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MICROBIAL QUALITY OF SOME MEAT PRODUCTS

BY

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SUMMARY

A total of 100 random samples of basterma, luncheon, minced meat and raw sausage (25 samples of each) were collected from different supermarkets and butcher's shops in Cairo and Giza governorates and examined bacteriologically.
The mean values of total mesophilic count/gram of the fore mentioned samples were 4.7 x 10^6, 5.5 x 10^8, 7.2 x 10^8 and 2.6 x 10^6, respectively. While the mean values of Enterobacteriaceae/gram were 5.9 x 10^3, 7.0 x 10^4, 4.3 x 10^5 and 3.0 x 10^4, respectively.
On the other hand, the mean values of coliforms/gram were 1.4 x 10^3, 1.4 x 10^3, 4.9 x10^3 and 4.7 x 10^3, respectively and the mean values of staphylococci/g were 3.7 x 10^5, 2.3 x 10^4,, 1.7 x 10^4 and 3.6 x 10^4, respectively.
The study shows that E.coli was isolated at a high percentages (27%, 52%, 33% and 45%) respectively from the same examined samples, followed by Enterobacter aerogenes at percentages of 18%, 14%, 24% and 8% respectively, while salmonella could not be isolated from any examined samples.
Coagulase positive Staph aureus could be isolated from (40%) in samples of basterma,(18%) in samples of Luncheon, (15%) in samples of minced meat and (43%) in samples of sausage.
The public health importance, economic significance of existing microorganisms as well as the suggested measures for improving quality of the products have been discussed.

INTRODUCTION

Meat and meat products are considered as essential foods, being tasty, easily digested and an excellent source of amino acids as well as vitamins and minerals. Progress in food technology made utilization of meat in different forms Possible.
The sanitary conditions of such products may be affected through the methods of preparation, handling and storage being contaminated from different sources. This may lead to spoilage of the products and/or act as a public health hazzard to consumer, (Gepson, 1954; El Mossalami ,1958; Sadek, 1965; lee , 1974 and Boyd, 1979).
The isolation of different indicator organisms. may indicate possible contamination with potential pathogens and/or pathogens. (Levine , 1961 and Yassien, 1988).
Moreover Miskivmin et al. (1976) found that E.coli count is a suitable indication for the microbiological quality of foods, but to assure safety of a food products specific pathogen testing was necessary. Freeman (1960) added that E. coli, Coliform and enterococci were the three indicotors for the sanitary quality of foods and the presence of one or more of them in great number could easily give rise to public health hazards.
Therefore the present study was carried to determine the microbial quality of such meat products through isolation and identification of some indicator organisms.

MATERIAL AND METHODS

A total of 100 samples of localy manufactured meat products (25 each of basterma, luncheon, minced meat and raw sausage) were collected from different districts at Cairo and Giza provinces, and delivered immediatly to the laboratory for bacteriological examination.
The standard plate count technique (SPC) was applied for detection of mesophilic count using SPC-agar (APHA, 1984), and total Enterobacteriacea count using Violet Red Bile Glucose

(VRBG) agar (Gork, 1976).
The most propable number of coliform bacteria in collected samples was determined by using the multiple tube fermentation techniques (APHA, 1984).
Isolation and identification of E.coli were done according to the techniques recomended by ICMSF (1974) and ISO (1975).
The trials for isolation of salmonella was carried out by enrichment in, Selenit Cystine broth and Rappaport Vassiliadis broth (RAPPAPORT et al.,1956) then streaking onto Xylose Lysine Desoxychocalate agar (XLD) and Brilliant Green agar plates (ICMSF, 1978). Suspected colonies were purified and identified,according to Finegold and Martin , (1982).
Staphylococcus aureus count was determined by plating on Baird parker agar (Thatcher and Clark, 1978) suspected colonies were purified and identified, according to Cruicksank et al., (1969) ; Bailley and Scott (1974) and MacFaddin , (1976).

RESUTLS AND DISCUSSION

The data recorded in table (1) showed that the total mesophillic count/gram of basterma, luncheon, minced meat and sausage varried from 2×10^4 to 4×10^7, 4×10^3 to 8×10^9, 6×10^4 to 6×10^8 and $2 \times 10^2$to 8×10^6, respectively. with mean values $4.7 \times 10^6 \pm 2.2 \times 10^6$ $5.5 \times 10^8 \pm 3.3 \times 10^8$, $7.2 \times 10^8 \pm 2.9 \times 10^7$ And $2.6 \times 10^6 \pm 1.6 \times 10^6$ respectively.

These results were nearly similar to those obtained by Summer (1977), Tolba (1986) and Yassien (1988).
Table (1) showed that the Enterobacteriaceae count of each basterma, luncheon, minced meat and sausage ranged from 1×10^2 to 4×10^4, 1×10^2 to 9×10^5, 2×10^2 to $6 \times 10^6$and 1×10^2 to 1×10^5, respectively, with mean values $5.9 \times 10^3 \pm 1.8 \times 10^3$, $7 \times 10^4 \pm 3.9 \times 10^4$($4.3 \times 10^5 \pm 2.6 \times 10^5$ and 3×10^4 .
It is evident from table (2) that the Enterobacteriaceae could be isolated from 100% of minced meat samples while the organisms could be isolated from sausage, luncheon and basterma at an incidence rate of 90%, 88%, 80%, respectively. Such results are nearly similar to those reported by Lotfi (1986) and Yassien (1988).
As the total mesophilic count is helfull in indicating the sanitary quality of food. Enterobacteriaceae also acts as indicator organism . It was first suggested by Mossel in (1969).

Table (2): Incidence of Enterobacteriaceae, coliform and Staphylococcus aureus in the examined meat product samples.

Type of samples	No.of examined samples	Enterobacteriaceae No. of + ve samples	%	Coliform No. of + ve samples	%	Staphylococcus No. of + ve samples	%
Basterma	25	20	80	23	92	20	80
Luncheon	25	22	88	20	80	16	64
Minced meat	25	25	100	25	100	20	80
sausage	25	24	96	24	96	16	64

The result of coliform count of examined basterma, luncheon, minced meat and sausage as shown in table (1) ranged from 4 x 10 to 1.1×10^4 of each with mean average $1.4 \times 10^3 \pm 7.2 \times 10^2$, $1.4 \times 10^3 \pm 7.2 \times 10^2$, $4.9 \times 10^3 \pm 1 \times 10^3$ and $4.7 \times 10^3 \pm 1 \times 10^3$ respectively.

Table (1): Statistical Analytical Data of the count of different groups of bacteria in the examined samples.

	Basterma (25 samples)			Luncheon (25 samples)			Minced meat (25 samples)			Sausage (25 samples)		
	Min	Max	x ± SE	Min	Max	x ± SE	Min	Max	x ± SE	Min	Max	x ± SE
Total Mesophilic count	$2x10^4$	$4x10^7$	$4.7x10^6 \pm 2.2x10^6$	$4x10^3$	$8x10^9$	$5.5x10^8 \pm 3.3x10^8$	$6x10^4$	$6x10^8$	$7.2x10^8 \pm 2.9x10^7$	$2x10^2$	$8x10^6$	$2.6x10^6 \pm 1.6x10^6$
Enterobacteriaceae count	$1x10^2$	$4x10^4$	$5.9x10^3 \pm 1.8x10^3$	$1x10^2$	$9x10^5$	$7x10^4 \pm 3.9x10^4$	$2x10^2$	$6x10^5$	$4.3x10^5 \pm 2.6x10^5$	$1x10^2$	$1x10^5$	$3x10^4 \pm 7.8x10^3$
Coliform count	$4x10$	$1.1x10^4$	$1.4x10^3 \pm 7.2x10^2$	$4x10$	$1.1x10^4$	$1.4x10^3 \pm 7.2x10^2$	$4x10$	$1.1x10^4$	$4.9x10^3 \pm 1x10^3$	$4x10$	$1.1x10^4$	$4.7x10^3 \pm 1x10^3$
Staphylococci count	$6x10^2$	$5x10^6$	$3.7x10^5 \pm 2.2x10^5$	$1x10^3$	$6x10^4$	$2.3x10^4 \pm 1.5x10^4$	$8x10^2$	$8x10^4$	$1.7x10^4 \pm 4.9x10^3$	$3x10^2$	$7x10^5$	$3.6x10^4 \pm 2.7x10^5$

Min: Minimum
Max: Maximum
X: Arithmatic mean
SE: Standard error

Table (2) revealed that coliforms could be isolated from 100% of Minced meat as well as from 96%, 92% and 80% of sausage, Basterma and Luncheon. respectively. These results semulate those stated by Duitschaever et al. (1973) and Yassien (1988).
The percentage of isolation of E. coli was illus-

varied in table (3) from Basterma, Luncheon, Minced meat and Sausage in a percent 27%, 52%, 33% and 45% respectively. Followed by Entero-bacter aerogens 18%, 14%, 24% and 8%. On the other hand various strains in different ratios could be detected.

Salmonella failed to be isolated from the examined samples. Lotfi (1986) and Abd. El-Aziz (1988), reported similar results.

It is evident from table (1) that t staphylococcus aureus count varied from 8×10^2 to 5×10^6, 1×10^3 to 6×10^4, 8×10^2 to 8×10^4 and 3×10^2 to 7×10^5 for Basterma, Luncheon, Minced meat and sausage, respectively with mean values $3.7 \times 10^5 \pm 2.2 \times 10^5$, $2.3 \times 10^4 \pm 1.5 \times 10^4$, $1.7 \times 10^4 \pm 4.9 \times 10^3$ and $3.6 \times 10^4 \pm 2.7 \times 10^4$ respectivley.

Table (3): Frequancey distribution of identified enterobacteriaceae organisms.

Isolated organisms	Basterma		Luncheon		Minced meat		Sausage	
	No.	%	No.	%	No.	%	No.	%
1- *Enterobacter aerogenes*	4	18	4	14	8	24	2	8
2- " *agglomerance*	5	22	1	3	2	6	1	3
3- *E. coli*	6	27	15	52	11	33	12	45
4- *Hafnia group*	1	4	2	7	-	-	4	14
5- *Proteus mirabilis*	-	-	1	3	1	2	-	-
6- " *rettegeri*	1	4	-	-	1	2	-	-
7- " *vulgaris*	-	-	3	11	3	9	3	12
8- " *morganii*	3	13	1	3	2	6	1	3
9- *Providencia alcalifaciens*	2	8	-	-	4	12	3	12
10- *Providencia nettegri*	1	4	2	7	-	-	-	-
11- *Providencia stuartii*	-	-	-	-	2	6	1	3
Total	23	100	29	100	34	100	26	100

Coliform group is considered as an indicator of both questionable and acceptable it may indicate feacal contamination from either human or animal sources and from soil. Also, its presence indicates poor sanitation and handling. These organisms are not of the presence of potential pathogens but can cause food spoilage (Finstein, 1973 and Banwart, 1981).

Table (4): Incidence of isolation of coagulase positive and negative stralns of staph. aureus isolated from examined meat products

Type of samples	No. of staphylococci isolates	Coagulase + ve		Coagulase - ve	
		No.	%	No	%
Basterma 25 sample	20	8	40	12	60
Luncheon 25 samples	16	3	19	13	81
Minced meat 25 samples	20	3	15	17	85
Sausage 25 samples	16	7	43	9	57

* The results given in Table (2) indicated that staph. aureus could be isolated from 80% of the basterma and minced meat samples, while 64% of the luncheon and sausage samples were found to be contaminated. These results agreed with those recorded by Al-Cherif (1983) and Abd El-Aziz (1987).

Table (4) showed that the coagulase +ve Staph-aureus isolated from the examined basterma, luncheon, minced meat and sausage were 8 out of 20 (40%), 3 out of 16 (18%), 3 out of 20 (15%) and 7 out of 16 (43%) respectvely.

Staph. aureus has been frequently isolated from meat products and may be originated from contaminated meat or through contamination from food handlers.

CONCLUSION

Regarding to the mentioned results, minced meat showed a heavier bacterial load followed by luncheon, sausage and basterma. It was not sur-

prising to find with such load coliforms, Enterobacteriaceae and staphylococci.

The main causes for contamination are mishandling, unproper hygienic measures during manufacturing and transportation, keeping methods as well as methods of exposure to sale.

Therefore the following suggestive measures should be followed to improve sanitary conditions of meat products.

-Training and Education for handlers, employee whom should be healty and carry medical certificates before getting in manufacturing meat products factories.

- Transportation of meat products under strict hygienic measures.
- Meat products must be kept in hygienically constructed grossery shops.
- Minced meat should be minced at time of sale or exposed for sale in refrigerators.

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