

BACTERIOLOGICAL RESEARCH ON THE INCIDENCE OF BACTERIAL MICROFLORA IN SOME VARIETIES OF FISH

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Abstract

The scientific research reflected in this study aimed to identify the bacterial microflora in different varieties of fish of different commercial categories through microbiological investigation. The microbiological assessment conditions of the examined fish varieties determined the presence of saprophytic germs, affirming a normal microflora according to the requirements of microbiological investigation standards and the identification of existing microbial species. The microbiological aspects of the assessment of the examined fish varieties confirmed the presence of saprophytic germs, confirming a normal microflora favorable to the requirements of the microbiological investigation standards and the identification of existing microbial species.

Key words: Bacteriology, Microflora, Fish, Bacterioscopy, Assortment

At the present time, it is considered that a functional and balanced diet is important in human nutrition regarding the human-food interrelationship with an unprecedented impact worldwide. The aspects of primary production, the processing and placing of food on the market under the conditions of ever lower risks, represent a priority on the front line vis-à-vis the profound implications that food and nutrition have on the life and health of consumers. Therefore, food represents the most favorable vector of multiple risks of a biological, chemical or physical nature, as well as important nutritional problems, so the consumer is more concerned about the way of eating and has the desire to eat as healthy as possible [2,7].

Some specialist studies confirm that a food due to its nutritional content and dietary qualities is fish, considered one of the most valuable food products due to the easily assimilable nutrients necessary for human life, which it contains: proteins, vitamins, mineral elements, etc.[1,4]. The importance of microbiological processes on fish as food can be variable and influence the physico-chemical, nutritional and organoleptic characteristics. For these reasons, microbial activity is most often manifested in connection with enzymatic mechanisms. An important aspect is the fact that micro-organisms have the function of intervening during the formation of the raw material.

Microorganisms in the fish industry have a special role by modifying the organoleptic and

nutritional properties, which due to its structure constitute a beneficial environment for the development of different important species of microorganisms [3,6]. For these reasons, it is important to highlight and evaluate in time the pathogenic microbial germs, which pollute fish and contribute to various degradations of this food product [5,8,10]. At the same time, some microbial species devalue food through pathogenic mechanisms, making it unfit for human consumption. [9].

As a result of the studies carried out, we found it appropriate to carry out some scientific research in this field and for this reason we proposed the objective of identifying the aspects of the bacterial microflora in different varieties of fish of different commercial categories by investigating and identifying the microbial aspects.

MATERIAL AND METHOD

The study was carried out by performing microbiological research according to the classic bacterioscopic and bacteriological laboratory methods of Carp, Mintay and Hake fish varieties purchased from the store and market, Chisinau municipality.

RESULTS AND DISCUSSIONS

The results of the ongoing research allowed us to ascertain and evaluate the microbiological aspects based on the detection of the number of polluting microorganisms studied through their

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morphological, cultural activity, the mode of action and other properties that present complexity and importance. The organoleptic evaluation of the fresh and frozen fish assortments was carried out according to the organoleptic aspects: muscle stiffness, appearance of the mouth and eyes, gills, skin, scales, nose, musculature, assessment of the appearance of the viscera. For the frozen fish assortments, the assessment was carried out after thawing.

The organoleptic research on fresh fish of the Carp variety confirmed the presence of muscle stiffness, the mouth was closed, the appearance of the eyes was at the level of the orbits, the gills were reddish in color, without a characteristic smell, no characteristic mucus was observed. The appearance of the skin and scales showed natural glossy color, the scales were slightly shiny, well attached to the skin, and there was a negligible amount of mucus on the surface. The musculature showed elasticity, well held to the bones, grey, white to pink. The viscera were well examined and individualized, with a specific smell. Therefore, these organoleptic evaluations indicate the fact that the researched fish of the Carp variety presented the first freshness category according to the organoleptic investigation results.

The organoleptic researches of Mintay and Hake frozen fish varieties presented characteristic organoleptic aspects through the following organoleptic indicators: mouth slightly ajar; exophthalmic eyes; scales a little shiny and skin a little shiny. These aspects allowed us to deduce the fact that the frozen fish assortments that were purchased from the store are of a relatively fresh category. Microbiological research on the qualitative microbiology of the freshness of fish assortments of different categories reported differentiated indices according to several aspects of fish investigation. Thus, according to the specialized bibliographic information of food microbiology, it is considered that the microbiological analysis of the investigation of the freshness of the fish food product, evaluates this food product according to the number of microorganisms that pollute it. For these reasons, it is considered that if, under microscopy, on the surface of the microscopic field visualization of the fish fingerprint smears collected from the surface

layer, single cocci saprophytic bacterial cells are observed, then this assortment of fish is considered to be of the product category - first grade freshness.

At the same time, if between 10 - 30 saprophytic cocci are visible on the microscopic smears on the surface layer, then the fish is considered fresh and is allowed to be used in food. In the deep layer of the fresh category fish, there should be single insignificant microbial cells 1-2 saprophytic cells visualized under microscopy. Likewise, specialized bibliographic sources of the microbiology of fish food inform us that it is prohibited to use fish in food for the purpose of preventing food poisoning, if as a result of bacterioscopic and bacteriological investigations of the surface layer of the fish to be examined, microscopically from 40 and more microbial cells, and in the deep layer of the researched fish more than 10 microbial cells were enumerated on the microscope field.

The microbiological examination of the fish of different varieties Carp, Mintay and Hake followed the evaluation of the bacterial microflora in this food product by means of microscopic investigations on the microbial preparations regarding the enumeration of the total number of germs in the superficial and deep layers of this food product and the evaluation of the quality of its freshness.

Following the values of the germ indices on the microscopic fingerprints of the Carp fish assortment Figure 1, it is revealed that the degree of pollution of the microflora of the surface layer constitutes 8 bacterial cells in the form of single cocci, chaotically isolated, Gram positive.

Therefore, according to our research study regarding this assortment of fish that we investigated after the microbiological conduct of the laboratory, the following referential assessments follow, which show that both the microflora of the surface layer and the deep layer of the Carp fish meet the requirements of microbiological analysis and standards, and this assortment of fish constitutes a food product in the fresh category according to the quality of the fish.

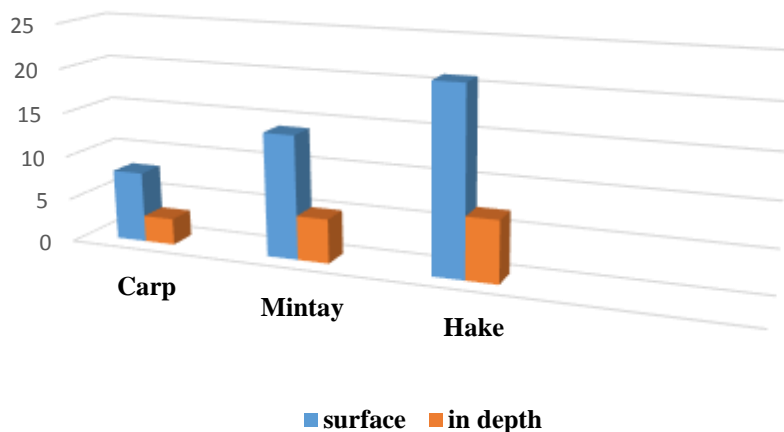


Figure 1. Bacterial microflora regarding the freshness of some varieties of fish during bacterioscopy
Source: elaborated by the author

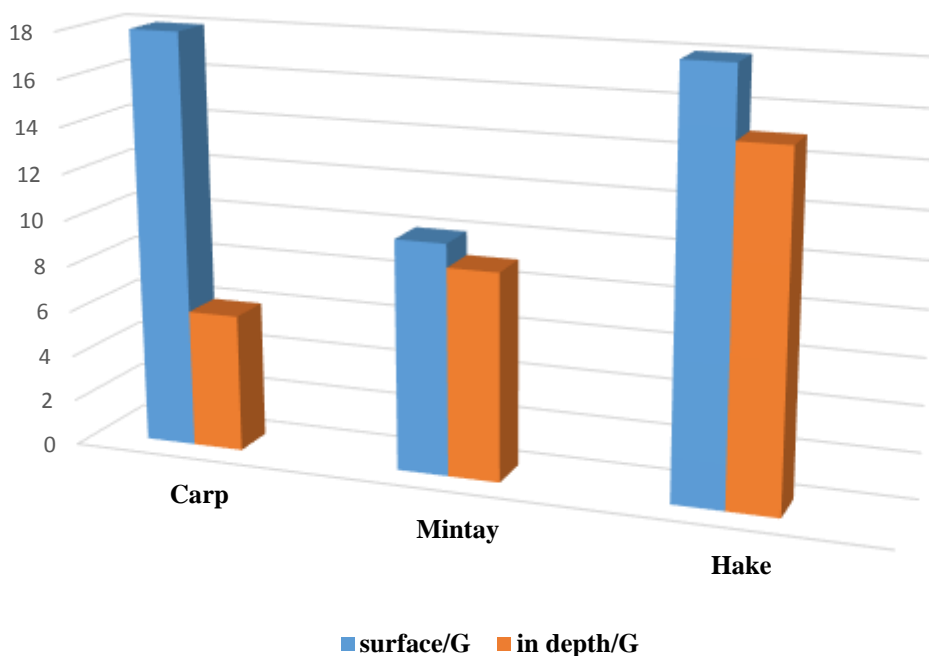


Figure 2. Bacterial microflora regarding the freshness of some varieties of fish in bacteriology
Source: elaborated by the author

The Mintay variety fish, according to the studies of the microscopic visualization of the total number of germs, confirms to us an increased number of microscopic bacterial cells, characteristic of the surface and depth layers, which respectively constituted 14 and 5 bacterial cells from the cocci category. Microorganism rods were not visualized. And yet, we want to emphasize that the surface microflora is increased due to some aspects related to the ways of keeping the fish in the store where it was purchased.

Regardless of these preservation aspects, however, this variety of fish meets the marketing requirements, because the allowed norm of microbial cells on the microscopic field is 10-30

cells on The values of figure 1 confirm the bacterioscopy investigation of the germs in the footprint of the Hake assortment fish food product, reporting a higher number of microorganisms -21 cocci microbial cells chaotically isolated in the surface layer and 7 cocci cells in the deep layer of this food product. The reports demonstrated above confirm to us after differentiating from other fish varieties examined Carp and Pollock, that however the bacterial microflora visualized under microscopy according to the total number of germs in the Hake variety is higher regarding the surface layer and the deep layer of examination. However, these aspects are considered normal, considering the requirements for marketing the food product in the fish category.

Indexes 21 and 7, which correspond to the microscopic aspects of the Hake fish assortment, correspond to microbiological standards. The Hake variety fish is considered less fresh, but does not pose a danger to the health of consumers, because its pollution is determined by saprophytic cocci microorganisms.

The microbiological investigations through the passages of the three varieties of fish Carp, Mintay and Hake reflect us different values in figure 2, which confirm us the bacterial microbiological data of the highlighted number of bacterial colonies enumerated on Petri plates with simple culture media, their visual characteristic and the interpretation according to the cultural characteristics specific to the aspects of specialized bibliographic conduct.

The data obtained allow us to deduce that the surface layer of the Carp assortment is polluted with a number of 18 microbial colonies that developed on the agar/plates medium and 6 colonies that developed on the agar/tube medium, compared to the layer deep bacteriological investigation, which noted 6 colonies on agar medium/plates and 2 colonies on agar medium/tubes. On the Endo special medium, the development of pathogenic colonies specific to the development on this culture medium was not highlighted. So, these aspects of investigation indicate the fact that the number of 18 microbial colonies is not alarming, because it corresponds to the requirements of microbiological conduct, especially as we mentioned before in the subject of microscopic research, that no pathogenic bacterial cells were identified and in the given case we have not observed and confirmed no development on the investigation medium.

The Mintay fish assortment regarding the number of microbial colonies shown in the table allow us to confirm in the result of the evaluation of the cultural aspects a number of 10 colonies and 9 colonies regarding the microflora on the agar medium on the plates regarding the surface and deep layers of this assortment of fish with an aspect of development of the cultural characters of sour/white colonies and absence of development on the Endo environment of microorganisms specific to the pathogenicity of some characteristic microbial species. Bacteriology results of tube passages showed 7 and 4 characteristic colonies on the agar medium/tubes at the corresponding surface and deep layers,

In this context, however, it must be taken into account that this assortment was procured in a frozen state and in order to be microbiologically researched according to the requirements, it was thawed. Possibly the freezing process was long-

lasting and in this way the physiological processes of the fish meat were slightly degraded, giving it an uncharacteristic pollution because according to the microbiological requirements the fish of the Pollock assortment corresponds to be used for the consumer.

The information regarding the bacteriological conduct of the microbiological investigation of the Hake variety according to the microbiological conditions shows us that this Hake fish variety, compared to the Carp and fish varieties, is more polluted with the microorganisms of the microbial colonies. Therefore, analyzing the number of colonies listed on plates and tubes with the corresponding culture media where the cocci species are trained, as we visualized under microscopy the highest number of colonies is observed: 18 and 15 regarding the surface layer and deep on the plates Petri of the fish to be researched from the Hake assortment. The bacteriology of this assortment of fish, regarding the passages in the tubes, determined 12 and 9 colonies in the examined layers. Therefore, these obtained results confirm that this category of fish is not of prime freshness. The previous research aspects indicate that the Carp fish assortment is the first freshness according to the number of colonies developed in the examined layers characteristic of this food product, followed by the Mintay fish assortment with a relative freshness and finally the Hake fish assortment with a dubious freshness, due to the increased number of microbial cells visualized on the microscopic fields and the number of the most highly developed microbial colonies on the usual culture media. Therefore, these aspects are obtained as a result of the investigations denote a larger number of colonies due to the unhygienic conditions of keeping the fish of the Carp assortment until it is made in market conditions.

The cultural characters of the cultures developed after the passages performed correspond to the respective characteristics of sour/white colonies on the agar medium both on plates and in tubes and aspects characteristic of the development in the broth medium in the form of sediment and turbidity. The laboratory conduct regarding the microbiology of different varieties of fish meat also aimed to identify coliform, salmonella and staphylococcal germs in fish, which frequently cause food poisoning. For this purpose, microbiological research laboratory determinations of the microbial agents of the Salmonella species were carried out. The germs of the suspected salmonella colonies were investigated from the samples of the fish to be investigated, later by

passages on the Endo special culture medium and simple agar and broth media.

Bacteriological preparations were stained by Gram according to the classic staining method. Salmonella bacteria were not confirmed by microscopic visualization and also no Salmonella cultures were determined on the culture media when passages were performed. Therefore, all categories of fish varieties to be researched did not confirm the presence of the Salmonella species, conforming that these fish varieties meet the requirements. The samples of the fish assortments also did not determine the microorganisms of the Escherichia species on the usual and differential culture media. No colonies characteristic of this species were formed on the Endo culture medium, which would confirm the presence of E.coli. That is why knowing the microorganisms in the fish industry is important to know the changes in the organoleptic and nutritional properties of the fish, which due to its structure constitutes a beneficial environment for the development of microorganisms. For these reasons, the microbiological determination of pathogenic microbial germs, which pollute fish and contribute to various degradations of this food product, is important.

The scientific aspects, regarding the microbiology of this food product, reveal the importance of the safety of this food product, which confirms during the investigations certain aspects of not affecting the health of the consumer, and fish meat due to its varied chemical composition and richness in the main groups of nutrients necessary for the body is recommends that it be used in human food as often as possible.

CONCLUSIONS

1. The investigative fish assortments confirmed saprophytic germs, confirming a normal microflora favorable to the requirements of microbiological research standards.
2. Carp fish assortment confirmed the lowest number of saprophytic coccyx microorganisms both in the surface layers and in depth, ranking the fish meat of first freshness.
3. Mintay and Hake fish assortments revealed a variable bacterioscopic and bacteriological number of saprophytic microorganisms, ranking the fish meat of these assortments of relative freshness.
4. Investigations regarding the varieties of fish sold in the market and shops according to the microbiological conduct reveal that all categories of fish are edible.

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