ASSESSMENT OF THE HYGIENIC QUALITY OF THE FISH FRESH RAW MATERIAL BASED ON THE BACTERIOLOGICAL EXAMINATIONS

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Abstract

Immediately after catching it, the flesh and some internal organs of fish are normally sterile. There are however, numerous microorganisms, especially bacteria, on the skin (103-109/g), on the gills(103-107/g) and in the digestive tube(103-108/g). The number of bacteria from different parts of the organism vary very much and reflect, mostly, the degree of contamination (Barzoi D.,Apostu S., 2002, Yasumoto, T. et al., 1993). The assessment of the state of freshness of the raw material fish may be achieved beside the sensorial analyses (smell, colour, consistency, etc.) also based on the physical-chemical ones: the biological particularities of the fish, the structure and chemical composition of the tissues, the technology of capturing and life suppression impart certain characteristics to the biochemical processes in the fish flesh (Eftimie V.M., 2001). The biological particularities of fish, its tissues structure and chemical composition, the life capture and suppression, the processing and conservation methods all imprint certain characteristics to the biological processes in the fish meat, especially to the alterative ones.

Keywords: fish, microorganisms: sporulated gram-positive bacteria and gram-negative bacteria

INTRODUCTION

The pathogenic germs present in fish may multiply, reaching contamination levels capable of determining the occurrence of illnesses in man. Most of the species, especially the oceanic fishes, are predators so they have a nourishment regime based mainly on proteins. The food digestion is mainly accomplished by the proteolitic enzymes abundantly secreted by the specific glandular system attached to the digestive tub and pyloric appendices, respectively. After fish death, these enzymes act on their own mother-tissue and than are spreading in the neighbouring tissues (the organs of the general cavity and the abdominal musculature) gradually producing their lysis, Thus, there are being created optimal conditions for the bacterial activity, The fish, excepting the large sized specimen, is processed and it is valorised in one single, non-eviscerated piece. The digestive tube content is an abundant source of bacteria which, after fish death, invade the tissues and the organs from the general cavity and then the muscular one. consumption location, hastens the alteration processes.

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When the hygienic and technological conditions in which the fish is kept, the diverse conditions starting with the fishing and ending with its consumption as such or with its processing, are appropriate ones, microflora is, in general, less significantly represented against the butcher's animals' case.

MATERIALS AND METHODS

With a view to highlighting the microbial contamination, 178 samples of whole fresh fish were drawn, from 2 units, A and B, one monitored the verification of 16 batches (8 batches from unit A and 8 batches from unit B). The draw of samples was performed after classifying the fish raw material in quality classes (based on species, size, corporal weight, state of freshness, etc.) from the batches of indigenous fish, which were verified from sanitary-veterinary point of view at the reception in the two fish processing units.

91 samples from 8 batches from unit A and 87 samples from 8 batches of unit B were drawn. After collection, the fresh fish samples were introduced in sterile packages (polyethylene one time use bags), in order to prevent the subsequent contamination and were sent to the laboratory with a view to performing the microbiological examination. The whole fresh raw material fish must correspond from bacteriological point of view to the conditions of quality foreseen in STAS 5386-86 (Barzoi D. et al., 1999, Huss H.H., 2004).

According to STAS 5386-86 (Popa G. et al., 1991) the whole fresh fish must not contain bacteria in the depths of the muscular mass; gram positive bacteria are allowed (cocci, bacilli), which do not produce in cultures gases, indol, sulphurated hydrogen under the condition that the fish does not present organoleptic and physical-chemical modifications.

From the 16 analyzed batches (8 in unit A and 8 in unit B), in 15 of them one highlighted the presence of bacteria in the depths of the muscular masses.

From the 178 draws performed in the 2 units, a number of 124 of them responded positively as a result of the bacteriologic examination for the presence of the bacterian flora in the depths of the muscular masses.

In table 1 the results obtained as a result of the direct isolation on the 3 culture environments used in parallel for the highlighting of the mesophile aerobe bacteria and respectively of the anaerobe bacteria or optionally anaerobe from the samples of whole fresh raw material fish are shown.

As a result of the performed bacteriologic examinations one obtained 124 positive samples from the 134 analyzed (92.53% in the two units with a contamination rate of 65.93% in 60/91 samples) in unit A and 73,56% (64/87 samples) in unit B

The anaerobe bacteria of type Bacillus were predominant, these being isolated in 85 samples from the 178 samples analyzed in the two units(47.75%), followed by the type Clostridium, found in 25 samples of the 178 samples analyzed(14,04%); the aerobe bacteria(cocci an bacilli) were isolated in proportion of 7,86% of the total of contaminated samples. In 1 of the 16 batches the presence of the bacterian flora was not confirmed in the depths of the muscular masses(batch 3A). For the culture environments that allow the growth and development of the aerobe mesophile bacteria(glucosed bullion respectively glucosed nutritive agar) one obtained rates of positivity of 92,53% in the contaminated batches and respectively 85,82% and on the environment of culture used for cultivating anaerobe bacteria(the glucosed nutritive bullion with liver), the positivity rate was of 81,34%. One of the analyzed batches proved to be contaminated in proportion of 100% with aerobe mesophile bacteria: batch 1A; other batches presented a contamination of over 90%; the batch 2B(92,3%); the batches 8A and 7B(90.9%); the batch 6A (90%), according to the table 1. In the other batches, the contamination rate observed was more reduced: 66,66% for batch 7A, 70% for batch 3B, 75% for batch 4A, 81,8% for batch 7B etc.

Table 1.

Evaluation of the bacterian contamination of the fresh raw material fish at reception in the two processing units

Crt. No.	Unit/batch	Isolation environments			Total positive samples/ batch
		Nutritive glucosed bullion	Nutritive glucosed agar	Nutritive glucosed bullion with liver	
1.	1A	10/10	10/10	9/10	10/10(100%)
2.	2A	10/12	10/12	9/12	10/12(83,33%)
3.	1B	8/10	8/10	7/10	8/10(80%)
4.	2B	12/13	12/13	11/13	12/13(92,3%)
5.	3B	7/10	7/10	7/10	7/10(70%)
6.	4B	10/11	9/11	9/11	10/11(90,9%)
7.	5B	4/10	2/10	2/10	4/10(40%)
8.	6B	10/12	10/12	9/10	10/12(83,33%)
9.	7B	11/11	9/11	8/11	11/11(100%)
10.	8B	2/10	0/10	0/10	2/10(20%)
11.	3A	0/11	0/11	0/11	0/11(0%)
12.	4A	9/12	9/12	9/12	9/12(75%)
13.	5A	4/13	4/13	3/13	4/13(30,76%)
14.	6A	9/10	9/10	9/10	9/10(90%)
15.	7A	8/12	8/12	8/12	8/12(66,66%)
16.	8A	10/11	9/11	9/11	10/11(90,9%)
Total samples + from the contaminated batches	15 contaminated batches	124/134 (92,53%)	115/134 (85,82%)	109/134 (81,34%)	124/134(92,53%)
Total samples + from the draws of the two units	16 Analyzed batches	124/178 (69,66%)	115/178 (64,60%)	109/178 (61,23%)	124/178(69,66%)

Table 2

Distribution of the bacterian stems isolated as a result of the analysis of the batches of whole fresh fish in the units A and B

Crt. No.	Unit	Sporulated gram-positive bacteria		Gram-negative bacteria
		Bacillus Type	*Clostridium* Type	
1.	A	44/91 (48,35%)	10/91 (10,98%)	6/91 (6,59%)
2.	B	41/87 (47,12%)	15/87 (17,24%)	8/87 (9,19%)
3.	A+B	85/178 (47,75%)	25/178 (14,04%)	14/178 (7,86%)

CONCLUSIONS

1. The fresh raw material fish presented as a result of the evaluation of the bacterian contamination at the reception in the two units A and B a contamination of 65,93% in unit A and of 73,65% in unit B.
2. The results obtained from the samples of fresh raw material fish drawn from the two units A and B reveal a level of contamination with sporulated gram positive bacteria of type Bacillus of 47, 75% followed by the type Clostridium 14,04%; the mixed gram negative microbial flora (cocci and bacilli) represented a level of contamination of 7,86% from the total of analyzed samples.

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