

# CONTRIBUTIONS TO THE INTERPRETATION OF MICROBIOLOGICAL RESEARCH ON THE MICROFLORA OF DIFFERENT FISH VARIETIES

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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 marketing categories through microbiological investigation. The microbiological conditions for assessing the examined fish assortments determined the presence of saprophytic germs, asserting a normal microflora according to the requirements of the microbiological investigation standards and the identification of existing microbial species.

**Key words:** Fish, Bacteria, Chickens, Salmonella, Food Toxin Infections, Food Safety.

The animal-food-human relationship has become of unprecedented importance and impact, given that the 21st century has brought globalization and agro-industrialization to the world and, consequently, new challenges in developing an optimal model for a functional and balanced diet.

Primary production, processing and trading of food in the face of declining risks are a major priority, due to the profound implications that food and nutrition have on the lives and health of consumers. Food is the most conducive vector of multiple biological, chemical or physical risks, as well as important nutritional problems, so the consumer is more concerned about how he eats and has the desire to eat as healthy as possible to prolong the life [2,7].

In this context, a special food due to its nutritional content and special taste qualities is fish, considered one of the most valuable food products due to easily assimilable nutrients necessary for human life, which contains: proteins, vitamins, minerals, enzymes, etc. [1,4].

The action of microorganisms on fish as food can be variable and can influence the physico-chemical, nutritional and organoleptic characteristics. Microbial activity is most often manifested in connection with enzymatic reactions. It must also be taken into consideration that microorganisms may also intervene during the formation of the raw material. Microorganisms in the fish industry have a special role by modifying the organoleptic and nutritional properties of fish, which due to its structure is a beneficial environment in the development of microorganisms [3,6].

For these reasons it is important to know the microbial pathogens, which pollute the fish and contribute to its degradation [5,8,10].

At the same time, it is known that microorganisms that act harmful on food, generally making them unfit for human consumption are: bacteria, molds, yeasts that produce various processes of fermentation, mold and rot [9].

Studying various bibliographic accounts of different authors, I found it appropriate to conduct some scientific researches in this field and for this reason I aimed to identify the bacterial microflora in different varieties of fish of different marketing categories by investigating and identifying the existing microbial species.

## MATERIAL AND METHOD

In order to perform out the study, investigations were performed according to the classical bacterioscopic and bacteriological laboratory methods of some varieties of Crap, Mintai and Hec fish purchased from the central square and the market from Chisinau municipality.

## RESULTS AND DISCUSSIONS

The detailed analysis of the research allowed us to find and analyze the microbiological aspects based on the detection of the number of pollution microorganisms studied by their morphological, cultural activity, mode of action and other properties that are particularly complex and important. Organoleptic examination of fresh and frozen fish assortments was performed according to the following organoleptic indicators: muscle stiffness, appearance of the mouth, eyes, gills, skin and scales, nose, muscles (on the fish as such and on the surface of section) and assessment of the appearance of the viscera. In

the case of frozen fish, the examination was performed after defrost.

Organoleptic research of the fresh fish from the Crap assortment confirmed the presence of the muscular rigidity, the mouth closed, the appearance of the eyes was at the level of the orbits, the gills were reddish, without a characteristic smell, no characteristic mucus was observed. The appearance of the skin and scales showed a shiny natural color, the scales were a little shiny, they were well attached to the skin, and there was a small amount of mucus on the surface. As for the muscles, elasticity was observed, it was well attached to the bones, gray in color, white in pink. The viscera were well examined and individualized, with a specific smell. However, these researches lead to the conclusion that the fish investigated from the Crap assortment was in a state of first freshness according to the results of organoleptic investigation.

Organoleptic research of the Mintai and Hec frozen fish assortments presented characteristic organoleptic aspects through the following organoleptic indicators: slightly ajar mouth; exophthalmic eyes; slightly shiny scales and slightly shiny skin. These aspects allowed us to deduce from the fact that the assortments of frozen fish that were purchased from the market are of relatively fresh origin.

The microbiological researches regarding the qualitative microbiology of freshness of fish assortments of different categories reported indices differentiated 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, appreciates this food product according to the number of microorganisms that pollute it. Therefore, it is considered that if microscopic field smears of fish fingerprints harvested from the surface layer are observed single saprophytic microorganisms cells (shells, rods), then this assortment of fish is considered the category of product of the degree - first freshness.

In the same time, if on the smear fingerprints under the microscopy of the fish

samples are listed from 10 to 30 saprophytic cocci on the surface layer, then the fish is considered fit, fresh and allowed to be used in food. In the deep layer of fresh fish must contain unique insignificant microbial cells 1-2 saprophytic cells in the immersion field. Also, the specialized bibliographic sources of fish microbiology inform us that it is forbidden to use fish in food in order to prevent food poisoning, if as a result of bacterioscopic and bacteriological investigations of the surface layer of the fish to be examined was detected under microscopy from 40 and more microbial cells, and in the deep layer of the fish to be researched, more than 10 microbial cells were listed in the microscopy field.

Microbiological investigations of fish of different varieties Crap, Mintai and Hec aimed to evaluate the bacterial microflora in this food product through microscopic investigations on microbial preparations on the enumeration of the total number of germs in the superficial and deep layers of this food and assessing the quality of its freshness.

Following the data of the number of germs on the microscopic fingerprints of the Fish Carp assortment (Table 1) we deduce that the degree of pollution of the surface layer microflora constitutes 8 bacterial cells in the form of unique cocci, chaotically isolated, Gram positive. The deep layer of the Crap fish assortment shows us that the bacterial microflora as a result of visualizing the microbial preparations is smaller, constituting 3 unique cocci cells isolated by bacteria.

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

Table 1

**The quality of the freshness of the fish assortments regarding the quantity of the bacterial microflora**

Assortment	Bacterioscopy/surface layer	Bacterioscopy/deep layer	Microscopy
Crap	8	3	Isolated Cocci, Gram+
Mintai	14	5	Isolated Cocci, Gram+
Hec	21	7	Isolated Cocci, Gram+

Table 2

**Quantitative aspects of microbial colonies regarding the quality of freshness of fish assortments**

Assortment	Bacterioscopy/surface Agar/Endo	Bacterioscopy/deep Agar/Endo	Bacterioscopy/surface/ deep tubes	Cultural characters
Crap	18/0	6/0	6/2	Grey/white colonies
Mintai	10/0	9/0	7/4	Grey/white colonies
Hec	18/0	15/0	12/9	Grey/white colonies

The fish of the Mintai assortment, according to the studies of the microscopic visualization of the total number of germs, confirms a higher number of microscopic bacterial cells, characteristic of the surface and depth layers, which constituted 14 and 5 bacterial cells from the cocci category. Microorganism sticks were not viewed. And yet, I want to emphasize that the surface microflora of Mintai is more enlarged due to some aspects related to the ways of keeping the fish in the store where it was purchased. Regardless of these storage aspects, however, this Mintai fish assortment meets the marketing requirements, because the allowable norm of microbial cells in the microscopy field is 10-30 cells in the microscopic field. Therefore, the Mintai fish assortment used in the diet does not present a danger of food poisoning and we can classify it as a relatively fresh food product.

The data in Table 1 confirm the bacterioscopy investigation of germs from the fish food mark of the Hec assortment, reporting a higher number of microorganisms -21 chaotically isolated cocci microbial cells isolated in the surface layer and 7 cocci cells in the deep layer of this foodstuff. The reports demonstrated above confirm us after differentiating from other fish species examined Carp and Mintai, that however the bacterial microflora visualized under microscopy according to the total number of germs in the Hec assortment is higher in terms of surface layer and deep examination layer. However, these issues are considered normal, given the requirements for the marketing of fish food. Indices 21 and 7, which correspond to the microscopic aspects of the Hec fish assortment, correspond to the microbiological standards. The fish from the Hec assortment is considered less

fresh, but does not present a danger to the health of consumers, because its rainfall is determined by saprophytic coccic microorganisms.

Microbiological aspects through the passages of the three varieties of fish Crap, Mintai and Hec reflect different aspects in Table 2, which confirms the bacterial microbiological data of the number of bacterial colonies listed on Petri dishes with simple and special culture media, their characteristic visual and cultural interpretation specific to aspects of specialized bibliographic conduct.

The interpretation of the results, regarding the quantitative aspects of the microbial colonies highlighted after the passages from the Crap fish assortment on the simple and special culture media on plates showed, that the quantitative number of the developed colonies is visually differentiated.

The data obtained allow us to deduce that the surface layer of the Crap assortment is contaminated with a number of 18 microbial colonies that developed on the agar / plate medium and 6 colonies that developed on the agar / tube medium, compared to the layer deep bacteriological investigation, which noted 6 colonies on agar / plates and 2 colonies on agar / tubes.

On the special Endo medium, the development of colonies specific to the development on this culture medium was not highlighted.

However, these aspects of the investigation show that the number 18 microbial colonies is not alarming, because it meets the requirements of microbiological behavior, especially as mentioned earlier in the subject of microscopic research, that no pathogenic bacterial cells were detected and in in this case we did not notice and no development was confirmed on the medium.

The Mintai fish assortment regarding the number of microbial colonies shown in the table allow us to confirm as a result of the enumeration of cultural aspects a number of 10 colonies and 9 colonies regarding the microflora on the agar medium on plates regarding the surface and deep layers of this fish assortment with an aspect of development of the cultural characters of light / white colonies and absence of development on the Endo environment of microorganisms specific to the pathogenicity of some characteristic microbial species. The results of the bacteriology of the tube passages imprinted 7 and 4 characteristic colonies on the agar / tube medium at the corresponding surface and deep layers, which indicates that in comparison with the number of colonies of this fish assortment is increased compared to the Crap fish assortment and confirms that the freshness is relative, but still corresponds to the aspects of microbiological requirements.

In this context, however, it must be taken in consideration that this assortment was procured in the frozen state and in order to be microbiologically researched as required, it was defrosted. Possibly the freezing process was long 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 Mintai assortment corresponds to be used for the consumer.

The information regarding the bacteriological conduct of microbiological investigation of the Hec assortment according to the microbiological conditions shows us that this assortment of Hec fish compared to the Crap and Mintai fish assortments is more polluted with the microorganisms of the microbial colonies. Therefore, analyzing the number of colonies listed on plates and tubes with the appropriate culture media where the cocci species are entrained, as we saw under microscopy, the highest number of colonies is observed: 18 and 15 on the surface and deep layer on the plates Petri of the fish researched from the Hec assortment.

The bacteriology of this assortment of fish, regarding the passages in tubes determined in the examined layers 12 and 9 colonies. Therefore, these results confirm that this category of fish is older and not fresh.

Previous reports conclude that the Crap fish assortment is of the first freshness according to the number of colonies developed in the examined layers characteristic of this food product, followed by the Mintai fish assortment with a relative freshness and finally the Hec fish assortment with a dubious freshness, due the higher number of microbial cells visualized on the microscopic fields and the higher number of microbial colonies

developed on the usual and special culture media. Possibly the larger number of colonies corresponds to unhygienic conditions for keeping the Crap assorted fish until it is sold in market conditions.

The cultural characteristics of the cultures developed after the passages performed correspond to the respective characteristics of gray / 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 on the microbiology of different types of fish meat also aimed to identify coliform germs, salmonella and staphylococci in fish, which frequently cause food poisoning.

Microbiological laboratory determinations were performed to investigate Salmonella microbial agents. The germs of the suspicious salmonella colonies were investigated from the fish samples to be investigated, subsequently there were passages on the special culture medium Endo and simple media agar and broth. Bacteriological preparations were stained according to Gram according to the classical staining method. Salmonella bacteria were not confirmed on microscopic visualization and also no salmonella cultures were determined on the culture media when performing the passages. Therefore, all categories of fish to be investigated did not confirm the presence of Salmonella and according to the microbiological conditions these fish varieties meet the requirements. Samples of fish also did not determine Escherichia microorganisms on common and differential culture media. The colonies characteristic of this species, which show the presence of E.coli, were not formed on the Endo culture medium. 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 is a beneficial environment in the development of microorganisms. For these reasons, it is important to know the microbial pathogens, which pollute the fish and contribute to its degradation.

These scientific interpretations deduce and ensure that food safety is presented by not affecting the health of the consumer, and fish meat due to its varied chemical composition and rich in the main groups of nutrients needed by the body: proteins, fats, carbohydrates, minerals and vitamins. etc., favors the normal functioning of the human body.

## CONCLUSIONS

1. The microbiological conditions for assessing the examined fish varieties determined the presence of

saprophytic germs, asserting a normal microflora according to the requirements of the microbiological investigation standards.

2. The Crap fish assortment confirmed the smallest number of saprophytic cocci microorganisms both in the surface layers and in depth, ranking the freshest fish meat.

3. The Mintai and Hec fish assortments revealed a variable bacterioscopic and bacteriological number of saprophytic microorganisms, classifying the fish meat of these assortments of relative freshness.

4. The approach of the given topic regarding the assortments of fish sold in squares and markets according to the microbiological conduct reveals us that all categories of fish due to their dietary and nutritional values are edible, useful and can be used in food.

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