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**RISK ASSESSMENT OF RICE
KOFTEA FORMED FROM CAMEL MEAT**
(With 2 Tables)

By

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(Received at 9/11/2003)

تقييم المخاطر الصحية في كفتة الأرز المصنوعة من لحوم الجمال

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تم جمع ٣٠ عينة من كل من لحوم الجمال قبل الفرغ وبعد الفرغ وكذلك من الأرز والخضر والبهارات التي تضاف لعمل منتج كفتة الأرز المصنوعة من لحوم الجمال. كما تم أخذ نفس عدد العينات وهي عبارة عن مسحات من السكاكين وأيدي العمال والغرامات. أخذت العينات تحت ظروف صحية سليمة ونقلت إلى العمل في كولمان للعينات في أسرع وقت ممكن. تم فحص العينات بكتريولوجيا لتحديد العد الكلي للميكروبات الهوائية وكانت كالاتي:-

المتوسط اللوغاريتمي ٦,٦، ٨,٣٢، ٤,٣، ٥,٤٨، ٥,٨٥، ٢,٩٦، ٦,٤٨، ٤,٩، ٨,٣ في كل العينات بالترتيب. كما كان متوسط العد اللوغاريتمي للميكروبات عند درجة ٧ لمدة ١٠ أيام ٥,٩، ٦,٤٨، ٣,٩٧، ٤,٦، ٤,٩٦، ١,٧٨، ٤,٦٣، ٣,٩٥، ٧,٤٨ من كل العينات بالترتيب. وكان متوسط العد اللوغاريتمي لميكروبات القولون ٤,٠، ٥,٩٧، ١,٨٤، ٤,٠، ٢,٨٥، ٤,٧٩، ٣,٨٥، ٥,٩٥ على الترتيب من كل العينات. وكان متوسط العد اللوغاريتمي لميكروب الأيشيريشيا كولاي ١,٩٥، ٢,٣٠، ٠,٤٨، ١,٩، ٠,٤٨، ٠,٤٨، ٠,٤٨، ٣,٣٠، ٢,٣٠، ٢,٨٥ على الترتيب من جميع العينات. وكان متوسط العد اللوغاريتمي لميكروب العنقودي الذهبي ٣,٤٨، ٢,٠٠، ٣,٦، ٠,٣٠، ٠,٣٠، ٣,٣٠، ٢,٤٨، ٢,٤٨، ٤,٤٨ على الترتيب من كل العينات. وكان المتوسط اللوغاريتمي لعد الكرويات المعوية ٣,٣٠، ٥,٩٨، ٢,٤٨، ٤,٣٠، ٤,٥٢، ٣,٣٠، -، -، -، ٣,٣٠ على الترتيب من كل العينات. وكان متوسط اللوغاريتمي لميكروب الباسيلس سيريس ٢,٩٦، ٦,٣٠، ٣,٣٠، ٤,٩٠، ٤,٩٥، ٢,٣٦، -، -، -، من كل العينات على الترتيب. كما تم عزل الميكروبات الأتية بنسب تكرارية مختلفة وهي:- الأيشيريشيا كولاي البرازية، الأينيتروباكترا، البروتيس الأكروموباكترا، الألكاليجين، استريبتوكوكس فيكالس، الباسيلس سيريس، والعنقودي الذهبي، الميكروكوكاي.

SUMMARY

Thirty samples from each of camel meat before and after mincing as well as from crushed soaked rice, green leaves, garlic and onion, spices, knives swabs, worker's hands and mincer were collected from different

butcher's shops. The collected samples were dispatched to the laboratory to be examined bacteriologically for *TAPC*, psychrotrophic count, *coliform count*, *faecal coliform count*, *Escherichia coli count*, *Staphylococcus aureus count*, *aerobic spore formers count*, *Bacillus cereus count* and *Streptococcus faecalis count*. Moreover, other bacterial species were isolated and identified. The mean \pm S.E bacterial count and the frequency distribution of the isolated and identified bacteria were calculated and tabulated.

Key Words: *Camel meat, Kofta, meat products.*

INTRODUCTION

Kofta is a very common and popular processed meat product manufactured from lower value minced meat to produce a higher value products. Food additives are used to accomplish certain function and altered flavour. Camel meat is commonly used for kofta processing, where it is a good source of protein and of low price. Moreover, Sadek (1966) showed that the use of camel meat for processing of meat products eliminated its toughness. The meat is easily cured and the high protein content provides good caloric value. Also processed products from camel meat are cheaper than that made from other meat. Camel meat is similar in taste and texture to beef, in addition it is low in cholesterol content and high in protein, so it is becoming more readily available to supermarkets. Concerning the lipid contents, camel meat ranges from 10.4 to 16.3g per 100 gram products. The most fractional composition is triglycerides (91-92%). Camel meat lipid particularly those obtained from the camel's hump are characterized by considerable content of saturated fatty acids (44% in camel meat and 62.2% in the hump). The loss of meat lipid on culinary treatment are within 24-44%. Hump lipids are poor in polyunsaturated fatty acids (1.1%). Studies on the bacteriology of meat and products from camel are very scanty. So to study the bacteriological quality of meat and products made from camel meat the present investigation was done.

MATERIAL and METHODS

Samples from camel meat before and after mincing and also from crushed soaked rice, green leaves, spices, garlic and onion, swabs from worker's hands, knives and mincers (30 of each) were collected from

different butcher's shops at different localities. Samples were collected carefully under complete aseptic condition and transported in cooled sampling box with minimal delay to the laboratory where they were subjected for the following investigations:-

- a) Total aerobic plate count at 35°C for 24 hours incubation:- The procedures were carried according to ICMSF (1978). The results were recoded and tabulated.
- b) Total psychrotrophic count at 7°C for 10 days incubation according to ICMSF, (1978).
- c) Total coliform count at 37°C for 24 hours was carried according to Gork (1976).
- d) Total faecal coliform count was carried according to FAO (1992), using *Escherichia coli* broth incubated at 43±5°C for 24-48 hours. The bacterial density was estimated according to the Most Probable Number Table.
- e) Total *Escherichia coli* count was carried according to ISO (1975) tables.
- f) Enumeration of total aerobic spore formers was carried out according to Collins and Lyne, (1984).
- g) Total *Staphylococcus aureus* count (ICMSE, 1978) using Baird Parker Medium for enumeration of coagulase + ve *S.aureus*. 0.1 ml from the previously prepared dilutions was transferred and evenly spread over a dry surface of Baird Parker Medium Plates with sterile bent glass rod. Inoculated plates were incubated at 35-37°C for 30-48 hours. Suspected colonies were subjected to coagulase test for confirmation.
- h) *Bacillus cereus* count was carried out according to Giffel *et al.* (1995).
- i) Total *Streptococcus faecalis* count was carried out according to Efilhymiou and Joseph (1974), using Enterococcus Differential Selective medium (ESD). Magenta pink colored colonies represents the *Streptococcus faecalis*, were counted.

Isolation and Identification of the isolated microorganisms were carried out according to the scheme recommended by Vanderzant and Nicolas (1969).

RESULTS

Table (1) Log. Means \pm S.E. for total bacterial counts of rice Kofta from camel meat

Ingredient test	MBM	MAM	CSR	GL	Speers	G.O	Knives	Hands	Mincer
APC	6.60 \pm 4.48	8.22 \pm 7.60	4.30 \pm 3.85	5.48 \pm 4.84	5.85 \pm 4.79	2.96 \pm 2.08	6.48 \pm 5.85	4.90 \pm 3.96	8.30 \pm 5.78
Psychrotrophic count	5.90 \pm 3.95	6.48 \pm 5.84	3.97 \pm 2.78	4.60 \pm 3.95	4.96 \pm 4.30	1.78 \pm 1.00	4.63 \pm 3.70	3.95 \pm 2.78	7.48 \pm 6.60
Coliform count	4.00 \pm 2.78	5.97 \pm 4.61	1.84 \pm 1.00	4.00 \pm 3.79	2.85 \pm 2.48	0.48	4.79 \pm 3.30	3.85 \pm 3.00	5.95 \pm 5.48
Faecal coliform count	2.30 \pm 1.79	4.84 \pm 3.01	0.48	3.95 \pm 2.84	0.48	0.48	3.90 \pm 3.00	3.00 \pm 1.76	4.90 \pm 3.85
Escherichia coli count	1.95 \pm 1.30	2.30 \pm 1.78	0.48	1.90 \pm 1.30	0.48	0.48	3.30 \pm 1.95	2.30 \pm 1.60	2.85 \pm 2.30
Staph. aureus count	2.00 \pm 1.30	3.48 \pm 2.84	2.00 \pm 1.48	3.60 \pm 3.08	0.30	0.30	3.30 \pm 2.04	2.48 \pm 2.04	4.48 \pm 3.78
Aerobic spore formers count	4.90 \pm 3.90	5.90 \pm 4.96	3.48 \pm 3.00	3.30 \pm 2.95	5.00 \pm 4.78	2.00 \pm 1.48	4.48 \pm 3.70	4.48 \pm 3.70	5.00 \pm 4.91
Bacillus cereus count	2.96 \pm 2.30	6.30 \pm 5.90	3.30 \pm 2.60	4.90 \pm 4.48	4.95 \pm 4.30	2.36 \pm 2.00
Strept. faecalis count	3.30 \pm 2.78	5.98 \pm 5.48	2.48 \pm 1.95	4.30 \pm 3.86	4.52 \pm 4.08	2.30 \pm 1.78

MBM = Meat Before Mincing
 CSR = Crumbled Soaked Rice
 G.O = Garlic and Onion
 MAM = Meat After Mincing
 GL = Green Leaves
 APC = Aerobic Plate Count

Table (2) Incidence of the isolated bacteria from the examined samples

Isolated bacterial Spp.	MBM		MAM		CSR		GI		Spices		G.O		Knife		WH		Mincer	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Escherichia coli true faecal type	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%
Enterobacter spp.	12	40%	18	60%	15	50%	8	26.6%	14	46.7%	5	16.6%	10	33.3%	8	26.6%	15	50%
Proteus spp.	18	60%	22	72.3%	16	53.3%	20	66.7%	24	80%	12	40%	15	50%	15	50%	20	66.7%
Salmonella spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudomonas spp.	20	66.7%	25	83.3%	18	60%	16	53.3%	14	46.7%	10	33.3%	14	46.7%	7	23.3%	20	66.7%
Achromobacter spp.	22	72.3%	15	50%	14	46.7%	17	56.7%	9	30%	6	20%	9	30%	14	46.7%	18	60%
Alkaligenes	18	60%	16	53.3%	10	33.3%	18	60%	15	50%	7	23.3%	6	20%	12	40%	20	66.7%
Streptococcus faecalis	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%
Bacillus cereus	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%
Staph aureus	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%	30	100%
Micrococc	15	50%	22	72.3%	25	83.3%	12	40%	17	56.7%	14	46.7%	-	-	-	-	-	-

MBM = Meat Before Mincing
MAM = Meat After Mincing
CSR = Crushed Soaked Rice
GI = Green Leaves

G&O = Garlic and Onion
WH = Worker's Hands

DISCUSSION

The results presented in Table (1) revealed that the log mean APC. were 6.60 ± 4.48 , 8.32 ± 7.60 , 4.30 ± 3.85 , 5.48 ± 4.84 , 5.85 ± 4.79 , 2.96 ± 2.08 , 6.48 ± 5.85 , 4.90 ± 3.96 , 8.30 ± 5.78 , respectively, in camel meat before mincing, after mincing, green leaves, spices, garlic and onion, knives, hands of workers and mincer. Microbial growth in fresh meat is important particularly in the meat industry because it is the main factor associated with the reduction of meat quality, spoilage and subsequent economic losses. Lower counts were recorded by Emara (1995), while higher counts were recorded by Ahmed (2002) while nearly similar results were obtained by ICMSF (1978). Generally it is noticed, from the obtained results that all bacterial counts of the raw materials and added substances were higher than those of the raw material before processing and addition of the ingredients. *Bacillus presencet cereus* indicated that the soaked crused rice added for the products is the main source for its presence and also spices may be another source. (Ahmed, 2002). It is of basic importance to the manufacture of all processed meat is the selection of proper raw material. Quality of these meat as determined by their chemical and microbiological qualities should be high for it is certainly a truism a finished product can be of no higher quality than the ingredients it contain (Pearson and Tauber, 1984). Also all substances which are added to the meat product must have food grade purity, they shouldn't contain any food poisoning bacteria, so must be treated according to the highest hygienic standards. It is also important to keep them in properly closed containers or intact packages away from any dampness and dust. They are usually kept in special, dry premises away from the workers, in which they can pre-weighed, blended and packed into plastic bags in the proportions required for product formulation. One of the most important consequences of failure to protect all non meat ingredients is contamination with dirt, excreta from rodents, birds or other animals and infestation with insects., (Cano Munoz, 1992). Different microorganisms were recovered from the examined camel meat and the other ingredients and the mincers, worker's hands, as shown in table (2) in varying percentages which are of public health and spoilage significance of the products. Higher frequency appeared in *E. Coli*, *Streptococcus faecalis* and *Staphylococcus aureus*. *Bacillus cereus* also recorded higher frequency except samples from knives, worker's hands and mincer, (Table 2). Other bacterial species isolated in different percentages from

all the examined samples were *Enterobacter*, *Proteus*, *Pseudomonas*, *Achromobacter Alkaligenes* and *Micrococci* (Table 2). *Salmonella* organism could not be isolated from all the samples under investigation (Table 2). The public health and spoilage significance of these bacterial species reveal the risk of these products on the consumer and bad keeping quality, Elmaghraby (2002), Ahmed (2002) and Emara (1995).

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