%.

Salmonella species.

Also in table (2), Fig. (2), The examined beef luncheon Salmonella species could not detected, this was compatible with the E.S. 1114, (2005) as it should be free. Similar results were reported by Hoda and Hala (2002); Amal, (2004) and Ibrahim, (2009) by which they fail to detect Salmonella species in beef luncheon.

Mould isolates:-

Data in table (3), Fig (3). Revealed that the most isolated species of mould in the examined beef luncheon samples were *Penicillium* sp. 43 (40.9%), *Aspergillus* sp. 26 (24.7%), *Paecilomyces* sp. 11 (10.4%), *Fusarium* sp.7 (6.6%), *Trichoderma* sp. 9 (8.57%), *Cladosporium* sp. 5 (4.7%), *Alternaria alternate* sp.2 (1.9%), *Helminthesporium* 1 (0.9%) and *Syncephalostrum* sp. 1 (0.9%). Nearly similar results was recorded by Isamail and Zaki (1999), but lower results are obtained by Fatma (2008).

4. CONCLUSION:

The importance of using measures focused on the hygienic quality of both raw material and processing units to avoid development of aminogenic and toxigenic contaminant, also consumers should be aware while buying beef luncheon and avoid parts without casing which were exposed to air and surfaces. However, handlers and sellers should be healthy and provided with personal hygienic measures to minimize transmission of diseases, also hands, knives, equipment, packaging materials and cutting surfaces should be clean and dry.

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