

RESEARCH ON THE PRESERVATION OF LOCALLY INNOVATED PRODUCTS OBTAINED FROM FRESH WATER FISH BELONGING TO THE CYPRINIDAE FAMILY

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Abstract

This paper aims at identifying species of fresh water fish that could be used for creating locally innovated technological recipes. Therefore, 6 new technological recipes were obtained, which were subjected to analysis for the gravimetric composition of the fish species used, the nutrient composition and microbiology of the locally obtained cans and their preservation over time, depending on the preservation factors that were used. The test results show that the recipes that used lemon sauce, lemon, white wine sauce, mustard sauce, as well as the recipe subsequently preserved by smoking, were most appreciated from sensory point of view. In terms of preservation, all the recipes are kept in refrigeration conditions at 0...2°C for 15 days, and the recipes subject to the smoking treatment were kept up to 30 days under optimal conditions. The cans produced were extremely appreciated by consumers due to the fact that scientific nutrition currently recommends a high use of fish products. The research was conducted with the support of a fishing company (certified natural person) under the Research/consultancy agreement entitled “Research on the study of fresh and canned fish-based food products and the influence of the nutrients on the consumers’ health in the North-Eastern Region”.

Key words: fish, scientific nutrition, health

This paper follows the comparative analysis of nutrients in canned freshwater fish (crucian carp, grass carp, tench, bighead carp and common carp) and nutrients in canned saltwater fish (herring, tuna). The objective of this experimental research was to determine the nutritive importance and preservability of some new recipes for freshwater canned fish, which represents the raw material used from the Solești stock pond (Vaslui County), in the North-East Region of Romania.

These experimental determinations highlighted the gravimetric composition of some fish species in the north-east region, focusing on the study of the biochemical composition, the content of water, proteins, fats, carbohydrates, saturated and unsaturated fatty acids, vitamin content, as well as the preservability of the canned finished products.

MATERIAL AND METHOD

We realized 6 technological recipes were created throughout this experiment, using different species of fish as basic raw material. Recipe no. 1 includes fish of the *Carassius auratus gibelio* species (Prussian carp), salt, olive oil, lemon sauce, bay

laurel leaves, white pepper, lemon slices; recipe no. 2 includes fish of the

Ctenopharygodon idellus species (silver carp or grass carp), salt, olive oil, wine sauce, bay laurel leaves, white pepper, lemon slices; recipe no. 3 – fish of the *Aristichthys nobilis* species (bighead carp), salt, olive oil, lemon sauce, white wine sauce, bay laurel leaves, white pepper; recipe no. 4 – fish of the *Hypophthalmichthys molitrix* species (silver carp), salt, sunflower oil, mustard sauce, lemon sauce, bay laurel leaves, white pepper, allspice; recipe no. 5 – fish of the *Cyprinus Carpio* species (carp), salt, sesame oil, mustard sauce, bay laurel leaves, white pepper, allspice; and recipe no. 6 – fish of the *Cyprinus Carpio* species, salt, white pepper, coriander, garlic.

The Kjeldahl method was used for the purpose of determining protein substances, the Soxhlet method for determining fats, infrared drying for determining water, calcination was used for determining ash, and liquid chromatography for the purpose of determining the content of fatty acids and vitamins.

RESULTS AND DISCUSSIONS

The comparative analysis between the nutrients in saltwater fish (herring and tuna) and those in the freshwater fish (crucian carp, grass carp, tench, bighead carp and common carp) that

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was used as raw material indicate the following aspects:

Water content in the raw material fish varied from 72% water in the *Aristichtys nobilis* species (bighead carp) and up to 79% in the *Carassius auratus* gibelio species (Prussian carp), as compared to saltwater fish where the inferior

limit was 67.8% in tuna and the superior limit was 75.8% in herring.

Carrassius auretus gibelio species (Prussian carp), 3.0% in the *Ctenopharygodon idellus* species (silver carp or grass carp), 3.5% in the *Aristichtys nobilis* species (bighead carp), and 5.5% in the *Cyprinus Carpio* species (carp).

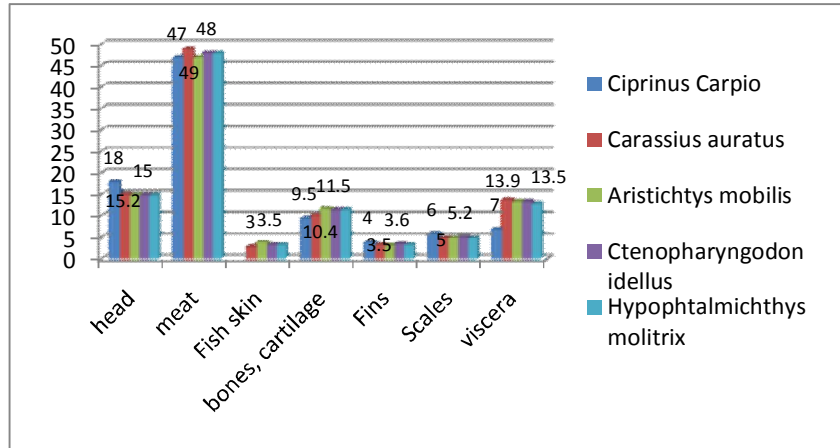


Figure 1 Gravimetric composition of species compare with weight

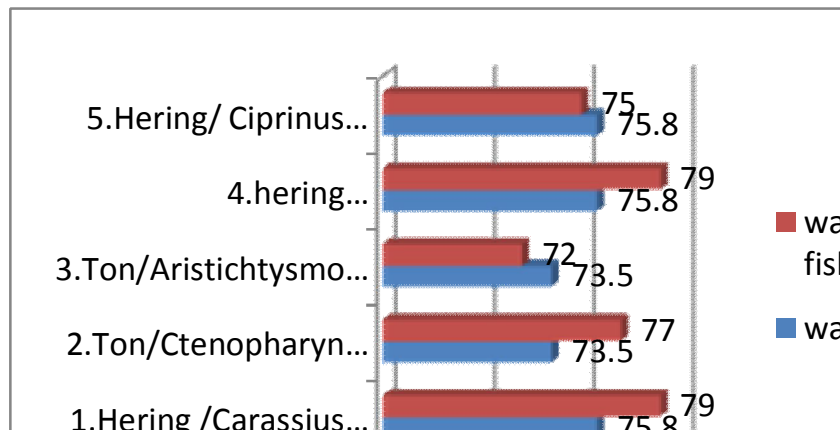


Figure 2 Comparative analysis between water of saltwater fish and freshwater fish

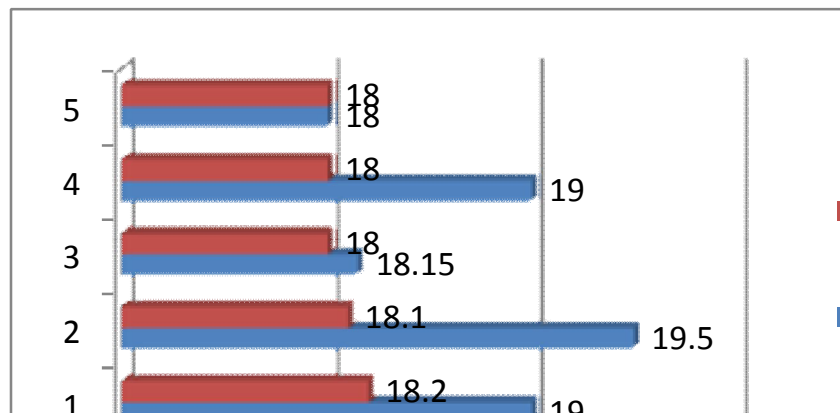


Figure 3 Comparative analysis between protein from freshwater fish and saltwater fish

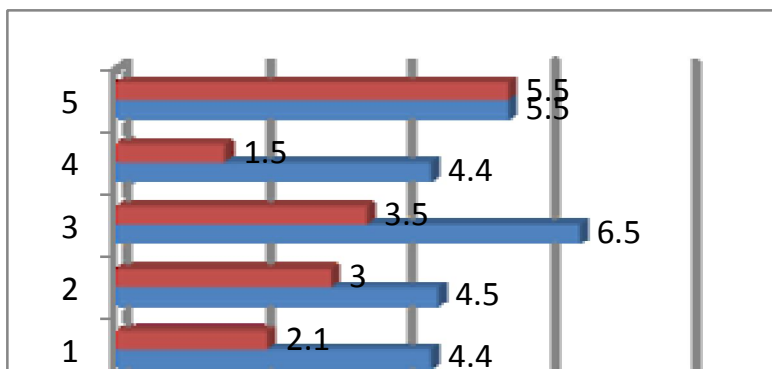


Figure 4 Comparative analysis between lipids from freshwater fish and saltwater fish

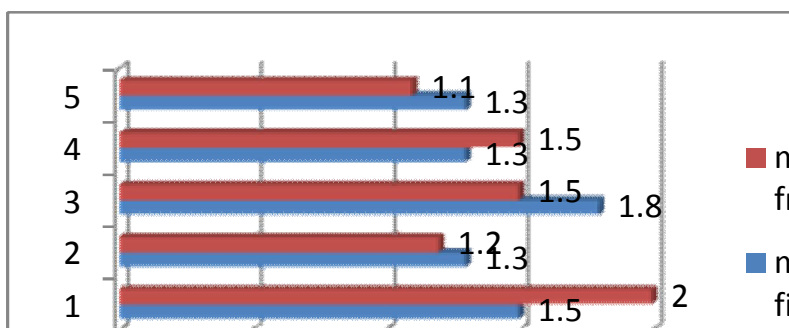


Figure 5 Comparative analysis between minerals from freshwater fish and saltwater fish

Table 1

Comparative analysis between vitamins of freshwater fish and saltwater fish conserved

Species of fish	Pro A mg		Vitamin A, mg	Vitamin B1, mg	Vitamin B2, mg			Vitamin PP, Mg		Vitamin C, mg
1.Hering /Carassius auratus	0.6	0.3	1.5	0.05	0.18	0.3	0.04	3.5		8.57
2.Ton/Ctenopharyngodon	0.55	0.29	0.1	0.15	0.09	0.33	0.04	3.9	1.1	3.5
3.Ton/Aristichtysmobilis	0.45	0.28	0.1	0.15	0.09	0.33	0.04	3.9	1.7	2.42
4.Hering /Hypoptalmichthys molitrix	0.6	0.28	1.5	0.05	0.09	0.3	0.04	3.5	1.7	4.11
5.Hering/ Ciprinus Carpio	0.6	0.34	1.5	0.05	0.1	0.3	0.15	3.5		

Table 2

Comparative analysis between cholesterol and unsaturated fatty acids of freshwater fish and saltwater fish

Species of fish	Cholesterol		C16:0		C18:0		C18:1		C20:5		C22:6	
1.Hering /Carassius auratus	69	52	1.72	0.14	0.38	0.04	2.41	0.03	0.55	0.09	0.67	0.2
2.Ton/Ctenopharyngodon	54	52	0.64	0.15	0.16	0.05	1.08	0.03	0.56	0.08	0.54	0.21
3.Ton/Aristichtysmobilis	54	52	0.64	0.17	0.16	0.06	1.08	0.04	0.56	0.09	0.64	0.21
4.Hering /Hypoptalmichthys molitrix	69	52	1.7	0.16	0.38	0.07	2.41	0.04	0.55	0.1	0.67	0.22
5.Hering/ Ciprinus Carpio	69	52	1.69	0.12	0.38	0.16	2.41	0.19	0.57	0.26	0.67	0.52

The report of gravimetric composition from freshwater fish was represented in *figure 1*. The highest level of water registered at *Carassius* 79% compared with *Aristichthys* with 72% water. The content of water influenced the preservation of recipes (*figure 2*).

The protein content expressed as a percentage varies between 18-19.5% in saltwater fish, and between 18.00-18.2% in freshwater fish (*figure 3*).

As far as the content of lipids is concerned, we noted that in saltwater fish (herring and tuna) it varied between 2.1% and 5.5%, while in the freshwater fish the lowest content of lipids was recorded for the *Hypophthalmichthys molitrix* species (silver carp), followed by 2.1% in the *Carassius auratus* (*figure 4*).

The content of minerals in saltwater fish varied between 1.3% and 1.8%, while in the case of freshwater fish we recorded the lowest contents of minerals in grass carp (1.1%), medium contents of ash in silver carp species (1.2%), while the highest contents of minerals were recorded in Prussian carp (1.5%) (*figure 5*).

Vitamins are also essential elements in the human nutrition. Therefore, checking the content of vitamins in the experimental recipes is particularly important. Although we noted lower levels of pro-vitamin A, vitamin A, and vitamins B1, B2 and PP in freshwater fish compared to saltwater fish, we added lemon sauce and lemon slices in 5 of the recipes so as to boost the level of nutrients in the finished products by means of the added quantities of vitamin C (*table 1*). Thus, we noted the highest level of vitamin C in recipe no. 1 (with 8.57 g per 100 g of finished product), followed by recipes no 5, 2, and 4.

Based on the comparative analysis of the contents of saturated, monounsaturated (cholesterol) and unsaturated fatty acids, we can state the following (*table 2*):

- the cholesterol level is lower than 52 g per 100 g of finite product in freshwater fish in comparison with saltwater fish, where tuna scored a level of 54 g/100 g and herring scored 69 g/100 g.

- the level of unsaturated fatty acids reaches the highest levels in herring and tuna (0.55–0.57

g/100 g) in comparison with freshwater fish, where these levels vary between 0.08-0.26 g/100 g in C20:5 and 0.20-0.52 g/100 g in C22:6.

The recipes were microbiologically tested after 10 days, 30 days, and 90 days. These tests indicated zero microbial alterations and checked for potential contaminations with: *Vibrio Vulnificus*, *Vibrio Parahaemolyticus*, *E. coli*, Verotoxigenic *E. coli*, Coliform Bacteria, Lyme borreliosis, *Clostridium*.

CONCLUSIONS

The results we obtained showed that all the recipes can be preserved for 90 days, at temperatures between 0-2°C, without presenting any pathogenic microbial alterations.

The recipes were improved with respect to the content of vitamin C by adding lemon and lemon sauce, without using vinegar for alimentary purposes, which is considered a good preservative. Lemon also proved to be a good preservative, that also provides significant nutritive benefits for consumers;

Another extremely significant advantage is the level of cholesterol in freshwater fish (52 g per 100 g of finished product) in comparison with saltwater fish (69 g per 100 g of finished product).

Based on the mineral content, we recommend all the preserves produced using freshwater fish.

ACKNOWLEDGMENTS

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