Evaluation of bacteriological status of some camel's meat products

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Abstract

Sixty random samples of camel's meat products (20 each of minced meat, rice kofta and luncheon) were collected from different butcher's shops and markets in Cairo governorate and subjected to bacteriological examination. The results revealed that the mean values of aerobic bacterial counts were 3.7 $10^6 \times 4.1 \pm 10^6 \times 7.2$,$10^6 \times 2.4 \pm 10^6 \times$and 1.3 $10^7 \times 1.1 \pm 10^7 \times$CFU / gm respectively. The mean values of enterobacteriace and *Staphylococcus aureus* counts were 8.4 ,$10^3 \times 2.8 \pm 10^3 \times 10^3 \times 2.6 \pm 10^3 \times 9.3$,$10^3 \times 2 \pm 10^3 \times 8.6$and 2.3 $9.6 \pm 10^2 \times$x 10, $3.94 \times \pm 10^2 \times 3$,$10^2 \times 1.2 \pm 10^2$ $10^2 \times 1.9$CFU/g, respectively. Also isolation of some microorganisms of public health importance was done. Only 5% of minced meat was positive for salmonellae which were identified serologically as *Salmonella typhimurium*. While 5% each of minced meat and rice kofta samples were positive for *E. coli* which were identified serologically as O78 and O128, *L. monocytogenes* failed to be detected in all examined samples. The results and the recommendations for production of high quality camel`s meat products were discussed.

Key words: *enterobacteriace, Staphylococcus aureus, L. monocytogenes, Salmonella typhimurium, minced meat, rice kofta, camel`s meat products.*

Introduction

Camel is a good source of meat and its taste is described to be similar to beef but lower in cholesterol and high in protein contents so it has health advantages over beef **(Hussien. 2006)**. Although, the consumption of camel's meat is considered of high sale to the Egyptian peoples due to its lower price as compared with other types of meat as well as its suitability for some of the popular meat industries as rice kofta and pasterma.

Meat products such as luncheon and minced meat have a popularity because they represent quick, easy prepared meat meals and solve the problem of the shortage in flesh meat of high price which is not within the reach of large number of families with limited income **(Mohamed, 2006)**. On the other side, meat products are liable to harbour different types of microorganisms through along chain of handling, processing, distribution and storage as well as preparation **(Hassanien, 2004)**. Within this respect meat in general and poultry in particular are the commonest source of food borne diseases and have been frequently linked to out breaks of food poisoning by salmonella **(Antunes *et al*., 2003)**.

Staphylococcal food poisoning resulted from the growth of enterotoxigenic strains of *S. aureus* in food leading to the production of enterotoxins which cause symptoms of intoxication such as vomiting, diarrhea and abdominal cramping **(Korgysa *et al*., 2005)**. The amount of enterotoxin necessary to cause intoxication is very small about 94-184 ng **(Erol and Iseri, 2004)**. The increasing occurrence in the last 20 years of listeriosis associated with the consumption of the contaminated food has led to *L. monocytogenes* being considered as one of the most important food borne pathogen to day (**Vazquez – Boland *et al*., 2001** and **Gilbreth *et al*., 2005**).

According to reports of the world health organization and the centers for disease control and prevention, every year a large number of people are affected by diseases due to contaminated meat consumption (**Busani *et al*., 2005)**, there fore the purpose of this work is planned out to evaluate the bacteriological aspect of camel's meat products to assess the sanitary measures and public health hazards.

Material and Methods

Sampling:

Sixty random samples of camel's meat products (20 each of minced meat, rice kofta and Luncheon) were collected from different butcher's shops and markets at Cairo governorate. The collected sample were aseptically transferred to the laboratory and subjected to the following bacteriological examination.

1. Bacterial counts:

1.1. Aerobic plate count (APC): according to **APHA (2001)**

1.2. Enterobacteriaceae count: according to **APHA (2001)**

1.3. *Staphylococcus aureus*: according to **FDA (2001)**

2. Isolation of some food pathogens:

2.1. Screening for salmonellae: according to **ISO 6579 (2002)**

2.2. Screening for *E. coli*: according to **ISO 16649/2 (2001)**

2.3. Screening for *L. monocytogense*: according to **FDA (2011)**

Table (1): Statistical analytical results of different bacterial counts in some camel`s meat products

Count		Minced	Rice kofta	Luncheon
A. P. C	Min	$1.3\ 10^5 \times$	$1.7\ 10^5 \times$	$1.8\ 10^5 \times$
	Max	$5\ 10^7 \times$	$8\ 10^7 \times$	$2.3\ 10^8 \times$
	Mean ± SE	$3.7\ 10^6 \times$ $2.4\ 10^6 \times$	$7.2\ 10^6 \times$ $4.1\ 10^6 \times$	$1.3\ 10^7 \times$ $1.1\ 10^7 \times$
Enterobacteriacae	Min	$1\ 10^3 \times$	$2\ 10^3 \times$	1.5×10^3
	Max	5×10^4	4×10^4	8×10^4
	Mean ± SE	8.4×10^3 2.8×10^3	8.6×10^3 2×10^3	9.3×10^3 2.6×10^3
S. aureus count	Min	$< 10^2$	$< 10^2$	$< 10^2$
	Max	2×10^3	5×10^3	$4\ 10^3 \times$
	Mean ± SE	2.3×10^2 9.6×10	3.94×10^2 1.2×10^2	3×10^2 1.9×10^2

Table (2): Pathogenic microorganisms isolated from examined camel`s meat products.

Isolated Pathogens	Minced meat		Rice kofta		Luncheon	
	No	%	No	%	No	%
Samonella	1	5	-	-	-	-
E. coli	1	5	1	5	-	-
L.monocytogens	-	-	-	-	-	-
S. aureus	3	15	4	20	2	10

Table (3): Serotyping of Salmonella and *E. coli* in examined camel`s meat products.

Pathogens	No. of isolates	Serotype
Samonella	1	*S. typhimurium*
E. coli	2	O78 O128

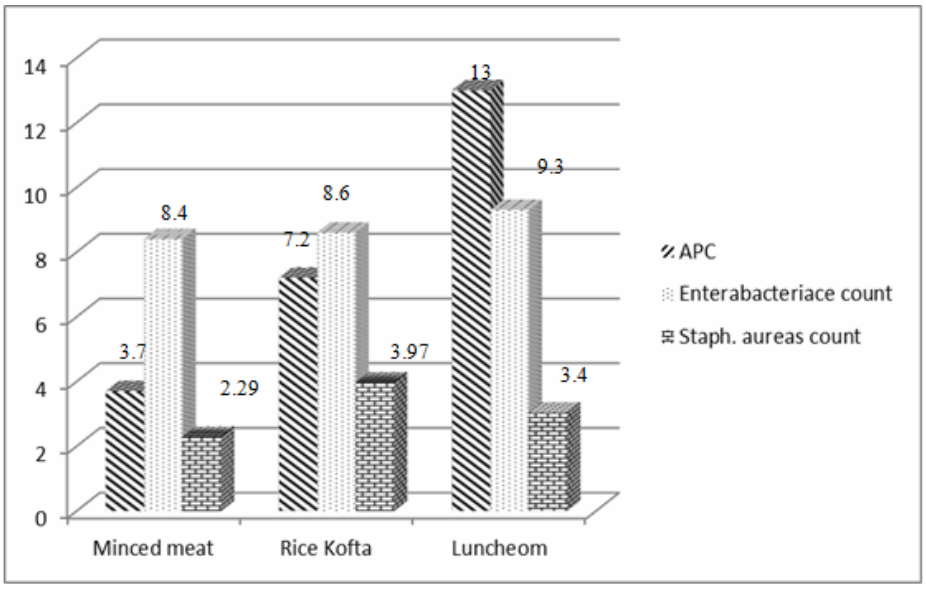

Fig (1): Mean values of bacterial counts of camel`s meat products.
APC x 10^6, Enterobacteriacae x 10^3, *S. aureus* count x 10^2

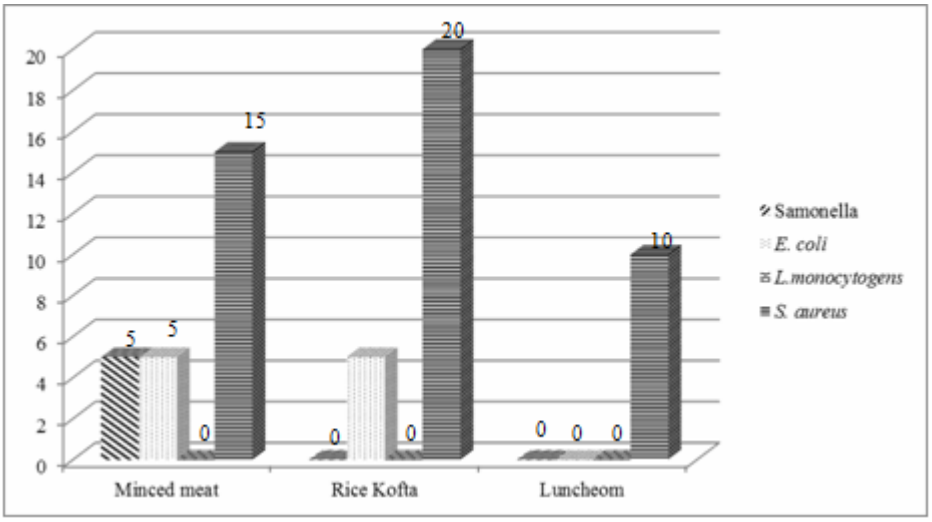

Fig (2): Incidence of some food borne pathogens in camel`s meat products.

Results and Discussion

The consumption of camel`s meat products in Egypt showed an observable increase especially in the later years this might be due to the need for more sources of animal proteins. Nowadays more attention is paid to the Arabian camels as multipurpose animals.

The statistics of bacteriological investigation of camels meat products (minced meat, rice kofta, Luncheon) table (1) revealed that the mean values of total aerobic counts (CFU/g) were 3.7 × 10^6 ×4.1 ± 10^6 × 7.2 ,10^6 × 2.4 ± $10^6$and 1.3 × 10^7 × 1.1 ± 10^7CFU/gm respectively. These results agreed with those reported by **Ouf (2004)**, **Hassan and Antown (2005)** and **Mohamed *et al.*, (2006)**, while slightly lower results were recoded by **Mohamed and Abd El. Gawaad (2005)** and **Sayed and Amir (2007)**.

The relatively high bacterial count might be attributed to unsanitary condition during the manufacture as bad handling and packaging of meat products besides long chilling, storage or holding then at an appropriate temperature **(Sharma *et al.*, 1996, Kandeepan and**

Biswas, 2005).

The mean values of enterabacteriaceae counts were $8.4 \times 10^3 \times 2 \pm 10^3 \times 8.6$,$10^3 \times 2.8 \pm 10^3$ and $9.3 \times 10^3 \times 2.6 \pm 10^3$ CFU/ gm respectively. The obtained results come in accordance with those recorded by **Ouf (2004).** Enterobacteriaceae is one of the main bacteria causing hygienic problems in food industry.

Concerning *S. aureus* count CFU/g, it was found to be $2.3\times 9.6 \pm 10^2$ x 10, $3.9\times \pm 10^2$ $10^2 \times 1.24$and $3\times 10^2 \times 1.9 \pm 10^2$ CFU/g in examined samples of minced, rice kofta and luncheon respectively. The obtained results come in accordance with those recorded by **Ouf (2004), Hassan and Antown (2005), Mohamed and Abd El. Fawaad (2005), Mohamed *et al.* (2006)** and **Sayed and Amir (2007).**

The higher percentage of isolated *S. aureus* strains may be due to higher prevalence of *S. aureus* in human being either on their skin or in their nose that create a great chance for contamination of food upon improper handling through persons who had insufficient informations about the basic rules of personal hygiene. This substantiates the conclusion of **Papadopoulou *et al.* (2007)**. It was clarified by **Le- Loir *et al* (2003)** that *S. aureus* is a main cause of gastroenteritis resulting from the consumption of contaminated food. It is worthy to mention that staphylococcal intoxication symptoms were appeared within 4.5 hours of consumption of contaminated food, the symptoms include nausea, vomiting, diarrhea, headache, dizziness and weakness **(Bergdoll, 1989** and **Jay 2000).**

From the results obtained in table (2), it was revealed that salmonellae could be detected in 5% of the examined camel`s minced meat, similar results were obtained by **El- Dieb (2002), Mohamed and Abd El. Gawaad (2005)** and **Mohamed *et al.*, (2006)**, while slightly higher results were recorded by **Hassan and Antown (2005)** possibility of contamination of meat products with food poisoning bacteria especially Salmonella organisms has been extensively reported **(Reham 2004)**. Regarding the serological identification of the isolated salmonellae strain, it was revealed that isolated strain showed *S.typhimurium* (Table 3). Salmonella spp. typically cause an intestinal infection with or without fever, the spread to human is usually caused by consumption of contaminated food stuffs **(Bhan *et al.*, 2005)**. In Egypt **(Fathi and Thabet, 2001)** made parameters of salmonellosis and found that several food poisoning outbreaks were attributed to *S. typhimurium*, **(El-Newishy and Ahmed, 2010)** recovered *S. typhimarium* (10%) from diarrheic patients.

The isolation of *E. coli* was possible in 5% of the examined camel`s meat products (minced meat and rice kofta) samples (Table 2). Higher results were recoded by **Ouf (2004)**, while slightly lower results were recorded by **Sayed and Amir (2007)**. The presence of *E. coli* in food of animal origin is considered as indicator of faults during preparation, handling, storage or service **(Sharaf *et al.*, 2010)**. Regarding the serological identification of the isolated *E. coli* strains, it was revealed that one isolate showed O128 and the others isolate showed O78 (Table 3). *E. coli* induce sever diarrhea in infants and young children as well as food poisoning and gastroenteritis among the adults **(Thompson *et al.*, 2005)**.

***L. monocytogenes* failed to be detected in all the examined samples**

In conclusion, the contamination of camel`s meat products by some food borne pathogens from the view point of a potential health hazard should not be ignored. Therefore, application of good hygienic measures during production, storage and distribution of such products is essential to safe products quality and prevent the risk of human hazards.

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تقييم الحالة البكتريولوجية لبعض مصنعات اللحم الجملى

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الملخص العربى

أجريت هذه الدراسة على عدد 60 عينة عشوائية من مصنعات اللحم الجملة (المفروم – كفتة الأرز – اللانشون) تم تجميعها من محلات الجزارة والسوبر ماركت فى محافظة القاهرة لاستبيان الحالة الصحية لهذه المنتجات وتأثيره على صحة المستهلك وقد خضعت العينات للفحوص البكتريولوجية وأظهرت النتائج ما يلي:

كان متوسط العد البكترى الكلى للميكروبات الواثية $3.7 \times 10^6 \pm 2.4 \times 10^6$ و $7.2 \times 10^6 \pm 4.1 \times 10^6$ و $1.3 \times 10^7 \pm 1.1 \times 10^7$ خلية / جم من العينات على التوالى. ومتوسط العد البكتيرى الكلى للميكروبات المعدية $8.4 \times 10^3 \pm 2.8 \times 10^3$ و $8.6 \times 10^3 \pm 2 \times 10^3$ و $9.3 \times 10^3 \pm 2.6 \times 10^3$ خلية / جم من العينات على التوالى.

وكان متوسط العد الكلى للميكروب العنقودى الذهبى 229.15 ± 96.33 و 394.10 ± 124.43 و 304.10 ± 194.78 خلية / جم من العينة على التوالى.

تم عزل ميكروب السالمونيلا من اللحم الجملى المفروم بنسبة 5% وتم عزل ميكروب الاثيريشيا كولاى بنسبة 5% من كل من اللحم الجملى المفروم وكفتة الأرز.

وكانت جميع العينات التى تم فحصها خالية من ميكروب الليستريا مونوستيوجينى.