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BATCTERIOLOGICAL EVALUATION OF BEEF LUNCHEON IN ALEXANDRIA MARKETS

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ABSTRACT

Atotal of 50 random samples of locally processed beef luncheon were collected from Alexandria market. The samples were transferred directily to the laboratory where they were examined organoleptically, chemically and bacteriologically. The organoleptic examination revealed that the examined samples had normal colour, acceptable odour and normal consistency. The chemical examination indicated that the PH within the permissible limits (5.4). Bacteriological examination of all samples revealed that the mean value of the total aerobic plate count, total anaerobic counts, total Enterobacteriaceae count, total Coliform count, total E- coli count, total Staphylococcus count and total Bacillus cereus counts were 9.5×10^5, 1.3×10^3, 1.6×10^4, 8.4×10^2, 14, 1.4×10^3 *and* 1.2×10^4 *cfu /gram respectively. Escherichia coli, Yersinia enterocolitica, Staphylococcus aureus, Bacillus cereus and Clostridium perfringens were isolated from the examined beef luncheon samples at an incidence of 4 , 8 , 6 , 4 and 8 % respectively, on the other hand Salmonella microorganisms could not be isolated from any of the examined samples . Escherichia coli strains were serotyped as 055 : k 59.*

The public heath significance of the isolated microorganisms as well as suggestion for improving the quality of locally beef luncheon were discussed .

INTRODUCTION

Luncheon meats are types of meat products which have been cured and subjected to 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 food borne intoxications ***(Banwart, 1989, Cliver, 1990, and Granum, 1997).*** Bacillus cereus and other Bacillus species could be isolated from the examined local beef luncheon samples ***(Darwish et al. 1991; Farag, 1995 and Jehan 2001).***

Clostridium perfringens is consider as a potential food poisoning was reported by ***Mohl et al. (1988)*** and could be detected in 40 % and 24% of the examined luncheon meat samples by ***Edris (1992) and El Mahrock (2002)*** respectively. Also other pathogenic microorganisms like Escherichia coli, Staphylococcus aureus and Yarsinia enterocolitica were implicated as a cause of food borne pathogens and could be isolated from beef luncheon (***Edris., 1993, Mousa et al., 1993, Fathi, 1994, Hoda, 1995, Abd El-Aziz, etal., 1996, sayed et al., 2001 and Nesreen, 2003).***

Staphylococcus aureus, Bacillus cereus and Clostridium perfringens were present in doses infective to the consumers in 8.42, 7.89 and 5.07 % in ready to eat luncheon meats in Latin America ***(Almeida et al., 1997).*** Total bacterial counts for different microorganisms have been used not only as indixes of safety but also as an important indication of the sanitary condition. ***Nesreen (2003)*** found that the luncheon meat samples had mean Staphylococcus count of 16.6×10^3 while the total Clostridium perfringens count was 3.6×10^3.

Egyptian Organization for Standardization (*E. O. S) (1992)* stated that the luncheon must be free from yeasts, moulds, non spore forming bacteria , pathogenic bacteria and the number of aerobic spore forming 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 Alexandria city prompted this study.

MATERIALS AND METHODS

Fifty random luncheon samples were collected from the markets of Alexandria city . The samples examined had normal colour, acceptable odour and normal consistency with ph value within permissible limits 5.4. The samples were dispatched to the laboratory with a minimum of delay where they were subjected to:

1- Organoleptic examination for colour, odour, consistency and slime formation according to *Miller (1994)*.

2- Chemical examination by determination of Ph value according to *ISO (1974).*

3- Bacteriological examination: portions of 10 g of each sample were aseptically placed in stomacher (lab. blender 400, seward Medical M. A., c Hause, London) with 90 ml of sterile saline solution and homogenized for-1 minute. further decimal serial dilutions were made in sterile saline solution and duplicate portions were mixed or spread on the corresponding media for bacteriological quatity as follow :-

1- Total aerobic plate count ***(Swanson et al., 1992)***.

2- Total anaerobic plate count ***(Course et al., 1991)***.

3- Enterobacteriaceae count according to ***European Union Regulation (2001).***

4- Enumeration of Coliform bacterial count according to ***FAO (1992).***

5- Enumeration of Escherichia coli count ***(FAO,1992).***

6- Determination of Staphylococus aureus count ***(ICMSF,1978).***

7- Enumeration of persumptive Bacillus cereus count ***(Oxoid, 1990).***

8- Isolation and identification of food borne pathogens:

a- Isolation and identification of E. coli according to Health protection ***Agency (2003)*** and seriological identification using diagnostic sera, Biotec E. coli (1999) .

b- Isolation and identification of Salmonella spp. ***(Vassiliadis et al., (1978)).***

c- Isolation and identificaation of Yersinia entrocolitica ***(APHA, 1992).***

d- Isolation and identification of Staphylococcus aureus according to ***Bennett and Lancette (2001)***.

e- Isolation and identification of Bacillus cereus ***(Oxoid ,1990).***

f- Isolation and identification of Closridium perfringens ***(Andrews , 1992).***

RESULTS

The samples examined had normal colour, acceptable odour and normal consistency with PH value within permissible limits 5.4.

Table (1): Mean values of bacterial counts for the examined beef luncheon samples (n= 50).

Microbial Count	Mean values	± S.E
Total aerobic plate count	9.5×10^5	4.6×10^5
Total anaerobic plate count	1.3×10^3	9.7×10^2
Total Enterobacteriaceae count	1.6×10^4	9.7×10^3
Total Coliform count	8.4×10^2	3.0×10^2
Total Escherichia coli count	14	6.6
Total Staphylococcus aureus count	1.4×10^3	8.8×10^2
Total Bacillus cereus count	1.2×10^4	5.1×10^3

Table (2): Incidence of the recovered microorganisms from the examined beef luncheon samples (n = 50).

Isolated organisms	No. of + ve samples	%
Escherichia coli	2	4
Yersinia enterocoletica	4	8
Staphylocuccus aureus	3	6
Bacillus cereus	2	4
Clostridium perfringens	4	8
Salmonella Species	-	-

Table (3): Serotyping of E. coli

Serotypes	O_{55}	O_{128}	O_{111}	O_{114}	O_{119}	O_{142}
Number	2	-	-	-	-	-

DISCUSSION

All examined samples were acceptable in odour, colour, consistency and without slime formation and with normal Ph value. Nearly similar result was obtained by ***Hoda (1995)***. The summarized results in Table (1) illustrated that the mean value of total aerobic, anaerobic ,Enterobacteriaceae, Coliform, Escherichia coli, Staphylococcus and Bacillus cereus counts in locally manufacture luncheon were 9.5×10^5, 1.3×10^3, 1.6×10^4, 8.4×10^2, 14, 1.4×10^3 and 1.2×10^4 CFU / g respectively.

Nearly similar finding for Aerobic plate count were reported by ***Tolba (1994) and Hoda (1995)***. Lower mean values were reported by ***Jehan – Ouf (2001)***, while higher mean value was reported by ***Mousa et al. (1993).***

Concerning Anaerobic count, similar finding was reported by ***Hoda (1995),*** and our results was inagreement of Egyptian Organization of Standaradization quality ***Control (1992)*** as the luncheon must be free from anaerobic spore forming bacteria.

In regard to Enterobacteriaceae counts of the examined Luncheon samples, nearly similar finding (7×10^4) was reported by ***Mousa (1993)***.

Coliforms count in luncheon samples, a higher result was reported by ***Fathi et al. (1992),*** and lower result was reported by ***Tolba (1994) and Jehan – Ouf (2001)*** < 3.

The mean value of Escherichia coli was 14 / g in our results in examined luncheon samples. ***Yassien (1988)*** recorded mean value of fecal coliforms was 2.3 /g. The occurrence of coliforms bacteria is usually attributed to microbiological qualities of raw meat together with the additives used as well as the available cooking technology ***(Mol et al. 1994).***

Concerning Staphylococcus aureus counts in the examined Luncheon samples, a similar findings were also reported by ***Tolba (1994) and Hoda (1995)*** and a higher mean value was reported by ***Nesreen (2003).***

Bacillus cereus counts of 10^5 and more were required for food poisoning ***(Cliver, 1990)***. Higher counts of Bacillus cereus 1 X 10^6 was reported by ***Abd – Alla (1994)*** and nearly similar counts 1.4 X 10^4 was reported by ***Nassar (1999).***

The sources of Bacillus cereus are the additives and spices as well as neglected sanitary measures during processing. Bacillus cereus has a proteolytic and lipolytic effect. Generally, 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. Concedering 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 microorganisms. Therefore, the presence of high bacterial count indicates insufficient heat treatment.

Table (2) illustrated that Escherichia coli, Yersinia enterocolitica, Staphylococcus aureus, Bacillus cereus and Clostridium perfringens were isolated from Luncheon Samples at an incidence of 4,8,6,4 and 8%, respectively. Many investigators reported these pathogenic microorganisms in examined Luncheon samples in Varied percentages.

Hassan (1999) and Nesreen (2003) reported that the incidence of E-coli were 5 and 4 % respectively. Yersinia enterocolitica is capable of causing food borne enteritis in human caused by consumption of

contaminated food, the organism is capable of growth in foods at refrigeration temperatures.

Abdel all (1993) and Abo El –Ela(1994) isolated Yersinia enterocolitica from the examined luncheon samples in a percentage of 7.5 and 6.6% while ***Amal and Seham (1998)*** failed to detect this organism from the examined luncheon samples. Staphylococus aureus was recovered in 6% of the examined samples while a high result about 15% was reported by ***Jehan – Ouf (2001)***. Staphylococcus has been implicated in food poisoning and food intoxication besides it may at time assumes a pathogenic role, so strict hygienic measures should be adapted in meat to ensure a maximum safety to consumer ***(WHO,1957).***

Bacillus cereus was recovered in an incidence of 4%, a high result were reported by ***Darwish et al. (1991) and Nassar (1999)***,while ***Jehan-Ouf (2001)*** failed to detect Bacillus cereus in any of the examined luncheon samples.

Clostridium perfringens could be isolated in 8% of the examined samples. Variable finding (8.3%, 40 % and 65%) were recorded in local luncheon by ***Youssef (1984), Edris et al. (1992), and Nassar (1999)*** respectively.

Salmonella could not be isolated from any of the examined samples. This was in agreement with the Egyptian Standard Specification of meat (1552/1991) that stated that meat should be free from Salmonella. The results of serological identification for serotyping of Escherichia coli isolated from the examined luncheon samples as shown in Table (3) revealed that E-coli was serotyped as two strains of O_{55}. ***George (2004)*** reported that E-coli serotype O_{55} was implicated as the causative agents for nursery school outbreaks, These outbreaks had a high attack rate with high mortality rate exceed 50% in infants.

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التقييم البكتريولوجى للانشون في أسواق مدينة الإسكندرية

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تم جمع عدد خمسون عينة عشوائية من اللانشون المصنع محليا من محلات أسواق مدينة الاسكندرية للتعرف علي الحالة البكتريولوجية والصحية له. وقد دلت نتائج الفحص الظاهري علي أن لون العينات المختبرة طبيعي ولها رائحة مقبولة وقوامها طبيعي ولا توجد عليها عفن وتركيز الأس الهيدوجيني للعينات المختبرة في حدود متوسط 5.4.

كانت متوسطات أعداد الميكروبات الهوائية، الميكروبات اللاهوائية، الميكروبات المعوية، الميكروبات القولونية، الميكروبات القولونية البرازية، ميكروبات العنقود الذهبي وميكروبات الباسيلس سيرس كالاتي: 9.5×10^{5} ، 1.3×10^{3} ، 1.6×10^{4} ، 8.4×10^{2} ، 14 ، 1.4×10^{3} وأخيرا 1.2×10^{4} بكتريا / جرام من اللانشون. كما تم عزل بعض الميكروبات المرضية ذات الاهمية الصحية للانسان مثل ميكروب الايشيريشياكولاي واليرسينيا انتيروكوليتيكا والميكروب العنقودي الذهبي وميكروب الباسيلس سيرس والكلوستريديوم برفرنجنز من اللانشون بنسب 4 % ، 8 % ، 6% ، 4 % ، 8 % بينما كانت جميع العينات التى خضعت للفحص سلبية لميكروب السلمونيللا وقد تم فحص مفردات الايشيرشياكولاي سيرولوجيا ووجد ان العترات تنتمي الي o55: k 59.

وقد تمت مناقشة الأهمية الصحية للميكروبات المعزولة حيث وجد أنها مسببة لأمراض التسمم الغذائي.