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SHELF LIVES OF CANNED FOOD "NATURAL PACIFIC SAURY"

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Saury fish is an important item in the realm of fishing. Products from this fish at the Russian market are being in much demand; particularly, the demand for canned goods from saury has grown because they are inexpensive and available for all strata of the population.

The canned food is produced under State standard (GOST) No. 7452–97 from fresh, cooled and frozen glazed saury that has been stored for no more than 2 months. The shelf life of such canned food is 2 years while the American and European manufacturers' analogs have generally the shelf life of five years and over [5].

The aim of this work is to substantiate shelf lives of the canned food "Natural Pacific Saury" having high quality and nutritive value.

As the object of research, a batch of canned fish produced at the Preobrazhenskaya Base of Trawling Fleet, JSC, from frozen saury fish gazed with sea water and stored for 2 months at –25°C was employed.

The canned fish quality was characterized in terms of microbiological, organoleptic, and physicochemical characteristics as well as nutritive value.

Microbiological studies were carried out pursuant to "Hygienic Requirements for Safety and Nutritive Value of Foodstuff" and methodological instructive regulations on the determination of foodstuff shelf lives.

The contents of nonprotein nitrogen and volatile base nitrogen as well as acid-degree value and peroxide number were determined according to State standard (GOST) No. 76–36–85; the amino acid composition of proteins was determined on an AAA-835 Hitachi amino analyzer; the fraction composition of lipids was studied by HPLC; the lipid fraction was analyzed by GLC on a Shimadzu 16A gas chromatograph. Parameters responsible for the variation of protein substances and lipids were determined in the dense portion, liquid (broth) and middle samples of the canned fish.

The organoleptic component was appraised by the method of rating.

The results of the microbiological studies showed that the canned food "Natural Pacific Saury" complied with the industrial sterility requirements over a period of 3.5 years.

The content of nonprotein nitrogen in the canned fish after the fabrication thereof varies from 0.16–0.23% in the dense portion, 0.32–0.38% in the middle sample up to 0.92–0.96% in the broth. After 2 years of storage, the nonprotein nitrogen content amounted to 0.37% and by the 3d year it became 0.52% (in the middle sample); in the dense portion it was 0.28% after 2 years and 0.41% after 3 years; in the broth it constituted 0.92% after 2 years and 0.98% after 3 years. When the storage time is increased by 1 year, the nonprotein nitrogen content rises by approx. 30% in the middle sample and dense portion and by 6% in the broth.

The nonprotein nitrogen accumulation by the end of 3.5 years of storage is to a greater extent characteristic for the dense and middle samples than for the broth.

The content of volatile base nitrogen after 2 years is 43 mg% in the middle sample and 48 mg% by the 3d year; 36 mg% in the dense portion and 42 mg% by the 3d year; 60 mg% in the broth and 66 mg% by the 3d year, that is, the volatile base nitrogen content increases by 10, 14 and 9%, respectively.

Some decrease in the percentage of nonprotein substances at the certain stages of the canned fish storage can be explained by the participation thereof in the formation of protein-lipid complexes.

The amino acid composition of proteins of the natural canned saury comprises a full set of nonessential and essential amino acids. A comparison by the content of essential amino acids of the "ideal" protein (scale of the FAO/WHO, 1975) and the canned fish proteins shows that 100 g of the latter contains more essential acids than 100 g of the "ideal" protein, except for valine. The limiting acids are methionine and cystine.

From among essential amino acids, one should point out a very high content of lysine in the canned fish proteins, which is 50% higher than that of the "ideal" protein, and a sufficiently high percentage of phenylalanine and tyrosine. From among nonessential acids, the predomination is observed for glutamic acid (approx. 14 g/100 g protein), asparaginic acid (approx. 9 g/100 g protein), and arginine (6 g/100 g protein).

The amino acid composition of proteins of the canned saury is stable throughout storage. Differences in the contents of essential and nonessential amino acids after 2 and 3 years have not been observed, as is consistent with data from Z.P. Shvidskaya and Yu.G. Blinov [2].

The fat acidity value in the broth after 2 years, in the middle sample and dense portion as well as in the broth is 3.5, 6.6 and 5.8, respectively; 4.5, 6.9 and 6.5 mg/g fat after 3 years. When stored over a period of 2 and 3 years, the fat acidity value in the dense portion and middle sample has a slight increment (by 4.3 and 10.8%), and in the broth the increment is more significant (by 22%), as is evidently connected with the redistribution of the oxidation products between the dense and liquid portions of the canned fish.

Thus, in process of maturation and storage of the canned fish the acid-degree value of lipids grows in the dense portion, middle sample, and broth. These data are correlated with those from literature wherein the conclusion is drawn regarding the variation in the fat acidity value when stored, which has a linear character and is associated with the oxidation of lipids [4].

The alteration in the peroxide number of lipids of the canned fish has a multiextremal character, and after 2 years of storage the peroxide number has a minimal quantity of 0.001 as well as after 3 years, as is in agreement with data from N.A. Fonarev [1].

The fraction composition comprised of lipids, monoglycerides, diglycerides, sterols, free fatty acids, and triglycerides remains practically unchanged in the course of 2 year storage and persists when stored up to 3.5 years. In this case, the percentage of free fatty acids has a tendency to rise, which may be indicative of the influence thereof upon the organoleptic properties of the canned fish.

The canned fish quality was evaluated from the fatty-acid composition of lipids. The total content of diene acids is not in excess of 4.0%, that of triene acids – 2.5%, tetraene acids – 5.94%, pentaene acids – 5.28%, and essential acids – 4.95%.

In natural canned saury fish when stored during 2 years there are observed no significant variations in the fatty-acid composition of lipids. The content of essential fatty acids changes to a little degree. When the natural canned fish is further stored for 3.5 years, no variations in the fatty-acid composition of lipids are observed.

The composition and ratio of fatty acids of the canned fish lipids in the course of 3 year storage do not practically change and remain the same as for 2 year storage. These data are consistent with the literature ones [4].

The organoleptic properties of the canned saury fish in process of storage were evaluated by the method of rating. The coefficients of significance were determined by the method of expert estimations using the literature recommendations available.

The canned fish fabricated one month ago was evaluated by experts to have 4.5 points; however, some samples had still a taste of an unripened product. When stored for 36 months, the canned fish is evaluated to have 4.9–5.0 points.

The organoleptic assessments of the canned fish stored for 2 and 3 years coincide, according to tasters' data.

In summary, the author has shown that characteristics responsible for quality and safety of the canned fish (microbiological studies) had no considerable changes throughout tests.

The storage times of the canned food "Natural Pacific Saury" are substantiated to be 3 years inclusive at 0°C up to 20°C with a relative humidity below 75%. On the basis of data obtained, technical documentation has been elaborated (TU 9271–118-00472124 and technological instruction thereto).

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LIPIDS AND FATTY ACIDS IN PELAGIC ARCTIC AND SUB-ARCTIC FOOD WEBS (*CALANUS GLACIALIS*, *LEPTOCLINUS MACULATUS*)

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The White Sea is considered as sub-Arctic sea with Arctic flora and fauna. In the era of rapid climate change, the life cycle and adaptations of White sea hydrobionts such as *Calanus glacialis*, fishes from family Stichaedaied – *Leptoclinus maculatus*, *Lupmpenus fabricii* – remains largely unstudied compare to same species from high Arctic region (such as, Svalbard). *Calanus glacialis, Leptoclinus maculatus, Lumpenus fabricii* and economically valuable White sea herring are associated together in food web in the White sea. *Calanus glacialis* – one of the most important Arctic species in the White Sea. Fishes feeding on *Calanus* ssp. diet in Arctic and sub-Arctic ecosystems store a lot amounts of lipids from zooplankton diet during short summer productivity season. Lipids are very important for Arctic and sub-Arctic organisms. Storage of high amount of lipids, specific phospholipids and fatty acids profile might be considered as distinctive characteristics of high Arctic and sub-Arctic aquatic organisms. *Calanus glacialis* – one of the most important Arctic species in the White Sea and provide fishes fed on Calanus diet by lipids, essential fatty acids and specific fatty acids which in fish metabolized to needful fatty acids. Trophic relationships in pelagic sub-Arctic food webs (the White Sea): lipid distribution, transformation and dynamics in food web "phytoplankton – zooplankton (*Calanus glacialis*) – planktivorous fish (*Leptoclinus maculatus*) – economical value fish (White Sea herring)" is a main aim of research work kept in Institute of biology KarRC RAS.

Using classic lipid detection methods such as TLC, LC and GC we determined lipid classes, phospholipids and fatty acids staff in *Calanus glacialis*, *Leptoclinus maculatus*, *Lumpenus fabricii* and White Sea herring caught from the White Sea seasonally. Lab obtained data are under discussion notable that new results renew "history" of White Sea herring and collect new data about source, distribution and transformation of lipid components in White Sea food chain (*Calanus glacialis – Leptoclinus maculatus, Lumpenus fabricii – White Sea herring*).

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COMPARATIVE ANALYSIS OF FATTY ACID COMPOSITION IN FORMULA FEEDS OF DIFFERENT TRADEMARKS USED IN RAINBOW TROUT CULTURE

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Successful application of formula feeds depends on the production process biotechnology, feedstock composition, and the ratio initial components. Analysis of the feed fatty acid composition helps evaluate its