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SANITARY CONDITION OF FRESH FISH FILLETS

BY

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INTRODUCTION

Fishes are very important source of protein specially in Egypt where the animal protein is insufficient to meet the requirements of population.

During fish processing as practised in filletting plants or shops; it is impossible to avoid contamination of the initially virtually sterile fish flesh (Shewan, 1961). Such contaminants may find opportunity to grow and multiply in fish or in its products, thus rendering it unfit for consumption or even harmful to the consumers. It is not surprising, therefore that freshly caught but handled fish, even from temperate or cold waters, may carry significant numbers of gram-positive bacteria and even coliform bacteria. These organisms derived from equipment, filletting boards knives, human environment and are not indogenous to the fish (ICMSF, 1980 and Van den Broek et al., 1984).

The present study was designed to evaluate the actual bacteriological condition of fish fillets sold in various local markets. Such information will help us to recommend better methods for transportation processing, filletting and storage of such product.

MATERIALS AND METHODS

A. Samples:

A total of 50 samples of fresh, ready-for sale fish fillets of good sensory quality were collected from different localities. The samples were rapidly delivered to the laboratory for bacteriological examination.

B. Methods:

Samples were prepared according to the technique recommended by Thatcher and Clark (1975) before the following experiments were applied:

1. Aerobic plate count (APC):

It was applied at 20°C and 37°C according to Van den Broek et al., (1984), in all instances using drop plate method which recommended by ICMSF (1978).

2. Total Enterobacteriaceae count (TEC):

The same technique of drop plate method was applied using violet red bile glucose agar incubated overnight at 37°C (Mossel et al., 1979)/

3. Staph. aureus count (SAC):

Coagulase positive and deoxyribonuclease producing Staph. aureus were counted using Baird-Parker medium according to ICMSF (1978).

4. Most probable Number (MPN) of Coliforms and E. coli:

The technique recommended by A.O.A.C. (1975) was used for determination of coliforms and E. coli.

5. Detection of salmonellae:

Samples of 10 gm of fish fillets were examined for presence of salmonellae according to Edel and Kampelmacher (1973).

RESULTS AND DISCUSSION

Table (1): Results Bacteriological examination of fish fillet samples (count/gm).

Bacterial counts	Minimum	Maxmimum	Mean.
APC. at 20°C	17×10^5	4×10^8	26×10^6
APC. at 37°C	34×10^4	8×10^7	76×10^5
TEC	$<2 \times 10^2$	5×10^5	24×10^5
Staph. aureus count	$<1 \times 10^2$	2×10^4	4×10^3
MPN of coliforms	$<3 \times 10^2$	2×10^5	2×10^4
MPN of E. coli	$<1 \times 10^2$	9×10^2	2×10^2

Table (2): Frequency distribution of examined fish fillet samples based on their bacterial count/g.

Frequency	APC at 20°C		APC at 37°C		TEC		S.aureus		Colifo-rms MPN		E.coli MPN	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
$< 10^2$	-	-	-	-	2	4	38	76	28	56	35	70
10^2-10^3	-	-	-	-	24	48	5	10	18	36	14	28
10^3-10^4	-	-	-	-	18	36	6	12	3	6	1	2
10^4-10^5	-	-	26	52	4	8	1	2	1	2	-	-
10^5-10^6	20	40	15	30	2	4	-	-	-	-	-	-
10^6-10^7	16	32	8	16	-	-	-	-	-	-	-	-
10^7-10^8	12	24	1	2	-	-	-	-	-	-	-	-
$> 10^8$	2	4	-	-	-	-	-	-	-	-	-	-
	50	100	50	100	50	100	50	100	50	100	50	100

Sanitary condition of fresh fish pillets.

From the results presented in **Table (1)** it is evident that the mean values of aerobic plate counts at 20°C and 37°C. Enterobacteriaceae count, Staph. aureus count, MPN of coliforms and E.coli of examined fish fillet samples were 26 x 10^6, 76 x 10^5, 24x10^3. 4 x 10^3, 2 x 10^4 and 2 x 10^2 organisms/gm respectively.

The obtained higher counts at 20°C can be attributed to teh presence of psychrophilic organisms which contaminate the examined samples. Such bacterial flora consists mainly from organisms adapted to low temperature during cold storage of fish, these bacteria will grow and together with those acquired by contact with contaminated surfaces (Van Spreekens, 1977 and ICMSF 1978). During filletting more spoilage bacteria will contaminate the fish flesh from debris and slime on filletting boards and knives and from the filletter's hands. (Van den Broek et al., 1984). On the other hand, the aerobic counts obtained at 37°C were obviously lower than 20°C as 25% of 50 samples were below 10^5/gm. and 82% did not exceed 10^6/gm. while, at 20°C, 72% of samples were higher than 10^6/gm and 28% exceed 10^7/gm. (Table 2).

The aerobic plate count of 60% of examined samples at 20°C and 28% of them at 37°C were higher than the recommended limit (5 x 10^5) by ICMSF (1978). Meanwhile, 28% and 2% of samples were higher in aerobic count than the values recommended by the food inspection service in utrecht sugested by Mossel and Tamminga (1980).

The enterobacteriaceae levels in foods allow an estimation of their general bacteriological condition (indicator function) and to a certain extent the risk of presence of entero pathogenic organisms (Mossèl, 1982). It is known that sea water acts as bacteriostatic and sometimes even a bactericidal

effect on enterobacteriaceae (Kamelmacher et al., 1973) and Dawe and Penrose, 1978). Fish fillets will hence become contaminated with enterobacteriaceae mainly during or after filletting. Adopting a reference value 10^3/gm. enterobacteriaceae (Mossel and Tamminga, 1980) over 52% of examined samples **(Table 2)** comply with this value.

Staph. aureus is not a natural inhabitant of marine fish. Therefore, the presence of high numbers of these bacteria on fish fillets is a result of contamination originating from human sources, followed by proliferation due to storage at ambient temperatures (Van de Breek et al., 1984).

The aforementioned results in **Table (2)** showed that out of tested fish fillet samples 86% contained 10^3 or less Staph. aureus which were within the acceptable limits recommended by ICMSF (1978).

Meanwhile, 24% of tested fillet samples contained higher Staph. aureus count than the reference value (10^2) adopted by Mossel and Tamminga, (1980).Similar findings were obtained by Abeyta (1983). They are the consequence of employees unsanitary practes during filletting enhanced by temperature abuse.

Escherichia coli and coliforms are natural inhabitants of the alimentary tract of man and other mammals, and therefore, their presence is indicative of infection or contamination of faecal origin (Kiss, 1984).

From the results presented in **Table (2)** it is evident that 70% of the tested samples contained E.coli within the acceptable limits recommended by ICMSF (1978). The results obtained were inagreement with those reported by Schoebitz et al. (1985) and Abe El-Galil et al. (1988).

Sanitary condition of fresh fish pillets.

Salmonella infection transmitted by fish occurs only sporadically (Turnbull and Gilbert, 1982 and Gilbert, 1983). In agreement with these epidemiological data, salmonellae could not be detected in any of the examined fish fillet samples.

In general, raw or processed seafoods are excellent substances for the growth of most common bacterial agents of food borne diseases if held at ambient temperatures therefore contamination of these foods during preparation and storage should be avoided. The utensils and equipments used in preparation of such fishes, unless well sterilized may be a dangerous source of contamination (Gilbert, 1969 and Dempster, et al., 1973). Also the role of hands and clothes of emplyees in contaminating the products hould not be overlooked. (Dempster et al., 1973). Moreover, the storage temperature is an important factor governing the rate of growth and multiplication of existing organisms (Bryan, 1975).

Therefore, as the product is widespread and no strict regulations or specifications are issued, concered authorities should take active part to ensure sanitary production and handling to safe-guard consumers from being infected.

SUMMARY

A total of 50 random samples of fresh fish fillets collected from different localities were examined bacteriologically to find out their bacteriological quality.

The mean values of aerobic plate counts at 20°C and 37°C, enterobacteriaceae count, Staph. aureus count, MPN of coliforms and MPN of E. coli for tested fish fillet samples were 26×10^6. 76×10^5, 24×10^5, 4×10^3, 2×10^4 and 2×10^2 organisms/gm. respectively.

The aerobic plate counts at 37°C were obviously lower than 20°C as 52% of fillet samples were below 10^5/gm and 82% did not exceed 16^6/gm, while at 20°C 72% of samples were higher than 10^6/gm. and 28% exceed 10^7/gm. Salmonellae were not detected in any sample,

Most of the samples showed high bacterial contamination as well as bacteria of faecal origin indicating insanitary handling and preparation.

Suggestive hygienic measures for handling, preparation and storage of such fish product were discussed.

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