Animal Health Research Laboratory, Assiut,
Head of Lab. Prof. Dr. S.M. Nashed.

MICROBIOLOGICAL QUALITY OF FROZEN MEAT IN ASSIUT

(With 2 Tables)

By

R.S. REFAIE; SEHAM M.A.; A. EL-R. THABET and A.A.M. EL-TIMAWY*

(Received at 11/3/1990)

دراسة ميكروبيولوجيه عن اللحوم المجمدة في أسيوط

رمضان رفاعي ، سهام محمد ، عبدالراضي ثابت ، عبدالخالق الطماوى

تم فحص ٥٠ عينة من اللحوم المجمدة والتي تم جمعها من محلات أسيوط المختلفة . ولقد تم تقدير العد الكلي للميكروبات الهوائية، الميكروبات المعوية ، والميكروب المكور العنقودى الذهبي والتي تراوحت مابين ٢ × ١٠^٤ الى ١٠^٤ /جم، ٦ × ١٠^٢ الى ٣ × ١٠^٦ /جم و ٨٨ × ١٠^٢ الى ٨ × ١٠^٥/جم على التوالي. ومتوسط العدد لهم هو ٢٫٧ × ١٠^٦ /جم و ٤٫٤ × ٩٠ و ١٫٩ × ١٠^٤ /جم على التوالي . وقد أمكن عزل الميكروبات الآتية: Enterobacter Spp. , Citrobacter Spp., Klebsiella Spp., Hafnia alvei and Proteus Spp. وكذلك تم عزل ميكروب Salmonella Typhimurium من العينات وقد تم مناقشة الأهمية الصحية ومدى خطورة هذه الميكروبات على الصحة العامة.

SUMMARY

Fifty random samples of frozen meat were aseptically collected from different shops and supermarkets in Assiut City. the samples were examined for aerobic plate counts. Enterobacteriaceae, and Staph. aureus counts and for detection of Salmonellae and Shigellae. The aerobic plate count ranged from $2X10^4$ to 10^7/g. with a mean value of $2.7X10^6$/9. The counts of Enterobacteriaceae and S. aureus ranged from $6X10^2$ to $3X10^6$/9, and $8X10^2$ to $10^{5/9}$ with a mean value of $4.4X10^5$ and $1.9X10^4$/g. respectively.

The Enterobacteriaceae which could be isolated from the examined frozen meat samples were: Enterobacter spp., Citrobacter spp., Klebsiella spp. Hafnia alvei and Proteus spp. The Salmonella serotype detected in the examined samples was Salmonella typhimurium. E. coli could not be isolated from the examined samples.

INTRODUCTION

The aim of preservation of food by freezing is the retardation of microbial growth to the point where microbial decomposition does not occur (WYBORN and MOTTINGHAM, 1975 and ICMSF, 1978).

*: Dept. of Microbiology, Fac. of Med., Assiut University.

The rapid cooling of meat products to about 0°C may result in death of injury of the mesophilic bacteria, which are capable for rapid growth at moderate temperature and include nearely all the pathogens and most food spoilage organisms. Gram negative micro-organisms are more susceptible to cold than Gram positive micro-organisms (ROSE, 1968).

THCRONTON (1957) reported that different methods of treatments have been recommended to improve the useful life time of meat and meat products, such methods aim to destroy, injure or at least hinder the rate of growh and multipliction of invading contaminants.

The general effect of cold temperature on micro-organisms is to diminish the rate of growth, to bring it eventually to a stand still and to cause the death of a proportion of bacterial population (INGRAM, 1951).

The microbiological quality of th frozen ground meat depends upon the quality of the meat used, sanitary conditions practiced during preparation and the storage temperature (MATES, 1983).

CHRISTOPHERSEM (1968) concluded that microbial growth does not occur in frozen foods held at temperature below -10°C.

This investigation was undertaken to determine the microbiological quality of frozen meat.

MATERIAL and METHODS

Collection of samples :

Fifty random samples of frozen meat were collected from different shops and supermarkets in Assiut City. All samples were aseptically packaged and brought to the laboratory with minimum of delay.

Preparation of sample :

25 gm. of each sample were added to 225 ml of sterile 0.1% peptone water in a sterile blender. The sample was blended for 3 min. at a high speed. Serial dilutions from 10 to 10^{-7} were made and then the bacteriological analyses were performed.

Bacteriological analyses:

Aerobic plate count: Standard plate count agar was used for the aerobic plate count according to A.R.H.A. (1972).

Enterobacteriaceae count: 0.1 ml of each dilution was plated on violet red bile glucose agar (VRBG) according to MERCURI and COX (1979). The plates were incubated at 37°C for 18-24 h. All purplish-red colonies surrounded by a red zone of precipitated bile acids were counted. Biochemical tests were done on the isolated colonies according to EDWARD and EWING (1972).

Enumeration of Coagulase Positive Staphylococci: By a surface plating technique, 0.1 ml from each of the previously prepared dilutions was transferred and evenly spread over a dry surface of Baird-Parker medium plates (THATCHER and CLARK, 1975). Inoculated plates were incubated at 37°C for 48 h. Suspected colonies are counted (black and shiny colonies, greater than 1 mm in diameter showing clear hallow zone of opacity around or beneath the colonies). A repreentative number of suspected colonies were picked up on agar slants for coagulase test according to CRUICKSHANK et al. (1975).

Detection of Salmonella and Shigella Organisms: 10 gm portion of each sample were inoculated into 200 ml selenite cystine broth and incubated at 37°C for 18-24 h. Aloopfull from incubated broth was streaked on SS agar (Difco). Suspected Salmonella or shigella colonies were further identified biochemically and serologically according to CRUICKSHANK et al. (1980).

RESULTS

Obtained results are recorded in tables (1 and 2).

DISCUSSION

Aerobic Plate Count :

The aerobic plate count (Table 1) ranged from $2X10^4$ to 10^7/g. with a mean value of $2.7X10^6$/g. These findings agree with that reported by PACE (1975); FOSTER et al. (1977); OBLINGER and KENNEDY (1980) and MATES (1983) while lower findings were reported by CAMPBELL et al. (1983) and RAYMAN et al. (1986).

In 1963 GERORGALA and HURST reported that food poisoning bacteria do not differ from non-pathogenic in their survival at low temperatures. Salmonella are less resistant than Stap. aureus. Also, they added that death of bacteria is greatest during the actual freezing process than during subsequent cold storage.

Enterobacteriaceae count:

The count of Enterobacteriaceae in frozen meat samples ranged from $6X10^2$ to $3X10^6$/g. with a mean value of $4.4X10^5$/g. The total count of Enterobacteriaceae in frozen meat samples showed a close agreement with that reported by FOSTER et al. (1977) and RAYMAN et al. (1986) while lower findings were reported by HALL et al. (1967) and OBLINGER and KENNEDY (1980).

ABD-ALMENOM (1986) showed that the mortality rate of micro-organisms on freezing varies with species. So Gram positive cocci are more resistant to cold than Gram negative rods. E. coli die quickly at cold storage than other members of coliform group (Enterobacter spp.).

Types of Enterobacteriaceae isolated from the examined frozen meat samples were Enterobcter spp., Citrobacter spp., Klebsiella spp., Hafnia alvei and Proteus spp.

E. coli could not be detected in the examined frozen meat samples and these findings agree with that reported by SURKIEWICZ et al. (1979) and ABD-ALMANOM (1986).

ELLIOTT and MICHNER (1964) reported that, E. coli dies quickly, other than members of the coliform group during cold storage.

Salmonella organisms were detected in one of the examined frozen meat samples and it was typed serologically as Salmonella typhimurium.

GOEPFERT and CHUNG (1970) showed that the Salmonellae decreased in number in the intact saurages held under refrigeration temperature.

Staphylococcus aureus:

Coagulase-ppsitive S. aureus counts ranged from $8X10^2$ to 10^5/g. with a mean value of $1.9X10^4$/g. these results are in accordence with the findings obtained by CHRISTIANSEN and KING (1971) and RAYMAN et al. (1986).

S. aureus organisms were detected in 4(8%) of the examined frozen meat samples. Similar findings were recorded by SURKIEWICZ et al. (1979).

According to ICMSF (1980) Gram positive micro-organisms are relatively resistance to freezing temperature.

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Table (1)

Aerobic Plate count, Enterobacteriaceae and S.aureus counts in examined frozen meat samples

	Minimum	Maximum	Mean
Aerobic plate count	$2x10^4$	10^7	$2.7x10^6$
Enterobacteriaceae count	$6x10^2$	$3x10^6$	$4.4x10^5$
S. aureus count	$8x10^2$	10^5	$1.9x10^4$

Table (2)

Enterobacteriaceae organisms detected in examined frozen meat samples

No. of examined samples	positive samples		No. of strains Isolated	Types of Enterobacteriaceae organisms											
				Enterobacter spp.		Citrobacter spp.		Klebsiella spp.		Hafnia alvei		Proteus spp.		Salmonella	
	No.	%		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
50	50	100	250	212	84.8	15	6.0	13	5.2	6	2.4	3	1.2	1	0.4