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BACTERIOLOGICAL STUDIES ON ENTEROBACTERIACEAE IN SOME MEAT PRODUCTS

(With Two Tables)

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(Received at 4/2/1989)

دراسة بكتريولوجية عن الميكروبات المعوية فى بعض منتجات اللحـــــوم

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تم فحص ٨٠ عينة عشوائية من منتجات اللحوم (٤٠ عينة لحوم مفرية ، ٢٠ عينة لانشـــون و٢٠ عينة بسطرمة) للميكروبات المعوية ـ وكان متوسط العدد ٤٢٫٩×١٠^{٣} ، ٧٢٫٥×١٠^{٢}، ٣٦٫٨×١٠^{٣} ميكروب لكل جرام من هذه المنتجات على التوالى · كما أمكن عزل الميكروبات الآتيـــة فى العينات المفحوصة : ميكروب القولونى ، الكلبسيلا ، انتروباكتر ستروباكتر ، الكالفنس‌ديبر بروتيس وهافنيا · وتمت مناقشة خطورة هذه الميكروبات على الصحة العامة ·

SUMMARY

A total of 80 random samples of meat products (40 minced meat, 20 lunchon and 20 basterma) were examined bacteriologically for Enterobacteriaceae. The mean value of total enterobacteriaceae count were $42.9x10^3$, $72.5x10^2$ and $36.8x\ 10^2$/gm in the samples of locally manufactured raw minced meat, lunchon and basterma respectively. Members of contaminated Enterobacteriaceae could be detected in the examined meat products which included "Escherichia coli, klebsiella, Enterobacter, Citrobacter., Alkalescens dispar, Proteus and Hafnia respectively.

Public health hazard of the contaminated micro-organisms were discussed.

INTRODUCTION

E. coli is taken as index to indicate recent faecal contamination of processed and unprocessed food (APHA, 1965, 1967). It is one of the predominant Enterobacteriacae in ground meat (COX and MERCURI, 1978; NAG and STILE, 1978). In raw meat, the suggestion that E.coli type 1 (IMVIC type ++ --) indicate faecal contamination has been criticized (GEOPFERT, 1976; HILL, 1975). The principal arguments are: (1) E.coli can survive on equipment and in raw meat, therefore they do not indicate

either direct or recent faecal contamination (11) E.coli can grow on raw meats, hence they might indicate poor temperature control rather than level of faecal contamination (111). The most likely source of E.coli on the carcasses is the skin or hide during dressing (HESS, 1973) and possibly represent both faecal and non faecal contamination (NEWTEN, et al. 1977).

In contrast, BUTTIAUX and MOSSEL, 1961; MOSSEL, et al. 1962 and MOSSEL, et al. (1963) criticized the use of E.coli as indicator of food safety for dehydrated, frozen and refrigerator food, because they found that E.coli does not survive well under such condition. As the results, they recommended the use of Enterobacteriacae as indicator of food safety (MOSSEL, 1962; MOUSSA, et al. 1973 and MOSSEL, et al. 1979). Greater concern to the non lactose fermenting enteric pathogens and more pathogenic organism such as Salmonellae and proteus species would grow, in addition the other coliform and non coliform Enterobacteriacae as their involvement in diarrheal diseases (TWEDT and BOUTON, 1979).

The aim of this study is to enumerate and typy the coliform bacteria and Enterobacteriacae by direct plating method of 80 meat products samples (40 minced meat, 20 lunchon and 20 basterma) on VRBG media and isolation and typing of Salmonella and shigella on selective media.

MATERIAL and METHODS

80 meat product samples for this study includes Minced meat (40), Lunchon (20) and Basterma (20) were collected from different market's in Assiut Governorate for enumeration, isolation and identification of E.coli, Enterobacteriacae, Salmonella and Shigella organisms. The samples were dispatched in sterile plastic bags to the laboratory with a minimum of delay.

11 gm sample was weighted, mixed with 99 ml sterile 0.1% peptone water and homogenized for 5 minutes in a warring blender (3000 r.p.m) several dilution of the homogenized material upto 10^4 were prepared from the original dilution (APHA, 1972). 01 ml of sample dilution were plated onto Violet red bile glucose agar (VRBG) according to MERCURI and COX, 1979. By pour plate technique the plates were incubated at 37°C for 18-24 hrs and counted without delay. 5 representative number of different colony types were randomly picked from VRBG plates and purified by streaking first on MacConkey agar, biochemical tests were done on the isolated colony according to EDWARD and EWING (1972).

10 gm portion of each samples were also inoculated into 200 ml selenite broth (Difco) for enrichment at 37°C for 18-24 hrs then streaked onto SS. agar (Difco). Suspected Salmonella or shigella colonies were further identified biochemicaly and serologically according to CRUICKSHANK (1980).

RESULTS

Results are recorded in Table 1-2.

Table (1)
Enterobacteriaceae count on VRBG

	Minimum	Mean	Maximum
Minced meat	$5x10^2$	$42.9x10^3$	$35x10^4$
Lunchon	$3x10^2$	$72.5x10^2$	$45x10^3$
Basterma	$2x10^2$	$36.8x10^2$	$13x10^3$

DISCUSSION

All examined samples were proved to be contaminated with Enterobacteriacae organisms and this may be attributed to contamination of flesh used during manufacturing of such products (KLEEBERGER, et al. 1980). Minced machine, grinder, equipment and knives considered as the main source of contamination of the meat during processing (FRAZIER, 1967 and BRYAN, 1975).

The incidence and distribution of Enterobacteriacae in examined samples of meat products were tabulated in Table II. Salmonella or shigellae organisms could not be isolated from the examined samples. From the aforemented results, the minced meat contaminated with Enterobacteriacae is more than that of lunchon and basterma, which indicated insufficient hygienic measure during processing and handling of such product.

Basterma samples were contaminated to a lesser extent than the other two products and this may attributed to the addition of nitrite which has a bacteriostatic effect (LIBBY, 1975) and the curing processing of the product which play a great effect in inhibiting and multiplication of microorganisms (FEHLHABER, 1981).

The results recorded in this work in general were in accordaence with that finding of several researchers (SURKIEWIEZ, et al. 1972; FOSTER, et al. 1977; LOTFI, et al. 1986) who recommended the use of Enterobacteriacae as indicator of food safety in place of traditional coliform count as indicator of sanitary or hygienic quality of food (HICHEIMAN, et al. 1973; HUNYADY, et al. 1973; LEISTNER, 1973; MOUSSA, et al. 1973 and MOSSEL, et al. 1979).

Greater concern for non E.coli coliform as klebsiella Pneumoniae which is a frequent inhabitant of intestine of animal and man (MASTEN, et al. 1974), has been proposed to be implicated in human infection (EICHHOFF, et al. 1966; BROWN and SEIDLER, 1973). The presence of klebsiella Pneumoniae has a short survival time in meat products and could indicate recent contamination which in turn indicate unsanitary and unhygienic handling (NEWTEN, et al. 1977) might indeed be a more meaningful Enterobacteriacae to use as an indicator for sanitation and hygienic condition than E.coli (STILE and NAG, 1981). Enterobacter species are reported to occur only rarley in human intistine (BUTTIAUX and MOSSEL, 1961) also E.coli is involved as food borne entritis (TODD,

Table (2): Incidence of Enterobacteriaceae of examined meat products samples.

Types of meat products	No. of examined samples	Percentage of positive sample	No. of strain examined	Escherichia coli		Klebsiella		Enterobacter		Citrobacter		Alkalescens-dispar		Proteus		Hafnia		Salmonella		Shegiella		Arizona	
				No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Minced meat	40	100	200	170	85	10	5	6	3	5	2.5	4	2	3	1.5	2	1	0	0		0		
Luncheon	20	100	100	66	66	9	9	8	8	4	4	4	4	6	6	3	3	0	0		0		
Basterma	20	100	100	65	65	11	11	8	8	4	4	3	3	5	5	4	4	0	0		0		
Total			400	301	75.25	30	7.5	22	5.5	13	3.25	11	2.75	14	3.5	9	2.25	0	0		0		

1978). The presence of proteus species in large numbers in unrefrigerated food may lead to food poisoning (FRAZIER, 1967).

So the composition of the Enterobacteriacae flora of food product at various stage of processing and distribution is simple and rapid and is essential to evaluate the significance of contamination in relation to public health.

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