



***9 LIVES GROUP***

*«A cat has nine lives»*

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# **PROJECT PROPOSAL**

**for scientific-and-research, technologic  
and economic cooperation**

*”Technology for production of an analogue of  
sturgeon and salmon roe with capsular structure on  
the basis of sodium alginate*



**"ANALOGUE OF STURGEON AND SALMON ROE"**

ABSTRACT

<b>1</b>	<b><i>Background of research</i></b>	<p>The technical result consists in production of an analogue of sturgeon and salmon caviar, with such analogue being as similar as possible to natural caviar in view of its organoleptical and structurally-mechanical characteristics as well as technological properties, quality and safety indicators.</p>
<b>2</b>	<b><i>Problem description</i></b>	<p>The precondition is the worldwide trend to essential decrease in yield and stock of sturgeon and salmon fishes. The problems of safety, production, shortages and high cost of natural caviar (especially sturgeon) have caused substantially total disappearance of these products from retail trade network and culinary assortments of restaurants and hotels, which predetermines the urgency of the represented project proposal.</p>
<b>3</b>	<b><i>Solution</i></b>	<p>Production of an analogue of salmon and sturgeon caviar having spherical ova each being of 1.5 to 6.5 mm in diameter and consisting of membrane and inner contents. By their structure, such ova represent capsules characterized in the presence of fluid or viscous inner contents and covered from outside by elastic, thermostable gel-like membranes. This project proposal is offered for food and/or fish-processing industry enterprises as well as restaurants and hotels.</p>
<b>4</b>	<b><i>Market opportunities</i></b>	<p>Sale to final consumer through wholesale-retail networks, restaurants and hotels; prefabricated products for preparation of culinary dishes and products. The expected market volume in EU countries will amount 1,000 to 1,500 tons of finished products annually.</p>
<b>5</b>	<b><i>Competitive advantage</i></b>	<p>The high level of competitive advantage is achieved due to:</p> <ul style="list-style-type: none"><li>-high nutritional qualities accompanied with respective organoleptic properties of natural caviar;</li><li>-structural-and-mechanical properties peculiar to natural caviar, namely capsular structure;</li><li>-low cost price due to use of available raw materials and simplified technological processes;</li><li>-thermal stability which allows pasteurization and - as the result – assures extended storage periods.</li></ul>

<b>6</b>	<b>Research team</b>	<p><i>Leading experts and process engineers possessing academic degrees and long-term experience took part in the development of this technology. The head of the scientific team is a doctor of engineering, professor of the Feeding Technology Subdepartment of the State University for Food and Trade, academician of the International Academy of Refrigeration, chief scientific consultancy expert in the field of analogue food technologies, author of 336 scientific works (including 11 monographs and textbooks, 64 patents and copyright certificates of the CIS and foreign countries.)</i></p>
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**TECHNOLOGY DESCRIPTION**

Short title:	<b>"ANALOGUE OF STURGEON AND SALMON ROE"</b>
Full title:	“Technology for production of an analogue of sturgeon and salmon roe with capsular structure on the basis of sodium alginate“.
Main problem to be solved with this technology:	<p>The precondition for development of a caviar analogue was the worldwide trend to essential decrease in commercial stock of sturgeon and salmon fishes due to the influence of anthropogenous factors, violation of conditions of fish reproduction and/or feeding, irrational economic activities, and deterioration in ecological conditions.</p> <p>The urgency of the represented technology is also predetermined by the currently existing problems of (especially sturgeon) natural caviar’s sanitary-and-hygienic safety, production, shortages and high cost, which has caused substantially total disappearance of these products from both retail trading networks and restaurants’ culinary assortments.</p>
Primary objective of the technology introduction	<p>The technical result of this technology is a ready-to-eat delicacy, that is an analogue of sturgeon and salmon caviar, with such analogue being as similar as possible to natural caviar in view of its organoleptical and structurally-mechanical characteristics as well as technological properties, safety, and storage stability. The final product according to this technology is characterized in capsular structure, high thermal stability (which allows it to be heat-treated), high microbiological stability, and extended storage periods. The product is characterized in high nutritional qualities, respective organoleptical and structural-and-mechanical properties</p>

	<p>peculiar to natural caviar as well as low cost price (due to use of available raw materials and simplified technological processes).</p>
<p>Brief description of technology/ product:</p>	<p>The main steps of the caviar analogue production technology are as follows:</p> <ul style="list-style-type: none"> <li>-mechanical culinary preparation and transformation of formulation components participating in a product structure formation into soluble phase at reasonable concentrations and structural-and-mechanical properties of solutions; preparation on their basis of compounds that simulate taste, color and odor peculiar to caviar;</li> <li>-extrusion-type introduction of inner contents of capsules into a medium that forms a membrane;</li> <li>-formation of capsules;</li> <li>-carrying-out of additional technological operations that are necessary to confer natural caviar's properties to the product;</li> <li>-intermixing with binding substance; adding fish oils and vitamins;</li> <li>-heat treatment of capsules at a reasonable temperature and over a certain period that assure production of a stable product;</li> <li>-multiple-unit packaging, labeling/marketing, expedition, and storage;</li> </ul> <p>In accordance with colors peculiar to various natural sturgeon and salmon caviars, the caviar analogue's color varies in wide range from light-gray to dark-gray or black or from light-orange to red.</p> <p>An ovum may be spherical in form, 1.5 to 6.5 mm in diameter and include membrane and inner contents. By its structure, such product consists of capsules characterized in the presence of fluid or viscous inner contents and covered by elastic gel-like membranes made of calcium alginate. The ova's inner contents include a viscous colloidal system, thickening agent selected from hydrocolloids, coloring agent, and preservatives (if needed).</p>
<p>Status of the technological project design</p>	<p><b>The technology is hundred-per-cent worked out</b> and ready for commercial introduction.</p>
<p>Innovative element(s) of the technology proposed:</p>	<p>This project proposal's innovations fall into both Type I ("<i>Product Innovation</i>") and Type II ("<i>Process Innovation</i>") innovations.</p> <p>The innovativeness of this project proposal consists in working-out of a fundamentally new (as compared to existing technologies) way of production of sturgeon and salmon caviar analogues.</p>

	<p>Implementation of this technology is founded on fundamental research results and development of new capsulation methods based on ionotropic gelatinization principles, which allows the following to be introduced into production:</p> <ol style="list-style-type: none"> <li>1. Production of new food analogues characterized in high biological value, i.e. sturgeon and salmon caviar analogues (Type I innovation: "Food Innovation". Introduction of fundamentally new products. Subtype 'I-a': "Radical Innovation").</li> <li>2. Improvement of processes of food analogues production; preservation of food value indicators' values; enhancement of raw materials processing efficiency accompanied by decrease in material costs and power consumption (Type II innovations - "Process Innovation:" introduction of essentially new technology or product manufacture methods).</li> </ol>
	<p>Today, designers expand capsulation principles for:</p> <ol style="list-style-type: none"> <li>1. Obtaining new food forms of traditional products (e.g. ketchups, sauces, mayonnaises, mustard, jams, honey, milk, juices, etc.) in thermostable capsules for the purpose of their further use as flavor fillers in a number of products, such as sausages, cheeses, yoghurts and others.</li> <li>2. Production of capsular forms with immobilized microorganisms (e.g. probiotics, bifidus bacteria, etc.), living cells, and medications.</li> <li>3. Creation of capsules for delivery of required medicinal components to target organs (e.g. pancreas, small intestine, large intestine, etc.).</li> </ol>
<p>Is the proposed technology expected to substitute for some other technology?</p>	<p>The proposed ready-for-introduction technology is an essentially new one in view of its technological process and finished products' properties. It allows a caviar analogue being as similar as possible to natural sturgeon and salmon caviar to be produced. Also, it can successfully substitute for field-specific conventional analogue fish food production technologies in the food technologies market.</p>

**INTELLECTUAL PROPERTY**

	<p>The head (prof.) of the research team is the patent holder. The status of the patents is "national" and "international".</p>
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## MARKET

Commercial status of technology/product:	<ol style="list-style-type: none"><li>1.1 Fish product processing industry.</li><li>1.2 Fish canning industry.</li><li>1.3 Restaurants and hotels.</li> <li>2.1 Pharmaceutical industry.</li><li>2.2 Medicine, public health services.</li><li>2.3 General and technical microbiology.</li></ol>
Expected potential earnings from commercialization of the finished technology/product:	<p>The proposed technology is supposed to bring potential profits due to its possible commercialization in some related fields, such as:</p> <ol style="list-style-type: none"><li>1. Medical industry.</li><li>2. Pharmaceutical industry.</li><li>3. Food-and-flavors field of science.</li><li>4. General and technical microbiology.</li><li>5. Other related fields.</li></ol>

## INTERNATIONAL COOPERATION

Expected cooperation results:	<p>This technology is characterized in high-degree knowledge content and innovativeness, which is a good background for obtaining successful financial and social-and-economic results from its introduction.</p>
In which forms will the research cooperation results be represented?	<ol style="list-style-type: none"><li>a) <b>in the form of ready-for-introduction technology;</b></li><li>b) <b>in the form of ready-for-commercialization product;</b></li><li>c) <b>other: in the form of scientific reports and papers.</b></li></ol>

## RESEARCH PROJECT TEAM

*Leading experts and process engineers possessing academic degrees and long-term experience took part in the development of this technology. The head of the scientific team is a doctor of engineering, professor of the Feeding Technology Subdepartment of the State University for Food and Trade, academician of the International Academy of Refrigeration, chief scientific consultancy expert in the field of analogue food technologies, author of 336 scientific works (including 11 monographs and textbooks, 64 patents and copyright certificates of the CIS and foreign countries.)*