

Kashutin A.N., Kashutina I.A.

**SOIL MIGRATION OF MARINE SEDIMENTS IN THE LITTORAL OF AVACHA BAY
(SOUTH-EASTERN KAMCHATKA) UNDER THE INFLUENCE OF
HYDRODYNAMIC WATER CURRENTS AS ONE OF THE FACTORS OF
INTERSEASONAL CHANGES IN THE AREA OF BROWN ALGAE FUCUS
DISTICHUS SUBSP. EVANESCENS**

Abstract. This article presents the results of the transfer of marine sediments and the features of their circulation, under the influence of hydrodynamic water currents in the littoral zone of Avacha Bay, which are one of the important factors of interseasonal changes in the area of the brown algae *F. distichus* subsp. *evanescens*. The work is based on experimental studies conducted by the authors in 2016-2022 in two areas of the bay – Seroglazka bay and Zavoyko bay. The total length of the off-season study of the dynamics of sedimentation in the middle and lower horizons of the littoral was 11.25 km. In the studied bays, the seashores have a complex kaleidoscope in terms of granulometric composition. The material collected during the field work made it possible to identify the most characteristic features of individual sections of the littoral and to determine their regional and typological features. Unsuitable substrates, with a length of about 4.05 km, for the spread of fucus, were silt and sand with different particle size modules. Multiple redeposition of clastic material in the littoral is clearly visible on the open coast of Seroglazka Bay, where the boundaries of sedimentation are very clearly demarcated: (I) – silt; (II) – accumulation of coarse-grained sand-gravel-pebble sediments; (III) – coastal strip of coarse-grained sand. Significant sand displacements Вестник Керченского государственного морского технологического университета. 2023. № 1 Биологические науки 9 are noted on the coastal strip of Zavoyko Bay, which contributes not only to changes in the coastline, but also to the absence of *F. distichus* brown algae.

Keywords: Avacha Bay, middle and lower littoral horizons, hydrodynamic impact, substrates, soil movement, *Fucus distichus* subsp. *evanescens*.

Kulish A.V., Kibenko V.A., Turkulova V.N.

**PROSPECTS FOR CREATING A COASTAL INDUSTRIAL-SCALE FACILITY FOR
COMMERCIAL CULTIVATION OF VALUABLE AQUACULTURE TARGET
SPECIES (STURGEONS, SALMONIDS) USING SEAWATER IN THE CONTEXT OF
THE NORTHWESTERN REGION OF THE REPUBLIC OF CRIMEA**

Abstract. This work presents the analysis of the historical and current literature, as well as of the data collected through research and practice, pertaining to the main trends in the development of industrial-scale aquaculture elucidating the world's and domestic experience of fish cultivation; it also addresses ecological, biological and cultivational characteristics of the valuable anadromous fish species-sturgeons, their hybrid forms, and salmonids and the prospects for their use in the commercial mariculture, namely in the fish farms operating on seawater; the physiographic, oceanographic and hydrochemical conditions, as well as ecological and toxicological status of the Kerch Strait providing the water for the coastal facility are also elucidated. The technology and practice of the commercial cultivation of bester beluga and sterlet hybrid and rainbow trout from externally supplied stocking material to a marketable product in a recirculating aquaculture system ensuring controlled aquatic environment is briefly described. Estimated capacity for a coastal fish farm using the Kerch Strait as a water source is identified, along with the recommendations for its construction and arrangement.

Keywords: industrial-scale facility, seawater, commercial aquaculture, bester, rainbow trout, estimated capacity, technological process, feeding, production, profitability.

Vyngra A.N.

DETERMINATION OF PROBLEMS OF SUSTAINABLE DEVELOPMENT OF COASTAL TERRITORIES OF THE REPUBLIC OF CRIMEA

Abstract. Coastal areas are characterized as extremely sensitive to anthropogenic impacts of the territory. The Republic of Crimea is washed by two seas and has a long coastline, so it is important to develop an integrated approach to managing coastal areas. This article discusses the main principles of sustainable development of coastal regions, which are disclosed in the European Code of Conduct for Coastal Zones and the Model Law on sustainable coastal zone management. This article identifies the problems of using the coastal territories of the Republic of Crimea in various areas of activity and considers ways to solve them. The work of ports, recreational, fishery and other activities increase anthropogenic pressure on the water protection zone. The proposed activities will help reduce the negative impact and preserve coastal areas for further long-term use.

Keywords: Coastal territories, Republic of Crimea, legislation, integrated management, sustainable development, water protection zone.

Sytnik N.A.

NATURAL AND CLIMATIC CHARACTERISTICS OF THE LOCATION OF THE KERCH STRAIT CROSSING

Abstract. The article considers the natural and climatic conditions of the Kerch Strait, the Taman Peninsula and the Kerch Peninsula through which passes the transport crossing that connects the Republic of Crimea with the Russian mainland. The paper presents data on average annual temperatures, intensity of precipitation, directions, frequency and speed of winds in the areas under consideration – as factors of dispersion of pollutants entering the atmospheric air from vehicles, due to the operation of the Crimean bridge. The article contains hydrological and hydrochemical characteristics of the Kerch Strait, and also data on engineering-geological, hydrogeological conditions of the area, and also relief, soils, flora and fauna in the area of location of the transport passage. As a result of these studies, it was determined that the area where the crossing is located is subject to dangerous meteorological phenomena, such as storm winds, ice piles on the bridge supports, fog and heavy precipitation, thunderstorms and tornados, which can hinder the operation of the bridge crossing. The data presented in the work can be the basis for the assessment of the current state of the environment within the environmental project support and the subsequent ice and hydrometeorological monitoring in the area of the Crimean bridge.

Keywords: transport crossing, Kerch Strait, Taman Peninsula, Kerch Peninsula, natural and climatic conditions, dangerous meteorological phenomena.

Ivanovskaya A.V.

PRINCIPLES OF MODELING THE DRIVE OF SHIP LIFTING EQUIPMENT

Abstract. The paper considers another principle of modeling the drive of a ship's lifting device. A feature of the operation of such a drive is the movement in different media: air, water and at their interface. Also, the dynamic processes occurring in the system are significantly affected by external hydrometeorological factors and unsteady loading. All this leads to difficulties in predicting the behavior of the elements of the system. Therefore, it is proposed to consider the drive as a multi-body system consisting of interconnected solid and deformable bodies experiencing various translational and rotational displacements. The configuration of such a system is determined by a set of variables called generalized coordinates that completely determine the location and orientation of each body in the system. The configuration of a particle in space is determined using three coordinates that describe the movement of this particle relative to the three axes of the inertial frame of reference. This method will increase the number of degrees of freedom when formalizing the drive elements, which is relevant in the development of an automated control

system for the drive of ship lifting devices.

Keywords: lifting device drive, multibody system, generalized coordinates.

Konyukov V.L.

ESTIMATION OF THE RANGE OF PERMISSIBLE LOADS OF A MARINE FOUR-STROKE DIESEL ENGINE BASED ON THERMAL CALCULATIONS

Abstract. Based on the computational and theoretical studies of the ship's four-stroke diesel engine, a series of restrictive characteristics were obtained that exclude its mechanical and thermal overload. The studies were carried out in a wide range of loads for a series of screw characteristics with different weighting coefficients. The obtained restrictive characteristics were examined for compliance with the assigned restrictive characteristics included in the diesel operating instructions. The most consistent were the restrictive characteristics constructed according to the permissible maximum combustion temperature of the fuel and the permissible temperature at the end of the expansion of the working fluid in the cylinder. Based on these characteristics, as a result of the expansion in rotation frequency, a zone of operating modes limited in load and operating time is formed. Based on the results of comparing the obtained and assigned restrictive characteristics, it is assumed that the restrictive characteristics given in the diesel operating instructions are obtained based on the thermal state of the exhaust valve, which corresponds to the gas temperatures at the end of the expansion process in the cylinder.

Keywords: diesel, load, screw characteristic, restrictive characteristic, thermal stress, mechanical stress.

Turneev V.R., Bogatyreva E.V.

WATER HAMMER AND CAVITATION AS COMPONENTS OF COMPLEX BALLAST WATER TREATMENT

Abstract. In the field of modernity, all the maritime powers of the World community for the control of ballast water operations over the past three decades have been constantly improving the legislative framework for the protection of their marine economic zone from invasive living creatures in the ballast waters of ships. The quality of ballast water must fully meet the stringent requirements of Regulation D-2 of the Ballast Water Management Convention. Shipowners are faced with the task of re-equipping sea vessels in order to install the latest innovative ballast water management systems that would meet IMO requirements, which is an expensive procedure. The article presents a comparative characteristic of the mechanical methods of ballast water preparation during complex disinfection. The article describes such phenomena as water hammer and cavitation. As a result, the assessment of the possibility of their use in the complex disinfection of ballast water in ship conditions is given, the tasks of further research are outlined.

Keywords: water hammer, cavitation, ballast water, biological invasions, disinfection of ballast water.

Titov I.L., Osipova M. A., Frolova S. N.

THE CONTROLLING OF GAS DIESEL GENERATING SETS USING FUZZY CONTROLLER

Abstract. The paper considers the controlling of gas diesel generating sets using fuzzy controller named proportional-integral-differential controller (PID controller) and its clear definition is given. The profound investigations of supplemental devices application necessity which regulate the PID controller operation are performed. The paper presents the analysis of gas diesel generator operation means with the use of a fuzzy controller making an actuating signal composed of the sum of three summands. It is defined that due to abrupt changes of the object operation mode over which the controlling is carried out or while transmitting of the given object to the alternative mode

of operation the quality of transmitting process in the system with the PID controller can be unsatisfied. Therefore, the need for using supplemental devices to correct the operation of the PID controller arises. It is proved that the technology of fuzzy logic can be used in the gas diesel generator (GDG) rotation frequency control system.

Keywords: PID controller, gas diesel generating set, automatic control systems, Matlab, fuzzification unit, fuzzy logic controller.

Ovsiyannikov V.Yu., Antipov S.T., Panfilov V.A.

DESIGNING THE APPLIANCES OF THE FUTURE OF FOOD TECHNOLOGY: A CONCEPTUAL BASIS

Abstract. In this article, on the basis of a set of requirements for modern devices, technological processes that directly ensure the transformation of the technological environment into a finished food product are analyzed. The existing technological and design problems characteristic of installations that carry out complex energy effects on food semi-finished products, as well as measures to eliminate them, are indicated. The proposed principle of idealization of the technological process of processing technological raw materials and apparatus makes it possible to create prerequisites for a directed impact on the technological, technical and constructive characteristics of technological equipment in order to improve it. It is shown that the development of food production apparatus designs is inextricably linked with the mutual adaptation of the technological properties of the media processed in them and the technical features of installations designed to conduct heat and mass transfer processes.

Keywords: food technology, ideal apparatus, development of structures, mass transfer, heat and mass transfer processes.

Prokopenko I.A., Yashonkov A.A.

TECHNOLOGY IMPROVEMENT RESTRUCTURED HAM PRODUCTS FROM POULTRY MEAT

Abstract. The paper analyses and presents the results of experimental studies to determine the feasibility of an innovative technology for the production of restructured poultry meat products. High hydrostatic pressure treatment of food products is used in many foreign countries. In Russia scientists conduct experimental research on automated high-pressure units (AHPU). Literature sources were analysed, on the basis of which it was decided to study static and cyclic high pressure treatment modes in order to obtain finished products. The technological process was carried out at 700 MPa during 45 minutes, the control sample was a boiled ham. In this work we studied the change in organoleptic indicators, paying special attention to the consistency, the type of minced meat on the cut, taste and aroma of meat products. At the second stage of research determined the change in structural and mechanical properties of the new products. The most rational mode of high pressure processing for the manufacture of restructured meat products was proposed.

Keywords: high hydrostatic pressure, ham, poultry meat.

Fomenko E.V., Zaporozhec E.Yu., Rudenko M.F., Aleksanian I.Yu., Andreeva E.V.,
Nugmanov A.H.-H.

THERMOPHYSICAL AND STRUCTURAL PARAMETERS OF THE ECTOCARPUS

Abstract. The most widely used biopolymers in the food industry are polysaccharides, such as sodium alginate. In the Caspian basin, among the species of brown algae rich in alginates, one can classify the family of Ectocarpus. Sodium alginate typically uses pre-dried algal raw materials, but of all food production processes, dehydration is the most energy-intensive procedure. The final result of the operation of drying algal raw materials is the production of material with the best biological value, as well as the best parameters for its preservation. Determination of rational

regime indicators of moisture removal from algae is based on the description of the transfer of thermal energy and mass, the forms of moisture-dry residue bonding, on the physicochemical and other parameters of materials at individual stages of the recommended technology. In this regard, the purpose of the study for the correct conduct of thermal calculations was the determination of the thermophysical and structural-mechanical characteristics of the ectocarpus. To carry out calculation procedures in the design of thermal processes and equipment for dehydration, the thermophysical parameters and physical density of algal raw materials are theoretically and experimentally determined within certain limits of varying the humidity of the dehumidification object, its temperature and coolant parameters, which determine the choice of rational mode parameters for drying the indicated algae.

Keywords: Brown algae, ectocarpus, alginates, thermophysical characteristics, density, drying, heat transfer coefficient.

A. I. Klyuchnikov, B. N. Fedorenko, S. T. Antipov, V. A. Panfilov

FUNDAMENTAL CREATION CONCEPTS FOR FOOD TECHNOLOGIES BIOREACTORS CONSTRUCTIONS OF THE FUTURE

Abstract. The article is devoted to some aspects concerning the creation of equipment for the biotechnology of the future within the context of the agro-industrial complex of Russia. The focus is on the idealization of the constructed object that shows the necessary trends in the development of real technique. The range of issues discussed includes: model of an ideal bioreactor; specifics of biosynthesis processes; specifics of biocatalysis processes; requirements for an ideal bioreactor; problems hindering the implementation of a bioreactor which is close to the ideal one; issues of mutual adaptation of technological properties of food media and bioreactors designs. Particular attention is paid to the dialectical complication of bioreactor designs.

Keywords: ideal bioreactor, biosynthesis processes, requirements for the design of bioreactors, adaptation processes in biotechnology.

Ganieva A.K.

UPDATING PROGRAMS FOR DIAGNOSTICS AND PREVENTION OF PROFESSIONAL BURNOUT OF PERSONNEL

Abstract. The article summarizes the concept of professional burnout, reveals its essence and stages, highlights symptoms, including emotional, physical, intellectual, behavioral, social. The factors causing the occurrence of professional burnout syndrome at work, which are classified as external and internal, have been identified. Methods of diagnostics and prevention of professional burnout of employees are presented, they include empirical, diagnostic, expert evaluation, quantitative and qualitative data processing. The directions of the development of a program for the diagnosis and prevention of professional burnout of employees are proposed, which provides for a system of principles of its structure and implementation; actual goals and program tasks; information of theoretical and applied content; possible effects and dynamics of approaching them; criteria for the effectiveness of expected results. It is proved that one of the key methods of prevention of professional burnout is the creation of a system of personal and managerial efficiency, which are characterized by a positive attitude to oneself, optimal professional development, self-actualization of the individual.

Keywords: professional burnout, stress, symptoms, diagnostic methods, burnout prevention program, staff.

Evsyukova T.G.

APPROACHES TO UNDERSTANDING THE NETWORK INTERACTION OF ECONOMIC AGENTS

Abstract. The article considers network interaction as a fundamentally new form of interaction between economic agents, based on the transformation of the economy and the transition to a new technological order. The degree of study of the issue of a new integration form - "network interaction", and various approaches to the interpretation of this term are determined. A monographic analysis of various approaches to understanding network interaction is presented, the main directions of the development of the term are highlighted. The institutional aspects that cause the emergence of a new form of interconnection between economic actors are studied. As a result, the basic principles of network interaction are defined and presented. The role of the digital transformation of the economy and the transition to a new technological order in economic relations are determined. The main provisions of the difference between the digital form of interaction and the traditional one within the framework of the network approach are presented. A scheme for calculating the coefficient of modernization for determining potential participants in network interaction is proposed.

Keywords: network interaction, institutions, economic agents, actors, organizational system.

Kvasko M.A.

STATE AND ASSESSMENT OF FUTURE DEVELOPMENT OF URBAN AGGLOMERATIONS IN THE RUSSIAN FEDERATION

Abstract. The paper considers features of the spatial development of urban agglomerations. The purpose of the study is to analyze the current development of urban agglomerations in the Russian Federation, as well as the subsequent assessment of their impact on regional socio-economic complexes. The paper identifies the factors that have a stimulating and constraining effect on the development of urban agglomerations. A retrospective analysis of the formation of urban agglomerations in the Russian Federation and its subjects was conducted. The estimation of the most significant urban agglomerations from the position of economic and social development of the Russian Federation. It was found that the development of urban agglomerations as a form of spatial organization directly depends on the approved and/or require the development of spatial planning schemes. It is the approved spatial planning schemes for remote territories at the level of normative-legislative acts of the Russian Federation and its subjects will allow to form a coherent and effective system of regional development.

Keywords: urban agglomeration, development, factor, effect, remote areas.

Kotenev A.D., Zhikrivetskaya Yu.V., Kryjevsкая N.N.

THE STANDARD OF LIVING OF THE POPULATION AS A FACTOR IN ENSURING THE ECONOMIC SECURITY OF THE STATE

Abstract. The issues of falling living standards of the population in modern conditions are among the most urgent, caused both by general economic problems and by the peculiarities of the development of individual regions. The complexity and heterogeneity of the causes require the development of heterogeneous solutions that have a complex scientifically substantiated character. The authors noted the relationship between the living standards of the population and economic security, which have similar socio-economic imperatives. The duality of the reasons, due to both economic and psychological components, does not allow the use of measures of state influence, due to their universality and isolation from regional characteristics. The authors focus on the need to rethink the stated issues from the standpoint of motivational principles, as well as taking into account the cost of labor, taking into account modern realities. The results of the study revealed a number of key points that allow an adequate assessment of the relationship between the standard

of living of the population and its impact on the economic security of the state as a whole.
Keywords: standard of living, poverty, economic security, poverty, labor productivity, government support.

Mnatsakanyan A.G., Kharin A.G.

A STUDY OF THE PRICE AVAILABILITY OF FISH PRODUCTS IN THE KALININGRAD REGION

Abstract. Food prices have a strong impact on food availability and therefore are a critical element of food security. The purpose of the paper is to study the patterns and features of price changes for one of the basic groups of food products – fish products. These goods should objectively occupy a significant place in the diet of residents of the coastal region of Russia - the Kaliningrad region. To do this, a short-term component is distinguished in the dynamics of retail prices for fish products. Following the provisions of the classical concept of food security, we consider this component as a destabilizing factor. The results of our study allow us to evaluate one of the components of food security - the economic availability of fish products for the inhabitants of the region, serve to explain the reasons that affect this parameter, and can become the basis for the development of appropriate compensatory measures.

Keywords: fish products, prices, volatility, availability, food security.

Ostrik V.Yu., Sukhomlin I.A.

STRATEGIC MODELING OF MODERN HR MANAGEMENT SYSTEMS IN ORGANIZATIONS

Abstract. An overview of the main models of personnel management at the present stage, identifies the main requirements for modern personnel management systems, taking into account digital transformations of socio-economic processes are presented in the article. The main stages of building an effective model of strategic management of the organization's personnel, as well as the necessary professional digital competencies that form the effective use of human resources in the organization are highlighted. The results of a study on the introduction and use of digital tools in management, taking into account the impact of the use of human resources on organizational results are given. Specific recommendations for the implementation of directions for modeling personnel management systems for enterprises are given. The development prospects and threats in domestic personnel and management systems, taking into account the needs of the external environment and modern personnel technologies are summarized.

Keywords: human resources, modeling, system, personnel, organization, strategy.

Plotnikova V.V., Garmashova E.P.

STATISTICAL ANALYSIS OF CONSUMER SPENDING IN SEVASTOPOL

Abstract. This article is devoted to the statistical analysis of consumer spending in Sevastopol. The level of spending of the population largely determines the quality of life and affects the structure of demand. In this regard, it is important to analyze and evaluate the composition and structure of household consumer spending by groups of food and non-food goods and services in modern conditions, as well as to identify key factors affecting the level and structure of expenditures of the population of the Sevastopol region. The authors gave a clear-cut presentation of the average per capita monetary expenditures of the population in comparison with income, the composition and structure of household final consumption expenditures, the composition and dynamics of consumer spending in the context of urban and rural population of Sevastopol. Based on the results of the analysis, the main factors influencing the level of household spending were formulated.

Keywords: composition and structure of expenditures, households, average per capita income,

average per capita expenditures, consumer price index, rural population, urban population.

Rysina V.A.

APPLICATION OF DIGITAL TECHNOLOGIES IN ACCOUNTING

Abstract. The article considers the main directions of application of digital technologies in the field of accounting for the purpose of its effective management. The characteristics of cloud services and online accounting services developed in the Russian Federation are given. The advantages and disadvantages of blockchain technology for accounting and financial reporting are revealed. The main capabilities of two types of robotic solutions, such as RPA (Robotic Process Automation) and IA (Intelligent Automation), used to automate routine accounting operations, are studied. The “digital twin” technology is considered, which allows creating virtual models of a physical object or process to automate the process of compiling primary documents, maintaining operational records and conducting asset inventories. The scheme of information support of accounting with the use of digital technologies is constructed, with the help of which a single information space is formed that meets the needs of various users.

Keywords: digital technologies, digitalization, blockchain, robotics, chatbot, artificial intelligence.

Skorobogatova V.V., Mukovina T.V.

ART MARKETING AS ONE OF THE DIRECTIONS OF SALES PROMOTION OF ART BUSINESS PRODUCTS

Abstract. This article discusses the concept of art marketing as one of the main directions of stimulating the sale of products of domestic and global art business. The analysis of the formation and development of the art business and the art market in Russia and in the world is carried out. The basic structure of the art market is described, which includes: a seller of works of art, their buyer and an intermediary acting as a third party in the process of buying and selling. The main goals and objectives of art marketing are revealed. The features of the general concept of art marketing are described and the main marketing model in the field of art business is analyzed, which is an augmented 4P model of the general theory of marketing and consists of seven elements: product (product), price (price), place (place), promotion (promotion), people (people), physical evidence (physical presence), process (process). It also provides examples of the successful use of the art marketing system in the field of art business in Russia and examples of the use of art and culture as the main sales promotion tools for various world-class companies.

Keywords: marketing, art business, art market, art marketing, art, culture, strategy, advertising.

Yarkina N.N.

CLASSIFICATION OF FACTORS OF INCREASING THE EFFICIENCY OF THE USE OF RESOURCES OF ENTERPRISES OF THE FISHERIES COMPLEX

Abstract. The subject of the study was the factors of increasing the efficiency of the use of resources of enterprises of the fisheries complex. The purpose of the work was to concretize and classify them taking into account the specifics enterprises of fishing, aquaculture and processing of fish and other aquatic biological resources. The research is based on logical methods of connection research, such as inductive methods of establishing a causal relationship, methods of generalization and classification. The connection of the production resources of the enterprises of the fisheries complex with aquatic biological resources, which form the basis of fish and other products from aquatic biological resources, is emphasized. The limitations and exhaustibility of aquatic biological resources are indicated, which actualizes the study of factors for increasing the efficiency of the use of all resources involved in the production activities of the enterprise, taking into account interaction and interdependence. Among the main classification features, such as the

type of resource component, the essential basis, the qualitative nature of increasing the efficiency of the use of resources of fisheries enterprises and their direct ability to influence it were considered.

Keywords: resources, factors, efficiency of use, classification, enterprises of the fisheries complex.

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Saenko E.M., Zhukova S.V., Kosenko Yu.V., Trushkov A.V., Baskakova T.E., Karmanov V.G.,
Burlachko D.S., Lutyanskaya L.A., Podmareva T.I.

ASSESSMENT OF THE CRAYFISH POPULATION HABITAT IN THE SAL RIVER BASIN UNDER MODERN HYDROLOGICAL CONDITIONS

Abstract. We present a review of research literature and the results of our studies bearing on the current state of the living conditions of crayfish in the basin of the Sal river within the boundaries of the Rostov region. In the summer and autumn of 2022, the hydrological regime developed according to the scenario of the years with reduced water content. Some sections of the riverbeds were characterized by shallowing and decreased flow velocities that are manifestation of incipient drying-up processes. Hydrochemical parameters in the basin of the Sal river (oxygen regime, pH value, level of nutrients, concentrations of the main salt-forming ions and total mineralization of water) indicated the suitability of the aquatic environment for the vital activity of the crayfish. In the water bodies of the Sal river basin, the crayfish were found at most sample stations, except the areas 0.35-0.50 m/s (at a depth of 0.0-0.8 m). The distribution of crayfish in the areas with a surface flow velocity of 0.05-0.21 m/s and near-bottom flow velocity within 0.02-0.12 m/s varied within 900-5067 specimens/ha. Crayfish were represented by almost all size groups. By their size and production characteristics the populations of crayfish were estimated as medium-productive (10-20 kg/ha) and highly productive (over 20 kg/ha) ones.

Keywords: the basin of the Sal river, crayfish, flow velocity, degree of overgrowth, oxygen regime, total mineralization of water, biogenic substances.

Gamayunov O.A.

THE STRATEGY OF INCREASING THE SPECIALLY PROTECTED NATURAL TERRITORIES OF THE KERCH PENINSULA AS A FACTOR IN THE DEVELOPMENT OF ECOLOGICAL TOURISM

Abstract. This article presents a strategy for increasing specially protected natural areas (protected areas) The Kerch Peninsula, the analysis of the development of the protected areas of the Crimea and the statistics of the increase in the reserve fund in the Russian Federation over the past 9 years, the main scientific developments in this area were analyzed. Now the network of protected areas on the Kerch Peninsula is mainly represented along the coastline of the Azov and Black Seas. As a result of the conducted research, the main promising territories of the Kerch Peninsula have been identified, which can become part of existing protected areas or newly created ones by increasing the existing area of the reserve fund by 2 times. The strategy is aimed at increasing the area of protected areas, mainly steppe landscapes, the preservation of which, in an intact state, will make it possible to expand the range and increase the populations of red book species of flora and fauna. In general, the increase in the territories of the reserve fund will give a positive dynamic in preserving the biodiversity of the region, will improve the quantitative and qualitative indicators of ecological tourism and will contribute to an increase in the overall tourist flow to the Kerch Peninsula.

Keywords: Republic of Crimea, specially protected natural areas, ecological tourism, biodiversity conservation.

Grinev V.F., Demidova M.E., Turyanova A.G.

PHYSICAL ASPECTS OF GLOBAL WARMING

Abstract. Thermodynamic processes are considered, happening on earth in the context of global warming. The main role of thermal energy released by the surface of the tropical belt of the planet is shown. The existing potential projects to combat global warming are analysed. A hypothesis is

given about the complex thermal effect of motorway tracks, walls and roofs of urban buildings on the thermodynamics of the tropical belt of the planet. A new potential project to combat global warming by changing the thermophysical properties of megacities of the tropical belt is proposed. The project also provides for the reduction of carbon dioxide emissions by streamlining automobile traffic within urban neighborhoods. The model of the organization of urban neighborhoods is considered, where there is no intra-district automobile traffic, which eliminates significant amount of carbon dioxide emissions. Automobile traffic within the territory of the microdistrict is carried out on a ring road. It is proposed to install engineering equipment on the sides of this road for the disposal of waste produced by population of the microdistrict. The important role of satellite monitoring of greenhouse gas emissions is emphasized.

Keywords: thermodynamic, equator, tropical belt, ocean, carbon dioxide, car, megapolis, microdistrict, the satellite monitoring.

Klimenko N.P., Chernuha V.S.

RATIONING AND RELIABILITY INDICATORS CALCULATION OF SHIP'S TECHNICAL MEANS

Abstract. For a case of approximation of distribution of probabilities of a maximum load Veybull's law with known parameter of a form and of coefficient of a variation, one may use sequences of calculation of the lower confidence bounds of an indicator of reliability of strength characteristics of designs of ship technical means with a help of fiducial probabilities method. The developed method is applied to an assessment of the lower confidence bounds of an indicator of reliability of vessels of a high pressure on the basis of results of their tests for bearing ability by internal pressure. The method of confidence sets is used for calculation of the lower confidence bounds of an indicator of reliability of strength characteristics of designs of agricultural cars at approximation of distribution of their maximum load by Veybull's law. A numerical algorithm has been developed to obtain the lower confidence bounds of a -the reliability indicator. The issues of normalization of reliability indicators for sudden destruction are considered. On the basis of the probabilistic model "load-strength", the upper limits for the safety margin factor are determined, providing a given probability of non-destruction.

Keywords: reliability indicators, confidence limits, strength characteristics, normalization of indicators, probability of non-destruction.

Konyukov V.L.

ANALYSIS OF OPERATIONAL PARAMETERS OF A MARINE FOUR-STROKE DIESEL ENGINE WHEN CHANGING THE SCREW CHARACTERISTICS

Abstract. In this work, studies have been carried out on the influence of the weighting of the screw characteristics of the vessel on the main operational parameters of the ship's four-stroke diesel engine. The studies were carried out by the computational and theoretical method for wide ranges of changes in the weighting coefficient and relative diesel power. The dependences of pressures and temperatures at characteristic points of the cycle on the weighting coefficient are obtained. The transition to a weighted characteristic leads to a decrease in the turbocharger power, a decrease in air consumption and a decrease in boost pressure, as a result of which the excess air coefficient for gorenje fuel decreases and the specific effective fuel consumption increases. An increase in gas temperatures at the characteristic points of the cycle leads to an increase in the thermal stress of the diesel engine, on the basis of which temperatures are identified that can be used as determining when assigning restrictive characteristics for thermal tension. The choice of such temperatures is made in accordance with the nature of their change from the speed of the diesel engine.

Keywords: diesel, operational parameters, load, screw characteristic, weighting coefficient, limiting characteristic, thermal stress, mechanical stress.

Dekan A.A., Sokolov S.A., Yashonkov A.A.

EXPERIMENTAL STUDY OF COMPRESSION CHARACTERISTICS OF LIQUID EGG MELANGE

Abstract. Intensive development of food processing technology using physical processing methods is caused not only by their ability to destroy microorganisms, but also by the prospects for improving the quality of finished products and intensification of processing. The introduction in industrial production of the most promising modern physical methods of food processing, in particular, their complex processing by high pressure and ultrasound requires a comprehensive study of them. The paper analyzes and presents the results of experimental studies of the effect of complex processing by high pressure and ultrasound on the compression characteristics of liquid chicken melange and such components as protein and yolk. Data on changes in values of relative volume, density, compressibility coefficient, modulus of volume elasticity of liquid chicken melange of protein and yolk are obtained.

Keywords: Egg melange, high pressure, ultrasound, compression characteristics, complex processing.

Klimov V.A., Nikiforov-Nikishin D.L., Kochetkov N.I., Smorodinskaya S.V.

FORMATION OF THE QUALITY OF FISH PRODUCTS PRODUCED FROM RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) THROUGH THE APPLICATION OF FEED WITH CHELATE COMPOUNDS OF MICROELEMENTS AND CAROTENOIDS

Abstract. In article, the possibility of in vivo formation of the quality of fish products by introducing additional components into the production feed, such as chelate compounds and carotenoids (lycopene), is considered. The technology of adding active components to compound feeds at the stage of granulation without losing the functional properties of additives is presented. Evaluation of the quality of rainbow trout fillets after experimental feeding showed an improvement in both the organoleptic indicators of the product (smell, texture, taste) and an increase in the content of a number of microelements. A significant increase in the relative content of iron and cobalt was recorded ($p < 0.05$). In the experimental group, an increase in the intensity of the color of muscle tissue was noted, which indicates the effective use of lycopene in the feed mixture for fish. According to the results of the analysis to determine the mass content of microelements, the resulting fish products can be classified as functional.

Keywords: Rainbow trout, formation of product quality, fish products, microelements, organoleptic indicators.

Logunova N.A., Yashonkov A.A., Kurash M.A.

FOOD WASTE MANAGEMENT AND NUTRIENT RECYCLING: PROBLEMS AND SOLUTIONS

Abstract. The paper considers the economic and social aspects of food waste management. Information is provided on the feasibility and technological prospects of their processing. The assessment of the global problem of food surpluses and food waste is given, the solution of which will help to cope with the food crisis. The continuous growth of the world's population increases the demand for food, thereby increasing the loss of food throughout the supply chain, which leads to a shortage of natural resources and, as a result, environmental pollution. Recycling and reuse are the basic principles of a closed-loop economy that focus on extracting energy and resources from food waste for a sustainable environment. Food waste is mainly rich in organic substances, such as carbohydrates, proteins and lipids, which can be used as raw materials for the production and/or recovery of biofertilizers, biofuels, biogas, valuable biologically active compounds, natural nutrients and enzymes. When analyzing the problem, studies by domestic and foreign authors, as

well as statistical data from open sources were used. The results of the study cover international and Russian experience and are aimed at finding ways to solve problems related to food waste. **Keywords:** food industry, food waste, food surpluses, waste-free technologies, closed-cycle economy, food losses.

Mazalova N.F., Babich V.V., Bitutskaya O.E.

COLD SMOKED STICKS FROM SHARKS-KATRAN WITH THE APPLICATION OF SMOKING LIQUID

Abstract. Technologies development of new products types from shark meat, as a little-used raw material, remains an urgent area of research. Only shark liver was in demand, from which a number of biologically active additives are produced. However, experts agree that ready-made shark meat balls taste and look like similar products from sturgeon fish. The aim of the work was to expand the assortment of delicatessen cold-smoked fish products. The assessment of physico-chemical and microbiological parameters of raw materials and finished products was carried out according to standard methods. The results of the experiments allowed us to recommend cutting into chopsticks and soaking katran meat combined with salting (12 % salt solution at pH 6.5) to reduce the urea content to 1200 mg% and reduce the time of the soaking-salting process to 3 hours. In order to increase the shelf life of the finished product and give the product new organoleptic properties, an aqueous solution of walnut extract was introduced into the smoking liquid. A package of technical documentation for the production of cold-smoked fish sticks from shark katran has been developed.

Keywords: shark katran, smoked products, smoke preparation, walnut extract, antimicrobial properties.

Oleynikova R.E., Gukasyan A.V., Stepanov D.V.

INVESTIGATION OF THE HYDROPNEUMATIC METHOD OF CUTTING SMALL FISH

Abstract. Topical issues of mechanization of labor-intensive manual cutting of small fish with a length from 90 to 120 mm are considered on the example of the Azov-Black Sea hamsa. The prospects of using a hydropneumatic method for removing the entrails of small fish are shown. The approximation of the shock wave by applying the Burgers method is described, as a result of which a two-dimensional rectangular area is obtained. The application of the principle of superposition of one-dimensional solutions made it possible to obtain an approximate solution of the differential equation of the two-dimensional shock wave flow in a rectangular channel. The solution of the differential equation is designed for a wide range of Reynolds numbers. The factors influencing the process of removing the entrails of small fish are described. Rational parameters of the process of removing the insides of 100% of the processed whole carcasses of the Azov-Black Sea hamsa have been established. The regularities of the process of removing the entrails of small fish by the hydropneumatic method are revealed.

Keywords: fishing industry, cutting, fish, removal of entrails, process.

Podolskaya O.G.

SOFTWARE CALCULATION OF STABILITY OF A LINEAR AUTOMATIC SYSTEM IN THE FOOD INDUSTRY

Abstract. In all branches of modern industrial production, high-quality packaging of products is required. In the food, chemical, medical industry, packaging lines are widely used for hermetic packaging of products, sealing, cutting off the packaged package and moving it for further operations. Packaging lines in the food industry are used for packaging fish products, confectionery, sweets, etc. The main requirement of modern production is the full automation of

packaging equipment. The creation of high-quality automatic systems is impossible without fulfilling the necessary stability condition, which ensures the normal functioning of linear automatic systems. The article deals with the definition of stability of linear automatic systems using the algebraic criterion of Rouse. Examples of calculating the stability of a linear automatic system by the "manual" method, using MS Excel spreadsheets and using the Mathcad program compiled by the author of the article, which allows you to determine the stability of an automatic system by a characteristic equation of any order, are considered. The use of the program for solving the applied problem of the food industry in determining the stability of the flying shear system is considered.

Keywords: food industry, packaging lines, automatic control systems, Rous's algebraic stability test, flying scissors, stability calculation program, MS Excel, Mathcad.

Sokolov S.A., Krasnogradov A.V., Sevatorov N.N.

COMPARISON OF ENERGY CONSUMPTION IN THE PROCESSING OF BOILED SAUSAGES USING DIFFERENT METHODS OF ENERGY TRANSFER

Abstract. The article presents a comparative assessment of energy consumption for traditional food processing (using high temperature) versus using high pressure, determining the ways in which the internal energy of the processed object changes and comparing them for different processing methods: traditional thermal and high pressure processing. The results show that energy consumption is lower when using the high pressure method compared to traditional thermal processing. The concept of internal energy and its relationship to energy transfer is also discussed. The use of high pressure as a method of food preservation is explored, and the thermodynamic principles involved in the process are explained and compared to traditional thermal processing. The advantages and disadvantages of the high pressure method are presented, as well as its potential for improving food quality. The study found that the high pressure method requires 3.4 times less energy than traditional thermal processing. The temperature changes in food products during high pressure processing are also analyzed, and further research is suggested to determine the optimal process parameters.

Keywords: comparative assessment of energy consumption, heat treatment, high pressure treatment.

Ukolov A.I., Malko S.V., Semenova A.D.

INFLUENCE OF HYDROCAVITATION TREATMENT OF BALLAST SEA WATER ON THE STABILITY OF MICROORGANISMS

Abstract. The use of hydrodynamic cavitation for water disinfection has environmental and economic benefits. This paper investigates the microbiocidal effectiveness of hydrodynamic cavitation for the disinfection of sea water. The experiments carried out in this study show that this method is a promising technology for the physicochemical disinfection of marine ballast water. The values of the degree of death and strength of the cell wall were obtained. The hydromechanical effect of cavitation, which includes cavity dynamics and turbulence, is considered, and the physicochemical conditions for damage to microorganisms by the free radical (peroxide) mechanism are described. In general, cavitation advanced technology is environmentally friendly because it does not use external chemicals, does not generate harmful by-products, is energy efficient, economical, and can be scaled up for disinfection on a large scale.

Keywords: zooplankton, cleaning, disinfection, hydrodynamic cavitation, ballast water.

Falko A.L.

FEATURES OF DESIGN AND CALCULATION OF VIBRO-TRANSPORTING CONVEYORS WITH ELECTROMAGNETIC DRIVE

Abstract. These studies highlight the issues of designing vibration conveyors with an electromagnetic drive. In the process of working on the creation of such machines, designers get acquainted with different methods for calculating the parameters they need, while choosing those that are more suitable for their conditions. The options for production conditions are endless, therefore it is more reasonable to strive for a single calculation method using a universal design sequence. The given generalizing material shows the possibility of creating such an algorithm. When creating the algorithm, various types of electromagnetic vibrators and schemes for their attachment to the base and the moving body of the machine were taken into account. Also taken into account are the frequency characteristics of the applied voltage, the power of the vibrator, the stiffness of the springs, the frequency of oscillation of the working body with and without the load, the speed of movement of the load and the limits of its change due to kinematic parameters, the dimensions of the machine and the possibility of transporting it over long distances, as well as movement within the production premises.

Keywords: vibrator, vibration conveyor, cargo movement, oscillations, working body, electromagnetic drive, oscillation frequency calculation.

Aleksakhina L.V.

ORGANIZATIONAL AND ECONOMIC MECHANISM FOR ENSURING CONFIDENTIALITY OF INFORMATION IN THE MANAGEMENT SYSTEM OF FUNCTIONING AND DEVELOPMENT MARITIME TRANSPORT AND LOGISTICS OF THE REGION

Abstract. The article presents an organizational and economic mechanism for ensuring the confidentiality of information in the management system for the functioning and development of maritime transport and logistics in the region, aimed at improving the level of information security of the transport and logistics complex and increasing its competitiveness. The information flows that flow within the framework of the maritime transport and logistics system, considered as a set of interrelated main, auxiliary and mediating communication processes for the creation of a transport and logistics product, are structured. The system of information interaction of elements of the maritime transport and logistics system of the region, formed for the purpose of information exchange and coordination of actions to ensure safe and efficient transportation of goods and passengers by sea, is presented. The necessity of forming an organizational policy in terms of information protection, involving the introduction of rules and procedures for access to information, compliance with the conditions of its use and strengthening responsibility for confidentiality violations, is demonstrated.

Keywords: maritime transport, logistics, trade secrets, information security, confidentiality, management, development.

Verna V.V., Hoyna M.N.

MODERN APPROACHES TO ADAPTATION OF PERSONNEL OF ORGANIZATIONS: EXPERIENCE OF RUSSIAN COMPANIES

Abstract. The article discusses the concept of staff adaptation, its impact on the effective functioning of the organization. The types of adaptation of employees, the most common in organizations, are presented. The directions of adaptation of personnel are identified depending on the category of employees adapting to the conditions of the enterprise. The conditions that have a direct impact on the quality, timing and effectiveness of the adaptation of specialists in the organization are indicated. Modern approaches to the adaptation of the personnel of organizations

that have an impact on both the newest employee and the team, and the entire organization as a whole are considered. The main steps that must be followed for the successful adaptation of employees are shown. The article provides examples of successful implementation of adaptation programs in Russian companies. Based on the results of the study, the most effective methods of personnel adaptation are presented. The need to introduce a program for the adaptation of employees in the organization has been updated.

Keywords: adaptation of personnel, adaptation program, training and development of employees, working conditions, mentoring.

Voytyuk V.N.

UNIFICATION OF PROCEDURES FOR ANALYSIS AND ESTIMATION OF RISKS FOR THE INVESTMENT STAGE OF CREATE INDUSTRIAL COMPLEXES PROJECTS

Abstract. The article is devoted to identifying the typology and decomposition of the main tasks for the implementation of the project to create an industrial complex that generate risks. The purpose of the work is to develop standard unified procedures for analyzing and estimation the risks of the investment stage of projects to create industrial complexes. Subject of research: organizational and economic relations that give rise to risks of the investment stage of the project to create a production complex. The research methodology is based on the works of domestic and foreign authors devoted to the theoretical substantiation of the economic feasibility of localizing industrial enterprises. Analytical and statistical reports of resident companies of industrial parks, industry associations and executive authorities were used as initial data. The hypothesis of the study is to improve the quality of risk estimation of investment projects based on groupings of typical risks and procedures. As a result of the analysis, typical tasks of the investment period were identified and grouped, and a unified algorithm for analyzing and estimation the risks generated by these tasks was proposed. The conclusions and recommendations of the study can be used by private investors, state executive authorities and local governments in the development and evaluation of investment projects for the creation of industrial complexes.

Keywords: industrial park, investment potential, investment risks, attraction of investments, concentration of productive forces, industrial park resident, state support measures.

Deduh V.I, Garmashova E.P.

TRENDS IN THE DEVELOPMENT OF THE LABOR MARKET OF THE CITY OF SEVASTOPOL

Abstract. This article is devoted to the analyses of Sevastopol labour market during the period from 2018 to 2022. The topic of research is relevant as the national well-being and stability of society depend on the labour market. The purpose of this article is to investigate the main factors of labourmarket on the basis of the analyses of labour resources, dynamics of the employed and unemployed rate, as well as on the study of the real and nominal wages. The evaluation of the labour market and the level of employment in the city of Sevastopol was carried out on the basis of statistical data of the Ministry of Labour and Social Protection of the Russian Federation in the city of Sevastopol and of Federal State Statistics Service of the Republic of Crimea and Sevastopol City.

Keywords: employment, unemployment rate, nominal and real wages, population, labour market, Sevastopol City.

Diviza N.A., Umanets V.A., Logunov N.S.

INTRODUCTION OF DIGITAL TECHNOLOGIES INTO THE SOCIO-ECONOMIC LIFE OF SOCIETY

Abstract. Digital technologies are rapidly penetrating into all spheres of modern society. Studies devoted to the study of the degree of penetration of digital technologies into the socio-economic life of society have revealed the insufficiency of disclosure of issues of digital transformation of the socio-economic infrastructure of society. The article discusses the directions of the introduction of digital technologies into the main elements of subsystems (economic, political, social and spiritual). The functioning of the economic subsystem is presented as a single complex of interrelated elements of the information system and the process of social production. A mechanism for processing, transmitting and storing information has been developed. The main trends of the digitalization of society are identified, which make it possible to assess the expediency, necessity and expected positive effect of the introduction of digital technologies into the life of a modern individual. The complexes of problems arising as a result of the introduction of digital technologies into the modern life of society are formulated.

Keywords: digital technologies, socio-economic life of society, communication, information technology, transformation, economic subsystem, economic processes.

Ivanov A.V., Kovalenko O.A.

REGIONAL VIEW ON THE VALIDITY OF THE APPLICATION OF THE MAIN PPP MODELS IN THE FISHING INDUSTRY

Abstract. The article analyzes the regulatory framework concerning public-private partnership. Contradictory facts have been revealed in legislative documents regulating legal relations in cooperation between the state and entrepreneurs in the Russian Federation. The objects of the concession and GSP have been grouped. The definition of the definition of "public-private partnership" is formulated. The importance of GSP for the state economy is systematized. The most popular GSP models are highlighted and the fundamental differences between them are indicated. An interim analysis of the results of the implementation of the public-private partnership program has been carried out and, based on it, proposals have been developed for the formation of a system of indicators for a more correct assessment of the effectiveness of individual organizational and legal forms at the regional level, and in particular in the fishing industry. A conditional division of organizations is proposed depending on the type of fishing carried out. The necessity of taking into account the importance of conformity and adaptation of models and methods in order to take into account the specifics of the RCC is justified.

Keywords: public-private partnership, state, region, business, investment projects, economic efficiency.

Kirilchuk S.P., Simchenko N.A.

PECULIARITIES OF TRANSFORMATION OF PROFESSIONAL ORIENTATION OF THE POPULATION IN THE LABOR MARKET

Abstract. The article provides an empirical analysis of the study of the transformation of the professional orientation of the population in the labor market. The article analyzes trends in the variability of the level of professional orientation of the country's population, followed by an assessment of the comparability of the strategic priorities of the socio-economic development of the country's economy with the trends in the development of professional preferences of workers in various sectors of the economy. The authors have identified certain meaningful characteristics and relationships in the study of the professional orientation of the population and the formation of measures to ensure the flexibility of the labor market. The conclusion is drawn regarding the need for strategic monitoring and strategic planning of quotas for training personnel for

strategically important sectors of the country's economy. It is emphasized that the digital society strives to achieve a high standard of living and a sustainable rate of economic growth, which is achievable due to the compliance of the areas of professional orientation of the population with the strategic priorities of the country's development.

Keywords: labor economics, labor market, professional orientation of the population, digitalization, transformation.

Yarkina N.N., Yakubova E.S.

DECLARATION AND CERTIFICATION OF FISH PRODUCTS AS A SAFETY TOOLS

Abstract. The subject of the study is such safety tools as declaration and certification of fish products. The purpose of the work is to study and characterize their specifics in the context of ensuring security for consumers and businesses. The research is based on empirical and theoretical methods of scientific cognition, including the study and generalization of various primary sources, problem formulation, analysis, synthesis, specification, etc. The directions of modern research on the safety of fish products are considered. It is emphasized that the issues of declaration and certification of fish products as tools to ensure the economic security of the fishing business in the domestic scientific field were practically not considered. It is noted that the declaration and certification of fish products is based on a system of technical regulations and international and national standards in the field of quality management and food safety. The characteristics of internationally recognized certification systems in the field of food products such as MSC environmental standards certification and BRC certification for food safety are given.

Keywords: safety, fish products, declaration, certification.

Ivanova O.A., Kuzmina A.V., Rodkina A.V.

JUSTIFICATION OF THE ELEMENTS CHOICE OF THE HULL SET WHEN DESIGNING OF THE SHIP'S HULL STRUCTURE

Abstract. The article considers the requirements of the Rules of the Russian Maritime Register of Shipping for the design of sea vessels and offshore drilling platforms metal structures, the requirements for choosing a structural type and a system for a set of main load-bearing floors, determined the design loads, loads on the hull from the transported cargo and ballast, the moment of section modulus of the main beams direction and frame. The authors of the article performed an analysis of various multi-criteria assessments methods. The hierarchy analysis method is proposed to use in the design of ship hull structures and offshore drilling platforms to structure the complex problem of substantiating the choice of hull elements. Based on this method, matrices of pairwise comparisons of criteria were developed, numerical estimates of criteria preferences were given, a comparative analysis of alternatives for main beams and frame beams was performed, as a result of which the optimal types of the hull set elements were determined that best meet the selection criteria and requirements of regulatory documents in the design ship hull structures and offshore technical structures. The prospect of further research is considered.

Keywords: analysis, criteria, ship, hierarchical model, matrix, numerical estimates.

Ilyin B. V.

ON THE APPROACH TO DOMAIN MODELING IN DATABASE DESIGN

Abstract. The article considers the approach to formalization of the information model of the subject area in the design of the database of an automated information system. The process of information modeling, inseparable from human speech-thinking activity, is considered as a sequence of display stages: "subject area" → "mental model" → "language model" → "written model". The basic concepts used to display the components of the corresponding model at each stage are considered. Increasing the semantic expressiveness of the information model is realized

through the introduction of multilevel conceptual structures formed using generalization and aggregation methods. The result of the research is a proposal to represent the information model of the subject area in the form of a uniformly structured textual description formalized using the language of predicate logic of the first order, objectively reflecting the semantics of the subject area.

Keywords: subject area, object, property, relation, information modeling.

Maksimov A.B., Kuzmenko S.N.

INFLUENCE OF DISLOCATION STRUCTURE TRANSFORMATION ON MECHANICAL AND MAGNETIC CHARACTERISTICS OF STEEL

Abstract. When metals are deformed, a complex evolution and transformation of the dislocation structure occurs as a result of the processes of self-organization of dislocations. Taking into account these effects complicates the simple statistical theory of the interaction of the elastic and magnetic subsystems of the crystal, the processes of magnetization reversal. In particular, this should lead to an increase in residual magnetization and coercive force. The effect of cyclic bending deformation on the dislocation structure is investigated. The main stages of transformation of the dislocation structure during deformation by cyclic bending are established. Based on the data obtained, it is possible to explain the behavior of mechanical properties depending on the density of dislocations and their distribution. The relationship between the dislocation structure and the nature of the movement of the domain walls is traced. Analysis of the literature data shows that dislocation clusters hinder the movement of domain boundaries. This should lead to an increase in coercive force. The trends of the influence of dislocation density and their distribution on strength and coercive force are close. Therefore, there is a stable relationship between strength and coercive force. Based on the established connections, it is possible to determine the strength properties of steels by the coercive force.

Keywords: steel, dislocation structure, self-organization, fractal clusters, magnetization curves, hysteresis loop, residual magnetization, coercive force.

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Abramchuk A.V., Moskul G.A., Pashinova N.G.

ON THE MORPHOBIOLOGICAL CHARACTERISTICS OF THE RUSSIAN BYSTRYANKA (*ALBURNOIDES BIPUNCTATUS ROSSICUS* BERG, 1924) OF THE KUBAN BASIN

Abstract. The biological, ecological and morphological characteristics of the population of the Russian bystryanka (*Alburnoides bipunctatus rossicus* Berg, 1924) of the rivers of the Kuban basin are given. Russian bystryanka is found in almost all rivers of the Kuban basin. It has no commercial significance, but it is an important component of trophic chains in the ecosystem. The Russian bystryanka in the rivers of the Kuban basin is characterized by intensive linear mass growth. Morphological features of the studied fish are characterized by relative uniformity. The coefficients of variation of meristic and plastic signs of the rapid of the Psekups River (Kuban basin) do not exceed 10% for any of the 37 indicators, which indicates a weak degree of variation. It reaches puberty in the second year of life. Spawning takes place in the spring (May – June), on stony-pebble rifts. The individual absolute fertility of females averages $997,5 \pm 4,74$ eggs. The range of nutrition of the Russian bystryanka in the rivers of the Kuban basin consists of both plant and animal organisms of various taxonomic groups.

Keywords: river, Kuban basin, Russian bystryanka, biology, ecology, morphology.

Bragina T. M., Meng A.O.

DYNAMICS OF THE HARVESTING LIMITS FOR THE BRINE SHRIMP *ARTEMIA* SP. (CRUSTACEA, ANOSTRACA) IN THE SALINE LAKES OF NORTHERN KAZAKHSTAN (KOSTANAY REGION) AND SOME MORPHOMETRIC DATA ON THE INDIVIDUALS REARED IN CULTURE

Abstract. *Artemia* sp. is a commercially valuable biological resource used in the cultivation of fish and crustaceans. Many hypersaline lakes in Northern Kazakhstan are prospectively suitable for *Artemia* harvesting for aquaculture purposes. However, the information on the biological characteristics of brine shrimps is scarce, and the changes in harvesting limits for the region are poorly analyzed. This article is aimed at the analysis of the limits for commercial exploitation of the branchiopod *Artemia* sp. in Northern Kazakhstan (based on the data collected in Kostanay Region) in 2018–2022 and examination of the morphometric characteristics of the specimens reared in laboratory conditions from the cysts harvested in the lakes of the region. Following the surveys conducted in Kostanay Region, the morphometric data of sexually mature *Artemia* individuals have been obtained for two parameters (body length and body weight), and the harvesting limits for this region have been analyzed.

Keywords: brine shrimp, harvesting, exploitation limits, morphometric parameters.

Bulli L.I., Guryeva I.S., Nikolaeva A.N.

MORPHOLOGICAL AND PHYSIOLOGICAL-BIOCHEMICAL CHANGES IN THE EMBRYOGENESIS OF MULLET OF THE FAMILY MUGILIDAE

Abstract. The paper summarizes long-term materials on morphological and general biochemical analysis of mullet caviar developing under optimal conditions. It is shown that changes in the composition of caviar during embryonic development are mainly associated with the processes of osmoregulation and metabolism. During the swelling of a fertilized egg, the formation of a blastodisk and the first stages of crushing, glycogen is consumed, then lipids are mainly consumed for energy expenditure. After the completion of the epiboly, an increase in the lipid content in the developing eggs of mullets begins due to the expenditure of protein and carbohydrates. Apparently, all metabolic processes during the embryonic development of mullets are

interconnected and are aimed at optimizing and adapting the growth and development of the organism in the pedagogical. The use of glycogen and lipids as the main energy sources at the beginning of embryogenesis, and then proteins, extractives and, probably, newly synthesized glycogen, ensures the accumulation of lipids in an amount that allows the eggs and mullet pre-larvae to maintain positive buoyancy during embryonic development.

Keywords: Azov-Black Sea basin, mullets, dry weight of caviar, embryogenesis, energy expenditure, lipid content, buoyancy of caviar.

Golovko G.V., Saenko E.M.

OPTIMIZATION OF THE NATURAL CONSUMPTION OF THE MACROPHYTE RESERVE OF THE VESELOVSKAYA RESERVOIR

Abstract. An analysis of the development of phytocenoses of the Veselovsky reservoir in the historical aspect showed a high density of overgrowth of its water area with submerged vegetation in the modern period and the level of specific biomass of macrophytes, which indicates a significant violation of the ecological balance of the entire ecosystem of the reservoir and determines the conditions for the effective reproduction of phytophilic fish, worsening them. In this regard, it became necessary to regulate the degree of overgrowth of the reservoir. The aim of the research was to quantify the species composition of macrophytophage fish of the Veselovsky reservoir, calculate the volume of macrophytes consumed by them, and assess the trophic reserve of macrophytes for the introduction of grass carp. For this purpose, the amount of biomass consumed by macrophytophages – rudd, ram and infested grass carp – was determined. The value of the trophic resource of macrophytes (1440 thousand tons) and the number of macrophytes consumed by these populations at the present time, which is 0.64 % of the total resource, were calculated. The volume of annual potential fish productivity was calculated due to the use of macrophytes with the annual stocking of 2.7 million juvenile grass carp, which for the 10th year will be 1029 tons, while the potential annual fish productivity of macrophytophages at the current level of development of macrophytes can be 14400 tons.

Keywords: Veselovskoe reservoir, degree of overgrowing with macrophytes, macrophytophage fish, reserve of macrophytes, stocking with fish, increasing fish productivity.

Koulishev A.V., Saenko E.M.

SIZE COMPOSITION AND FECUNDITY OF THE BALTIC PRAWN *PALAEMON ADSPERSUS* RATHKE, 1837 IN THE KERCH STRAIT (SEA OF AZOV)

Abstract. The structure of the assemblage of the Baltic prawn (*Palaemon adspersus*) females that already spawned, the species important for commercial catch, has been studied. The material for the research was samples of prawn (females that already spawned) from the Kerch Strait (Sea of Azov). The limits of variation of the total (3.6-7.2 cm) and commercial (2.6-5.6 cm) length of egg-bearing females with absolute realized fecundity from 500 to 2560 eggs in a clutch were determined. Fecundity values were calculated for all length groups of the marketable size females with an interval of 0.1 cm. The analysis of changes in the number of developing eggs in the “reconstructed” clutch was performed and the approximate percentage of the yield of juveniles at its hatching was calculated. A comparative analysis of the size composition and fecundity of the Baltic prawn in various parts of its range is presented.

Keywords: *Palaemon adspersus*, Kerch Strait, females that already spawned, size composition, realized fecundity

Kashutina I.A., Kashutin A.N.

INFLUENCE OF SAND AND VALVES OF THE PACIFIC MUSSEL MYTILUS TROSSULUS (BIVALVIA: MYTILIDAE) ON CHANGES IN THE AREA OF THE BROWN ALGAE FUCUS DISTICHUS SUBSP. EVANESCENS IN AVACHA BAY (SOUTH-EASTERN KAMCHATKA)

Abstract. This article discusses the erosion and transport of bottom sediments of sand with destroyed valves of different sizes of the Pacific mollusks *Mytilus trossulus*, under the turbulent regime of tidal water currents in the littoral zone of the eastern coast of Avacha Bay. The paper uses observations made by the authors in 2022 in Mokhovaya, Seroglazka, Petropavlovsky kovsh and Zavoyko bays. The main climatic factor in the areas under consideration, which determines the density of the settlement and the distribution of fucus, is the direction and speed of the wind. In the cold period of the year, the highest frequency (31 %) is the north wind with an average speed of 10.8 m/s. In the summer months of the year, the wind of the southeast, south directions prevails with a frequency of 31 % and an average speed of 4.3-4.7 m/s. The material collected during the field work made it possible not only to understand the distribution of sand with admixtures of mussel valve fragments by particle size distribution in the littoral zone, but also showed that their repeated impact on the brown alga *F. distichus* subsp. *evanescens* contributes to a change in their population density.

Keywords: east coast of Avacha Bay, littoral, turbulent regime of currents, wind speed, sand, fragments of valves *Mytilus* (*Mytilus*) *trossulus* A.A. Gould, *Fucus distichus* subsp. *evanescens*.

Sytnik N.A.

ASSESSMENT OF THE IMPACT ON THE ATMOSPHERIC AIR OF RECLAMATION OF THE SOLID MUNICIPAL WASTE LANDFILL IN THE CITY OF KERCH, REPUBLIC OF CRIMEA

Abstract. The article considers the impact of Kerch landfill on the atmospheric air during its reclamation. The technical and biological stages and technologies of landfill reclamation are described, providing a set of works aimed at the restoration of disturbed lands, and reducing the negative impact on the environment. According to quantitative indicators, the greatest impact will be on the atmospheric air during the technical stage of recultivation – emissions of 23 pollutants with a total mass of 974.6269 tons/year. Analysis of the obtained results of the calculation of dispersion of pollutant emissions, performed taking into account the peculiarities of natural conditions of the object location area, showed that the concentrations created by emissions of pollutants of the landfill before, during and after its recultivation do not exceed the maximum permissible values. The work provides a set of measures aimed at reducing the negative impact on the atmospheric air during the works.

Keywords: landfill, solid municipal waste, reclamation, negative impact assessment, atmospheric air, pollutants.

Tikhonova E.A., Burdiyan N.V., Doroshenko Yu.V., Budarova V.Yu.

MICROBIOLOGICAL AND HYDROCHEMICAL INVESTIGATIONS OF COASTAL AREA NORTHEAST KARA SEA IN SUMMER 2022

Abstract. In the present work, results of microbiological and hydrochemical investigations of coastal area northeast Kara Sea are given. Data obtained during the 50th expedition RV "Akademik Boris Petrov" (July-August, 2022) according to program «Training-Through-Research». The quantitative characteristic and distribution of bacteria transforming the main classes of organic compounds (proteins, lipids, carbohydrates), including oil hydrocarbons (diesel fuel) in the surface and near-bottom horizons of the water column was studied. It was established that in the surface waters the number of bacteria using protein substrate varied from 1 to 10⁶ cel./mL (in the bottom

waters from 10^2 to 10^5 cel./mL), respectively, carbohydrates (glucose) – from 10 to 10^4 cel./mL (in the bottom – from 10^3 to 10^5 cel./mL), lipids – from 1 to 100 cel./mL, also in the bottom. Hydrocarbon-oxidizing bacteria (HOB), diesel fuel degraders, in the surface waters were detected in 53 % of samples, in the bottom waters, respectively, in 36 % of samples. Quantitative HOB values ranged from 1 to 10 cel./mL. An uneven distribution of the studied groups of bacteria was noted. The low concentration of hydrocarbon-oxidizing bacteria indicates the absence of fresh pollution of the water area by diesel fuel. During the considered period, surface water temperature varied from $+1,5^{\circ}\text{C}$ to $+5^{\circ}\text{C}$, bottom water: from $+2^{\circ}\text{C}$ to $+4^{\circ}\text{C}$. The concentration of hydrogen ions (pH) in surface water ranged from 7,67 to 8,20 in bottom water: from 7,43 to 7,90. Depth at the bottom water sampling stations varied from 54 to 193 m. The content of hydrocarbons (HC) in the surface waters of the Kara Sea insignificantly exceeds (by 1,2 times) the maximum permissible concentration (MCP) of this class of substances for fishery reservoirs (0,05 mg/l), in the bottom horizon the average concentration of HC exceeds the MCP by 2 times. Significant correlations between the observed groups of microorganisms and physico-chemical parameters were not revealed.

Keywords: hydrocarbons, water, heterotrophic bacteria, pollution, Kara Sea

Ageev O.V., Yashonkov A.A., Samojlova N.V.

DEVELOPMENT OF CALCULATION METHOD FOR DETERMINING THE PARAMETERS OF THE WORKING BODIES OF FISH-WASHING MACHINES

Abstract. The relevance of improving the calculation methods for the scientifically substantiated determination of the parameters of the working bodies of fish-washing machines is shown. It has been established that the main working bodies of fish-washing machines are currently reels of various designs. During the development of the calculation method, expressions were proposed for determining the total resistance moment to rotation of the reel of a fish-washing machine with a water-fish mixture. At the same time, the following are taken into account: moments from the forces of gravity of the mass of fish and water moved by the blade of the reel, the moment caused by the interaction of fish with water, the moment due to the friction of the shaft in fixed supports and seals, as well as the moment arising from the interaction of the working body with a layer of water and water movement in the gap between the reel and the outer case of the machine. Also, the period of acceleration of the drive electric motor of the machine when it is started, as well as the required starting power of electrical equipment, taking into account friction forces, masses of fish and water, and the degree of filling of the reel with raw materials, are also determined. A calculation graphing scheme for calculating mechanical stresses and bending moment arising in a reel working body is proposed. As a result of numerical calculations, diagrams of the transverse force and bending moment were obtained.

Keywords: fish washing, work body, reel, calculation method, resistance moment, durability.

Zotova I.A., Kurash M.A., Sokolov S.A.

EXPERIMENTAL ASSESSMENT OF THE INFLUENCE OF PASCALIZATION OF APPLE PUMES ON THE YIELD AND MAIN CHARACTERISTICS OF EXTRACTABLE PECTIN

Abstract. Apple pomace is produced in huge quantities in juice processing plants around the world, and continuous efforts are made to utilize it holistically. This study assessed the effect of high pressure on apple pomace in order to increase the yield of pectin and determined rational processing parameters – a pressure of 400 MPa and an exposure time of 15 minutes, at which the pectin yield increases from 25 to 31.5 % compared to the yield of pectin from untreated pomace. The molecular weights of pectins and their IR spectra were studied and it was shown that they are not affected by the pressure treatment experienced by pectin-containing raw materials. Thus, pre-treatment of apple pomace with high pressure allows you to increase the degree of pectin extraction

and does not destroy its molecular structure.

Keywords: pectin, high pressure, processing of plant materials, molecular weight, IR spectroscopy.

Katanaeva Yu.A.

INVESTIGATION OF THE PROCESS OF CONVECTIVE DRYING OF POMEGRANATE PEEL

Abstract. During the production of pomegranate juice, a large amount of waste is generated, which can be a potential source of raw materials for food and other industries. The high level of biologically active compounds contained in the pomegranate peel makes it attractive for further processing to obtain components with high added value that can be used as functional ingredients. Due to the high humidity of the pomegranate peel, its shelf life is very limited. Various physical and chemical technologies are used to extend its shelf life. One of such technologies that significantly increase the shelf life is drying. Convective drying is the most widely used method of dehydration of high-moisture materials. To increase the efficiency of the convective drying process, it's necessary to experimentally determine the main parameters of the process and the kinetics of drying. As a result of the study, it was found that increasing the temperature in the drying cabinet increases the drying potential and, consequently, reduces the drying time.

Keywords: pomegranate peel, temperature, humidity, convective drying, diffusion coefficient.

Kim E.N., Timchuk E.G., Glebova E.V., Lapteva E.P., Zayats E.A.

QUALITY AND SAFETY ASSESSMENT MODEL OF SMOKED FISH PRODUCTS

Annotation. The article is devoted to the methodological foundations for creating models for assessing the quality and safety of smoked fish products. The results of marketing researches of smoked fish products are given. The most significant quality indicators were identified, which served as the basis for identifying consumer preferences, which made it possible to develop a matrix of consumer requirements for smoked fish products. The obtained consumer requirements, quality and safety indicators, identified in the standards and requirements of the Technical Regulations of the Customs and Eurasian Unions, made it possible to develop a tree of quality and safety indicators for smoked fish products. A calculation formula for a complex indicator of the quality and safety of smoked fish products is proposed. The principle of its construction is universal and allows assessing the quality of the entire range of smoked fish products in the process of its production, storage, transportation and sale.

Keywords: quality and safety assessment model, quality, safety, smoked fish products.

Sokolov S.A., Yashonkov A.A., Sevatorov N.N., Afenchenko D.S.

COMPUTER SIMULATION OF AERODYNAMICS IN THE PROCESSING CHAMBER DURING DRYING IN A CENTRIFUGAL FLUIDIZED BED

Abstract. The two main problems which humanity is facing at the present stage of its development are supply of food and energy for the population. These problems, in the context of an imperfect quality control system for industrially produced food products, have led to a tendency to replace many natural components in food products with cheaper, but less qualitative and in many cases harmful to human health substances that are artificially synthesized from non-food raw materials, grown via genetic modification and produced using other dubious technologies. Among the ways preventing this trend is improving of traditional technologies for cheap food raw materials processing. The paper considers the computer simulation process of the drying agent aerodynamics under the process of fluidized drying. The influence of the ratios between the main design parameters of the drying plant on the field of air velocities was determined, that made it possible to obtain their rational values.

Keywords: computer simulation, drying chamber, fluidized bed drying, drying agent aerodynamics.

Astasheva O.M.

KHERSON REGION: SOCIO-ECONOMIC POTENTIAL AND DEVELOPMENT PROSPECTS

Abstract. Within the framework of the subject of research of regional economics as an applied economic science that studies the features and patterns of rational allocation of productive forces, production and sales markets, it is relevant to study and compare the socio-economic potential, features and prospects of development of various regions of the country. This is due to the fact that the economy of various territorial socio-economic systems is distinguished by the originality, interconnectedness and unity of its objects and their combinations (complexes). The article examines the main components of the socio-economic potential of the Kherson region, formed during its stay in the structure of the national economy of the USSR and post-Soviet Ukraine, factors and opportunities for its development in accordance with the integration processes of entering the economic space of the Russian Federation, shows priority directions of socio-economic development of the region for the near future.

Keywords: regional economy, Kherson region, socio-economic potential, region, development prospects.

Glechikova T. O., Osipova M. A., Frolova S. N.

THE PECULIARITIES OF LEGAL REGULATION OF FSBEI ACTIVITY FINANCIAL SUPPORT PLANNING

Abstract. The main stage of state-funded educational institutions financial activity connected with the definition of main funding sources of higher educational institutions statutory activities and peculiarities of legal regulation of relationships arising at this stage are reviewed. Legislative and regulatory compliance practices which are accompanied by the identification of modern legal base possible deficiencies determining requirements and regulations controlling and limiting rights of funded institutions when planning their activities are appraised. Relation between funded institutions planning and the government strategic planning is defined. A review of legal and regulatory framework regulating the planning process at different stages and relationship with regulatory authorities of this process is performed. The necessity to pay more attention to the discussed theme if state-funded educational institutions financial activity planning is the basis of qualitative performance of the governmental task for training the specialists needed for development of the Russian Federation national economy branches is demonstrated.

Keywords: financial and economic activity planning, legal regulation, governmental task, legal entities, financial law, budget law.

Mnatsakanyan A. G., Mnatsakanyan R. A., Tomkovich A. V.

BOND FINANCING FOR SUSTAINABLE FISHERIES

Abstract. The transition of fisheries to sustainable development requires the search for new ways of financing. One of them is "blue" bonds – a promising, but so far little-studied investment tool. The article provides an overview of the features of this tool, provides recommendations for its use in Russian conditions. It is argued that the development of bond financing of the "blue" economy will not be successful without the creation of an appropriate institutional environment and market infrastructure, one of the elements of which can be the Fund for sustainable fisheries – a specialized organization that coordinates activities and consolidates resources in the field of the "blue" economy in the country. It is also necessary to unify the methods of evaluating projects focused

on sustainability goals, taking into account the specifics of the "blue" economy and wide disclosure of information about projects and enterprises financed by "blue" bonds.

Keywords: fisheries, sustainable development, investments, funding sources, bonds.

Nekhaychuk D.V., Verna V.V., Skaranik S. S., Vorobyova A.N.

MODERN PROBLEMS IN THE DEVELOPMENT OF RURAL TOURISM IN THE REPUBLIC OF CRIMEA

Abstract. The article is devoted to the analysis of current trends in the development of rural tourism in the Republic of Crimea. The study defines the essence of rural tourism, identifies its advantages and disadvantages, and examines its role in the development of rural areas and domestic tourism. Depending on the potential of the agrotourism industry in the context of the regions of Crimea, various types of territories have been identified for the development of rural tourism in the region. The specifics of the functioning of rural tourism objects in the Republic of Crimea are characterized by systematizing them into main groups depending on the scale and types of activity. The socio-economic effect of the functioning of rural tourism in the Republic of Crimea is substantiated. The objectives and strategic guidelines for the development of rural tourism in Crimea have been identified, which will increase the number of tourists visiting the region year-round, expand the range of tourism services provided in the field of rural tourism, and will also stimulate the development of the economy of rural areas.

Keywords: rural tourism, agrotourism, rural area, tourism industry, tourist product, tourist services, agrotouristic potential.

Samonova T.G., Sushko N.A.

ANALYSIS OF METHODOLOGICAL APPROACHES TO ASSESSING THE LEVEL OF ECONOMIC SECURITY OF THE ENTERPRISE

Abstract. The previously developed methodological approaches to assessing the level of economic security of an enterprise are classified. The essence of each of the presented methodological approaches is highlighted. The advantages and disadvantages of methodological approaches to assessing the level of economic security of an enterprise are disclosed. The essence of the resource-functional approach, which provides for the assessment of the components of the economic security of the enterprise, is revealed. The indicator approach based on the use of a system of indicators and comparison of the actual values obtained with indicators is characterized. The characteristic of the expert method of assessing the level of economic security of an enterprise is presented, which provides for the use of expert opinions to evaluate individual components or the entire enterprise as a whole. The essence of the matrix approach based on the use of matrices to assess various aspects of the economic security of the enterprise is revealed. The expediency of using the method of economic and mathematical modeling to assess the level of economic security of the enterprise is revealed.

Keywords: economic security, method, approach, assessment, level, advantages, disadvantages.

Boyko E.A., Shestak O.I.

INSTITUTIONAL ASPECTS OF TRANSFORMATION OF THE MANAGEMENT OF THE FISHERY COMPLEX OF RUSSIA: 1917-2022

Abstract. In the proposed study, we will try not only to study and evaluate the effectiveness of the system of public management of the Russian fishery complex, but to identify those decisions and positive experiences of public administration in the past, as well as to identify exactly those management practices that can be used in the present. To identify the features of managing the development processes of the fishery complex, we will use not only the traditional descriptive-analytical methodology of working with sources of information, but also the method of content

analysis, which allows, by calculating documents of similar origin and nature, to fairly objectively identify the main mechanisms, strategies and tools for managing fisheries. industry, whose experience has theoretical and practical significance for improving the management efficiency of the fishing industry of the Russian Federation.

Keywords: Fishery complex of Russia, management of the fishery complex, evolution of management of the fishery complex of Russia in the 20th – 21st centuries; management approaches, management mechanisms, efficiency of public administration.

Maksimov A.B., Gadeev A.V.,

COERCIVE MONITORING OF STEEL STRUCTURES AND STRUCTURES

Abstract. The paper substantiates and corrects the methodology for determining the residual life of steel by a non-destructive coercimetric method. It is shown that the parameters of the technique are the coercive force and the degree of damage to steel under fatigue. These characteristics combine the simplicity of experimental preparation and adequately reflect the change in the dislocation structure. It is assumed that the maximum damage (equal to one) corresponds to the greatest true uniform strain under tension. The value of the residual life of steel is determined from the dependence of the coercive force on the degree of plastic deformation. The residual life of steel without deformation is taken as 100 %. At maximum load, the tensile test is assumed to be 0 %. Intermediate damage is determined by the ratio of the true strain to the true strain at the highest load, that is, with a temporary load resistance. The upper limit of reversible damage is 0.3 of the maximum damage.

Keywords: carbon and low-alloy steels, non-destructive testing, coercive force, dislocation structure, reversible and irreversible damage, true deformation.

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Belyanin I.A., Gashnikov M.P.

STUDY OF STERLET (*ACIPENSER RUTHENUS* LINNAEUS, 1758) SPAWNING GROUND IN THE SARATOV RESERVOIR IN 2022-2023

Abstract. For the purpose of restitution of population in 1982 artificial reproduction and release of juveniles of a sterlet in the Saratov reservoir was begun. Over the past 14 years (2009-2022), the volume of annual fish stocking has doubled and reached 2 million rubles in 2022. Thanks to stocking it was succeeded to restore age structure of population of a sterlet of the close to that during the river period. Significant increase in volumes of stocking led to a rejuvenescence of population even in relation to the river period that is a positive factor for further increase of its number. The reached level of the general and trade stock and their positive dynamics in the long term allows to raise a question of a possible exception of a sterlet of the Saratov reservoir of the Red Lists of the Samara, Ulyanovsk and Saratov regions. One of the issues when considering the possibility of removing a species from the list of protected species is the effectiveness of natural sterlet spawning in the reservoir. In this regard, and for the purpose of a comprehensive study of the current state of its population, in 2022-2023, for the first time in a long time, work was carried out to study the condition of the spawning grounds and migration of sterlet larvae in the Saratov Reservoir.

Keywords: sterlet, number, spawning areas, ichthyoplankton, Saratov reservoir.

Bityutskaya O.E., Bulli L.I., Ukolov A.I.

EFFICIENCY OF HYDROCAVITATION TREATMENT OF SEAWATER

Abstract. One of the most effective methods of physical treatment is hydrodynamic cavitation - the phenomenon of formation, growth and collapse of microbubbles inside the flowing liquid. The effectiveness of the action, harmlessness to the environment and economic feasibility makes the method promising for widespread introduction into production associated with the need for water disinfection, in particular with aquaculture. The effect of hydrodynamic cavitation on the microbiota and plankton of seawater was studied. It was found that the treatment completely destroys zooplankton and significantly reduces the concentration of microalgae. The prolongation of hydrocavitation effects on the marine microbiota has been confirmed, so after hydrocavitation treatment, the sanitary and microbiological indicators of seawater meet the requirements of regulatory documentation. It was recommended to use water after hydrocavitation treatment in aquaculture of microalgae and other live feeds for larvae of marine aquatic organisms.

Keywords: hydrocavitation, zooplankton, microalgae, microflora, sea water disinfection.

Bityutsky D.G., Korzun Yu.V., Murzina S.A.

ANTARCTIC KRILL (*EUPHAUSIA SUPERBA*) RESEARCH AND FISHING IN THE INDIAN OCEAN SECTOR OF ANTARCTICA

Abstract. The work was based on the study of historical data on the fishing of Antarctic krill (*Euphausia superba*), as well as scientific research expeditions to the Indian Ocean sector of Antarctica. Materials on the CCAMLR demarcation zones were presented. Some ecological features of the distribution of Antarctic krill in the Indian Ocean sector of Antarctica were highlighted. The materials were presented from the database "Materials on the biology and fishing of Antarctic krill *Euphausia superba*, obtained in the expeditions of YugNIRO and the "Yugrybpromrazvedka" directorate in the Indian Ocean sector of Antarctica in the period 1972–1990.", FAO data from 1974–2021 and materials from the KRILLBASE database (1926–2016). The fishing potential of this area was considered, it was also noted that it is necessary to carrying off the research expedition for the possible resumption of fishing in this region.

Keywords: Antarctica, Indian Ocean, Southern Ocean, Antarctic krill, *Euphausia superba*, fishing, cruise.

Bulli L.I., Bityutskaya O.E., Mazalova N.F.

WORLD EXPERIENCE AND PROSPECTS OF INDUSTRIAL GROWING CLAM

Abstract. The term "clams" is commonly used in relation to a large number of edible bivalve mollusks (except mussels and oysters), differing in size, habitat conditions and belonging to different species and families. The decline in the world's commercial stocks of many valuable species of aquatic organisms, including clam, due to their intensive fishing, deterioration of environmental conditions, as well as an increase in consumer demand for delicatessen meat and biologically active additives, make work related to the cultivation of burrowing shellfish increasingly in demand. In a number of countries, more than half of the bivalve mollusks produced were grown at aquaculture enterprises. The most successful and advanced methods to date were the cultivation of such terminals as *Anadara granosa*, *A. subcrenata*, *Mercenaria mercenaria*, *Mya arenaria*, *Ruditapes philippinarum*, *Meretrix lusorina*, *Cerastoderma edule*, *Venerupis pullastra*, *V. corrugata*, etc. Clams-autoacclimatizers – *M. arenaria* and *A. kagoshimensis* are established elements of the Azov-Black Sea ecosystem, enhance the effectiveness of benthic biofilters and were considered promising objects of cultivation and industrial use.

Keywords: clams, aquaculture, bivalves, *anadara*, *venerupis*, *mia*, *mercenaria*.

Zhuk N.N., Kochergin A.T.

SOME HYDROMETEOROLOGICAL CONDITIONS OF THE KRILL HARVESTING IN THE BRANSFIELD STRAIT IN MARCH-JUNE 2017

Abstract. Some hydrometeorological conditions of the krill harvesting in the Bransfield Strait area (Atlantic Sector of the Southern Ocean) in the transitional from summer to winter period (March–June) of 2017 are considered. Spatial and temporal variability of the thermal characteristics in the water layer extending from the surface to the harvesting depths is given, as well as krill catches in various parts of the strait. From March to June, the air and upper water layer temperatures were gradually decreasing, which led to the shuga formation in the central strait area at the end of the observation period (in June). The temperature of the entire water column was negative throughout the observation period, reaching as low as minus 2.1 °C in June. The difference between the sea surface temperature (SST) and the temperature at the harvesting depth was no more than 0.5 °C in March–April and reached 0.7–1.0 °C in the central strait area in May–June. Average monthly water temperature in the surveyed layer in the investigated area was lower than the average long-term values. A slight decrease in krill catches from March–April to May–June was recorded in the context of increasing harvesting depth and some water stratification. A negative correlation of the catch per trawling and harvesting depths in April with 99 % confidence level has been found, as well as a positive one between the catch and the water temperature at the harvesting depths with 95 % confidence level for May and the entire observation period.

Keywords: temperature, harvesting depth, krill, correlation, Bransfield Strait.

Kuharev N.N., Korzun Y.V., Bitiutskii D.G.

THE ISSUE OF INTERANNUAL FLUCTUATIONS IN ANTARCTIC KRILL BIOMASS (EUPHAUSIA SUPERBA) IN THE SEA OF THE COMMONWEALTH

Abstract. In order to identify the causes of interannual changes in krill biomass in the Cosmonaut Sea, a brief review of the research results on biology, krill resources and oceanographic materials collected by YugNIRO during soviet period was carried out. During research and fishing, significant and often multiple interannual and intra-annual fluctuations in krill abundance and biomass was found. Periodic changes in the average surface density of krill in the Commonwealth Sea have been identified. The stock (biomass) of krill in the Commonwealth Sea was formed

mainly due to local reproduction. The efficiency of krill reproduction was closely linked to the basic elements of large-scale water circulation. Replenishment of the stock was greatest during intensive spawning in the return flow zone and lowest (with equal spawning activity) in the outflow zone. During periods of disruption of normal zonal transport in the atmosphere and the dominance of eastern transport, interannual changes in the stock were determined by expatriation processes, which periodically leads to a significant decrease in the local stock. It was shown that during the period under consideration, significant, multiple intra-annual and inter-annual fluctuations in the biomass of commercial krill aggregations and their density were noted. These indicators varied from values providing highly profitable fishing to values that practically excluded fishing.

Keywords: Antarctica, Indian Ocean sector, Antarctic krill, *Euphausia superba*, fishery, Commonwealth Sea, aggregation, biomass, forecasts.

Polin A.A., Shevchenko V.N., Suetnikov A.V.

TEMRYUK STURGEON HATCHERY. ARTIFICIAL REPRODUCTION OF STURGEON IN 1967-2022

Abstract. From the moment the river Don and Kuban flow was regulated, artificial reproduction began to play a major role in the formation and maintenance of natural populations of sturgeon fish in the Azov basin. Large state network of reproduction enterprises - sturgeon factories - was organized in the region. The Temryuk sturgeon hatchery has organized on Kuban river in 1967. The article analyzes data on the volume of artificial reproduction by the Temryuk sturgeon hatchery in the period 1967-2022. A decrease in the following volumes of cultivation and production of juvenile sturgeon fish was noted in the modern period of the twentieth century. The replacement of the release of juveniles of special breeds with less valuable ones has been established: dominance in the volume of release of juvenile freshwater sterlet, a reduction in the volume of release of stellate sturgeon a complete abandonment of the cultivation and release of juvenile beluga. It is shown that there is a disproportion in the species composition of the replacement broodstock of the Temryuk sturgeon hatchery towards the dominance of less developed regions (mainly sterlet) and the maintenance of individuals of higher species (especially). beluga, as well as stellate sturgeon). Attention is focused on the fact that the productivity of the Temryuk sturgeon hatchery is morally and physically outdated and, therefore, is in the stage of reconstruction and progress.

Keywords: Azov-Kuban region, r. Kuban, Temryuk sturgeon hatchery, huso, russian sturgeon, stellate sturgeon, sterlet, artificial reproduction.

Strelkova O. V., Ivanenko A. M.

COMPARATIVE ANALYSIS OF PARASITIC FAUNA OF FISH IN SEVERAL RESERVOIRS IN THE CENTRAL RUSSIAN PLAIN

Abstract. The incomplete parasitological analysis method was used to investigate 67 fish specimens of six species from five reservoirs of the Central Russian Plain: Desnogorsk (Smolensk Region), Kurchatov (Kursk Region), Istra (Moscow Region) reservoirs; from the Shatura lakes – Muromskoye and Svyatoye (Moscow Region) and the river Vorona (Tambov Region). 21 species of parasites representing 9 nosological units were detected: Trematoda, Cestoda, Monogenea, Nematoda, Mollusca, Crustacea, Hirudinea, Acanthocephales, Cnidosporidia. Jaccard's and Kabiosh's coefficients were used to assess the degree of similarity (difference) between parasitic faunas of reservoirs. The greatest similarity of species was noted in Desnogorsk reservoir and Shatura lakes – Muromskoye and Svyatoye ($C_j = 0,272$; $K = 0,602$), and difference – in the Istra reservoir and the river Vorona ($K = 0$; $C_j = 0,999$).

Key words: Central Russian plain, parasitofauna, Trematoda, Cestoda, Monogenea, Nematoda, Kabiosh coefficient, Jaccard coefficient.

Gamayunov O.A.

THE CONCEPT OF RESTORATION OF ECOSYSTEMS OF ARTIFICIAL PLANTATIONS OF THE KERCH PENINSULA

Abstract. This work considers a conceptual approach to the reconstruction of artificial plantations of the Kerch Peninsula. The scientific approach in substantiating the reconstruction of these ecosystems of the Kerch Peninsula makes it possible to identify the most vulnerable areas of artificial forests and develop mechanisms for their restoration with minimal involvement of both material and human resources. As part of the work, artificial forest plantations on the territory of the Kerch Peninsula were considered, the work is aimed at identifying the degree of forest degradation, as well as forecasting further successional processes occurring in these plantations. Restoration of forest ecosystems is not only important for preserving the biodiversity of the region, but can also become a new vector in the development of the tourism industry of the Eastern Crimea.

Keywords: Kerch peninsula, artificial forest plantations, restoration of ecosystems, ecological tourism, conservation of biodiversity.

Sytnik N.A.

ASSESSMENT OF THE IMPACT ON THE GEOLOGICAL ENVIRONMENT DURING RECLAMATION OF THE SOLID MUNICIPAL WASTE LANDFILL IN THE CITY OF KERCH, REPUBLIC OF KRIMEA

Abstract. The article considers the impact of Kerch solid municipal waste landfill on the geological environment during its reclamation. The stages and technologies of reclamation of the landfill are described, the results of engineering-geological surveys are given, according to which it is determined that the survey area is classified as III category of complexity of engineering-geological conditions. The source of technogenic impact of the object on land resources is leaching by atmospheric precipitation of toxic substances from the body of solid domestic waste dump with subsequent formation of secondary technogenic halos of elements and their infiltration over the years through soils. The adopted technology of landfill reclamation with the device of impervious screen excludes further uncontrolled flow of surface runoff to the adjacent territory and into the body of the landfill. The paper presents a set of environmental protection measures aimed at reducing the negative impact on soils and geological environment in general.

Keywords: landfill, solid municipal waste, reclamation, negative impact assessment, geological environment, pollutants, monitoring.

Glebova E.V., Lapteva E.P.

DEVELOPMENT OF A METHODOLOGICAL APPROACH TO INCREASING CONSUMER EDUCATION AND AWARENESS

Abstract. The article is devoted to the development of methodological foundations for the formation of social responsibility of a food producer in relation to its consumer. The analysis of legislative and regulatory documents establishing requirements for informing consumers of food products is presented. The results of the ordering of terminology describing the composition and content of information about food products presented to consumers, as well as ways to convey information to consumers are presented. The elements forming socially responsible behavior of the producer of food products in relation to the consumer are defined, which are presented in the form of a contextual diagram, which made it possible to form a model of informing consumers about the properties of a food product. A methodological approach to the formation of a food producer's social responsibility to the consumer is proposed, represented by a set of graphical models aimed at the formation of education, awareness and observation of consumers of food products.

Keywords: social responsibility, food products, producer, consumer, labeling, awareness, education, awareness, observation, consumer culture.

Gorbunov A.V., Kochetkov N.I., Nikiforov-Nikishin D.L., Nikiforov-Nikishin A.L.
**EFFECT OF ULTRASONIC AND ULTRAVIOLET RADIATION SYSTEM ON
TURBIDITY AND CHROMATICITY ON RECIRCULATING AQUACULTURE
SYSTEMS WATER ENVIRONMENT**

Abstract. In this study, the effect of ultrasonic (US) and ultraviolet (UV) radiation as part of the recirculating aquaculture systems (RAS) on the turbidity and chromaticity of the water environment was investigated. A higher number of suspended particles and organic compounds can impair the biocidal effect of UV. Cavitation, induced by ultraviolet radiation, leads to the release of a large amount of energy and various sonochemical and mechanical processes capable of destroying suspended particles and oxidation of some compounds. As a result of the study, a reliable reduction of chromaticity was found at the modes of operation of ultrasonic and ultrasonic ultraviolet by 26.7 and 27.4% at the exposure duration of 24 hours, respectively. These modes of operation had no effect on water turbidity, which was probably due to the initially low turbidity index (1.16 ± 0.15 EMF). The results obtained in the study suggest that the use of a flow-through unit with combined UV and US action can improve some hydrochemical parameters of water for aquaculture farming.

Keywords: ultrasound, hydrochemical parameters, closed water supply system, ultraviolet, purification

Kirichenko O.E., Gromov S.V., Kirichenko V.A., Katanaeva Yu.A.
**USING AN AIR HEAT PUMP
TO PASTEURIZE APPLE JUICE**

Annotation. The article presents a new design of a pasteurization and cooling plant with a capacity of 150 kg/h using an air heat pump. The advantage of the proposed design is the possibility of using low-potential ambient heat. The use of air as a coolant in the implementation of pasteurization and cooling processes makes it possible to abandon the use of water as the main coolant, thereby increasing the energy efficiency of these processes. The use of an air heat pump of a new design will also allow apple juice to be cooled without the use of steam compression refrigerating units. The main parameters of the air heat pump operation are given, its operation cycle is described and calculated. It is established that the power required to drive an air heat pump is the difference between the power spent on compression and movement of compressed air into the heat exchanger and the power of adiabatic expansion of air.

Keywords: pasteurization, apple juice, air heat pump, operation cycle, piston stroke.

Orlov B.Yu., Stepanova E.G., Zhlobo R.A.
**WAYS OF DEVELOPMENT OF TECHNOLOGICAL PROCESSES AND
IMPROVEMENT OF EQUIPMENT FOR OBTAINING LOW-NODULE CORE AT THE
SITE OF PREPARATORY OPERATIONS OF AN OIL-PRODUCING ENTERPRISE**

Abstract. This article presents the methods and main technological equipment (ferromagnetic impurities extraction, removal of litter from the seed mass, oilseed collapse, separation of the oilseeds obtained during the collapse of the roll) processing of oilseeds of the site of preparatory operations of the oil-producing enterprise. Due to the differences in the properties of the shells of oilseeds, the application of fundamentally different methods and designs of machines for their collapse is considered. The forces destroying the fruit shell are different (impact, cutting, chipping, instantaneous air pressure relief, explosion, etc.), but the collapse of all oilseeds has one common goal – minimal oiling of the seed shell with the maximum degree of their collapse (obtaining a

low-nodule core). The equipment for the separation of oil seed rolls is presented, in the design of which various separation methods are incorporated – currently operated at the enterprises of the oil and fat industry of the Russian Federation and newly developed. The disadvantages of the existing and advantages of the newly developed technological equipment of the preparatory section of the oil-producing enterprise are indicated.

Keywords: oilseeds, collapsing, kernel, husk, oilseed dust, rushanka, separation.

Pozdnyakova Yu.M., Kovalev N.N., Pivnenko T.N.

STUDY OF COMPLEXATION OF DNA FROM SALMON MILT WITH METALS AS A BASIS FOR CREATION OF RETARD FORMS OF PREPARATIONS

Abstract. Studies have been conducted to evaluate the complex formation of high-polymer DNA obtained from salmon milt with magnesium and platinum salts. The ratios of DNA-cis-platinum and DNA-magnesium chloride were established, which corresponded to the highest percentage of binding. It was found that with increasing concentration of platinum in the solution, the percentage of bound platinum increases, reaching a maximum binding at its concentration of 44.8 µg/ml, but with a further increase in the platinum content in the solution, the percentage of binding drops sharply. As the concentration of cis-platinum in the solution increases, a precipitate occurs, which can be explained by a decrease in DNA solubility. For the resulting DNA complexes with cisplatin, including the control (pure DNA solution without cis-platinum), absorption spectra in the UV region were determined. The resulting registered changes in the spectrum indicate the interaction of cis-platinum with nitrogenous bases of DNA. The research carried out can be used in the creation of medicines and dietary supplements based on high-polymer DNA from the milt of salmon fish of various functional orientations.

Keywords: salmon milt, deoxyribonucleic acid, cis-platinum, platinum, magnesium, complexation.

Smolenkova O.V., Novikova O.A.

THE USE OF INFUSIONS OF MEDICINAL PLANTS IN SAUSAGE PRODUCTION TECHNOLOGY

Abstract. The possibility of using infusions of medicinal plants in the production of sausage products is considered. The influence of infusions on the functional and technological properties of minced sausage, organoleptic, physico-chemical and microbiological parameters of the sausage product were studied. Infusions of rosehip and oregano were introduced instead of drinking water in the amount of 25.0% of the mass of meat raw materials at the stage of cutting. It was found that the use of infusions leads to an improvement in the functional and technological parameters of minced meat samples, positively affects the organoleptic parameters and the yield of the sausage product, physico-chemical and microbiological indicators did not exceed the established norms. The expediency of using infusions of rosehip and oregano in the production of sausages is shown, which makes it possible to expand the range of cooked sausages, will contribute to obtaining a safe food product with high consumer properties, and the content of vitamin C in infusions leads to.

Keywords: rosehip infusion, oregano infusion, boiled sausage product, functional and technological properties, organoleptic evaluation, physico-chemical and microbiological indicators, vitamin C.

Sokolov A.S., Sevatorov N.N., Yashonkov A.A.

REVIEW OF RESEARCH ON THE USE OF CITRUS WASTE FOR FOOD PURPOSES

Abstract. Citrus fruits are one of the main fruit crops in the world. Currently, the annual world production of citrus fruits is estimated at more than 105 million tons, with more than half of them

being oranges. About a third of the citrus fruits produced are processed, and more than 80 percent of them go to the production of orange juice. Citrus production and processing is the second largest fruit processing industry. Citrus production generates huge amounts of agricultural waste every year around the world. Wastes from these industries can be of great nutritional and economic value due to their chemical composition due to the abundance of various functional compounds in them. Technical measures for the recycling and reuse of waste produced by the industry are mandatory to reduce environmental impact, comply with the circular economy paradigm, contribute to the reduction of waste of functional compounds and the production of value-added products. This review covers recent work done in the field. complex recycling of citrus processing waste as a potential source of raw materials in food products.

Keywords: orange juice, processing waste, biologically active compounds, pectin, essential oil, polyphenolic flavonoids, carotenoids, dietary fiber.

Falko A.L.

TECHNICAL ISSUES IN SETTING UP VIBRATION CONVEYORS WITH ECCENTRIC DRIVE BEFORE OPERATION

Abstract. The research presents the subject of the kinematic features of the device and the design of eccentric drives for vibratory conveyors used in the food and fish industries. The advantage of eccentric vibrators is unambiguous – it is the ability to transfer a serious value of the disturbing force to the working body of the conveyor, according to this indicator, no other type of vibration drive can be compared with it. An important advantage is the fact that the value of the disturbing force is unchanged for any kinematic parameters of the working body, this guarantees the efficiency of vibration displacement at any moment of working time, which does not always happen when using other drives. Moreover, from this advantage follows a number of others, which together contribute to the widest distribution of eccentric vibrators in the world, one of the resulting advantages is the ability to vibrate very heavy loads. Conveyors with eccentric drives are the most load-bearing.

Keywords: vibrotransportation, vibroconveyor, vibration inertia, working body, eccentric drive, balancing forces.

Yashonkov A.A., Sokolov S.A.

APPLICATION OF THE GALERKIN METHOD TO SOLVE THE STEFAN PROBLEM USING THE EXAMPLE OF DRYING FISH RAW MATERIALS

Abstract. Fish raw materials are often subjected to such a type of heat treatment as drying. At the same time, the initial moisture content of fish raw materials is 70-80%. Modeling the process of moisture evaporation in a capillary-porous high-moisture material, which includes fish raw materials, is sufficiently complex. During the drying process, taking into account the heat supply, the boundary of separation of wet and dried material moves. At this boundary, there is a transition from one aggregate state to another, which requires the heat of the phase transition – evaporation. The problem of modeling the drying process of a capillary-porous material can be formulated as a problem of conjugation of two temperature fields in the presence of a special boundary condition at a moving interface. However, such modeling is characterized by non-linearity, including for boundary conditions. The Stefan problem with boundary conditions of the first kind is considered as a solution. In the modeling process, the Galerkin method was applied, which showed the possibility of achieving high accuracy with a small number of terms in solving problems with a movable boundary.

Keywords: Stefan's task, Galerkin's method, modeling of the drying process, drying of fish raw materials.

Aleksakhina L.V.

MODELING AND FORECASTING OF ECONOMIC PROCESSES IN THE STRATEGIC DEVELOPMENT OF MARITIME TRANSPORT

Abstract. The article presents approaches to modeling and forecasting economic processes from the point of view of their use in strategizing the development of maritime transport as a basis for making effective informed economic decisions at different levels of management. The role and possibilities of applying modern methods of modeling and forecasting economic processes to perform strategic analysis and substantiate strategic choice are presented. The necessity of considering periodic economic processes by assessing trend-seasonal fluctuations based on an in-depth analysis of time series in order to take into account the specifics of the manifestation of fluctuation in the dynamics of resources used and the results obtained in maritime transport is also demonstrated. The results of the application of regression analysis of data, calculation of seasonality indices as the basis for modeling economic indicators in the framework of strategic planning of the regional and sectoral space are presented.

Keywords: marine transport, development, modeling, trend, periodic processes, fluctuations, forecasting.

Voloshin G.A., Barishevskiy Ye.V.

THE DEPTH OF PROCESSING OF WATER BIORESOURCE CATCHES AS A COMPREHENSIVE APPROACH TO ASSESSING THE EFFICIENCY OF EXPLOITING WATER BIORESOURCE RESERVES

Abstract. The article considers the process of processing depth of the catch of aquatic biological resources. The analysis of the dynamics of production and consumption, as well as prices for fish products in the domestic market. The prerequisites, risks and limitations of the development of deep processing have been identified. The factors influencing the depth of processing of fish raw materials have been established, including the stability of the availability of stable quality raw materials; the cost of raw materials; the possibility of developing, manufacturing or purchasing and servicing high-tech equipment; the level of development of logistics delivery from production sites to markets; the possibility of storing stocks and methods of sale. The necessity of developing a new system for monitoring and accounting for the exploitation of aquatic biological resources reserves in order to improve their management efficiency is substantiated. A variant of an integrated approach to assessing the efficiency of exploitation of aquatic biological resources is proposed.

Keywords: sustainable development, deep processing of catches of aquatic biological resources, efficiency of water biological resources exploitation, collection rates for aquatic biological resources, methodology for determining the rate for the use of aquatic biological resources, bioeconomy, fisheries management system.

Demchuk O. V.

PROBLEMS OF STATE SUPPORT AND CREATION OF FAVORABLE CONDITIONS FOR OPERATING ENTERPRISES OF THE FISHERY COMPLEX OF THE RUSSIAN FEDERATION

Abstract. The article presents the results of a study of the problems of state support and the creation of favorable conditions for the functioning of enterprises of the fishery complex of the Russian Federation. The current problems facing fisheries enterprises are identified and possible directions for solving the identified bottlenecks are considered. The characteristics of the main threats and risks that arose for the fishery complex under the conditions of sanctions imposed on enterprises in all sectors of the national economy are given. A range of problems related to the deterioration of the raw material base of both the World Ocean and the exclusive economic zone

of the Russian Federation, which accounts for the largest volume of production of fish and marine aquatic organisms that ensure food security for the country's population, has been identified. The main measures of federal and regional government bodies aimed at creating a favorable business environment in the Russian Federation, and, in particular, increasing the investment attractiveness of the fishery complex are considered. The results of the analysis can be used in the process of developing measures to attract investment funds into the economic activities of fisheries enterprises.

Keywords: fishery complex, aquaculture, government support, investment attractiveness, quotas, economic efficiency, financial condition.

Ivanov A. V., Kovalenko O. A.

PROBLEMS OF ASSESSING THE ECONOMIC EFFICIENCY OF REGIONAL PROJECTS OF PUBLIC-PRIVATE PARTNERSHIP IN THE FISHING INDUSTRY

Abstract. This article is devoted to the currently most demanded symbiosis of interaction between the state and business, which, from the point of view of its legal form, is called public-private partnership (hereinafter referred to as PPP). Public-private partnership is a kind of alliance between the state and business, the purpose of which is the implementation of strategic and vital, socially significant projects in a wide range of areas of activity. At the same time, in the fishing industry, which is involved in solving the problem of the country's food security, the use of PPP projects is not yet widely used. And this, of course, requires an explanation. For each of the PPP participants, it is designed to provide quite a certain benefit, an economic effect in the implementation of a joint form of interaction. The mentioned effects may lie in different areas for each of the participants, have a different measure of measurement, not only within the framework of financial indicators, but also taking into account the specifics of production activities.

Keywords: public-private partnership, region, fishing industry, investment projects, economic efficiency.

Kotenev A.D., Budagov N.V.

FOOD SECURITY OF THE STATE: SOCIO-ECONOMIC CHARACTERISTICS AND RISKS OF ITS SECURITY

Abstract. The issue of ensuring an optimal level of food security is currently acquiring particular relevance, requiring the adoption of a set of decisions of both a financial, economic, and technical and technological nature. Considering the economic accessibility of food products and agricultural raw materials, the authors focus on the role of the state in ensuring it. The authors noted the presence of a number of characteristics that negatively affect the physical availability of food caused by factors of both internal and external nature. The growth in population caused by migration processes requires the adoption of comprehensive measures to provide citizens of the state with quality food, taking into account their material security. It is noted that for certain items, primarily fish and fish products, due to the high cost of their transportation, imported analogues are preferable.

Keywords: food security, economic accessibility, economic sanctions, food products, agricultural raw materials.

Makarova O.V., Marchuk D.G.

RECOGNITION AND ACCOUNTING OF IMPAIRMENT OF NON-CURRENT ASSETS

Abstract. This article highlights the key aspects of the procedure for recognizing and accounting for impairment of fixed assets and intangible assets in accordance with the requirements of the current regulatory framework in the field of accounting: IFRS 36 "Impairment of Assets" [1], FSB 6/2020 "Fixed Assets" [2], FSB 26/2020 "Capital Investments" [2], FSB 14/2022 "Intangible

Assets" [3]. The article analyzes the key concepts: fair value, value in use and cost of disposal. An author's algorithm has been developed for testing assets for impairment, including determining the smallest group of assets generating cash flows and distributing losses. In addition, the methods of assessing fair value in the absence of an active market for the analyzed assets are considered.

Keywords: impairment of assets, fair value, value in use of an asset, intangible assets, fixed assets.

Merkusheva M.V.

FEATURES OF THE FORMATION OF VALUE CHAINS IN AQUACULTURE

Abstract. The article examines the features of the formation of value chains in aquaculture as one of the sectors whose functioning solves the tasks of ensuring food security and demonstrates the highest and most stable indicators of development dynamics over the past decades. The article describes the main trends in the development of aquaculture, presents the main factors influencing the formation of value chains, both from the point of view of the organizational approach and from the point of view of the nature of the impact on the chains themselves, describes the main structural elements of the value chain of aquaculture products, presents the types of major changes that occur when building value chains costs in aquaculture. The difference in understanding the essence of the processes of "supply chain", "value added" and "value creation" is shown.

Keywords: value chains, value, value added, aquaculture.

Ostrik V.Y., Sukhomlin I.A.

FEATURES OF STIMULATING THE LABOR OF MANAGEMENT PERSONNEL IN ORGANIZATIONS

Abstract. Theoretical review of the characteristics and characteristics of the work of the managerial apparatus at the present stage of the activities of organizations; the basic requirements for designing an effective system for stimulating the work of managerial personnel are identified, taking into account restrictions and risks are presented in the article. Substantive criteria for improving the quality of managerial work in an organization are identified, which form the effective use of managerial personnel and ensure highly productive implementation of labor activity and the effectiveness of managerial influence. A step-by-step technology for improving the quality of a manager's work is presented through the introduction of a KPI system, which will allow building a competency map specific to managers and modeling an effective job profile taking into account strategic management. The process of planning a manager's KPI while improving the quality of managerial work is substantiated. The risks of introducing a model for managing the motivation of managerial work in organizations and ways of managing them, taking into account transformations of the complex mechanism of human capital management, are generalized.

Keywords: stimulation, system, managerial work, personnel, organization, labor function.

Ostrik V.Yu., Yakushev A.A., Ponamarenko A.A.

DEVELOPMENT OF STAFF MOTIVATION SYSTEMS IN CONDITIONS OF COMPETITIVENESS

Abstract. Theoretical overview of the motivational components of the human resource management system, substantiates the need to transform familiar tools under the influence of the mobility of external space and transform the set of needs of employees and teams are presented. The main directions of development of the personnel motivation system in the conditions of the organization's competitiveness are highlighted. The effective components of motivational training for employees of the organization are presented. Specific recommendations for the implementation

of directions for modeling effective motivational personnel management systems for enterprises are substantiated. Development prospects and threats in domestic personnel management and management systems are summarized, taking into account the transformation of motivational needs, with the introduction of modern personnel technologies. The sequence of actions for the formation and development of an effective system for motivating the work activity of personnel is formalized, which generalizes and specifies the actions of a manager and a specialist in the field of personnel management in designing an effective motivational system.

Keywords: personnel, motivation, system, design, organization, competitiveness, motivational platform, needs.

Rysina V.A., Skorobogatova V.V.

DIGITAL ACCOUNTING: THE CONCEPT AND ITS EVOLUTION

Abstract. The article examines the essence of the concept of «digital accounting», reflects its historical aspects in the contextual relationship and interdependence of accounting, information technology, the worldwide Internet, e-commerce, etc. The author's interpretation of the concept of «digital accounting» is formulated. The issues of accounting transformation in the context of digitalization are studied. The emerging advantages and costs of the organization associated with the organization and implementation of digital accounting by business entities in comparison with traditional accounting are systematized. The main aspects of the impact of digitalization and the Internet on the organization and management of accounting in modern technologies are formulated. The features of the application of information and network technologies in accounting are revealed on the example of the organization of accounting for the income cycle. The mechanism of «triple» accounting is considered. The main trends in the further development of digitalization of accounting have been identified.

Keywords: digital accounting, digitalization, transformation, digital technologies.

Sergeyev L. I.

STRATEGIC GOAL-SETTING OF THE COUNTRY'S FOOD SUPPLY

Abstract. The substantial provisions of the consistency (complexity) of the general strategic goal of achieving food security are developed. It is argued that the general purpose should include the words “availability of a security system...”. Attention is focused on the need to transfer the tasks of improving the quality of food to a new level. It is emphasized that the solution of the complex problem of providing high-quality food to the population requires the allocation of the main performers of the set targets by the levels of government. The problem of the need for calculations of regional balances of food production and consumption is actualized. It is argued that the regional aspect of food security should get its place on the top tier of doctrinal food security in the country. The necessity of generalization at the upper level of the tier of goals within the framework of both economic and financial accessibility of food is substantiated. The necessity of strengthening the target orientation of antimonopoly regulation of food reproduction in the sphere of their sale is emphasized. The expediency of including the goals of the processes of digital transformation of the organization and management system to ensure the country's food security in the upper tier of the tree is highlighted. Attention is focused on strengthening the relationship of individual organizational blocks of work, which characterize the need for the development of a comprehensive system of training specialists in the field of agriculture.

Keywords: Doctrine, food security, strategic goals, food, top tier of goals, food availability, food balance, digital transformation.

Skorobogatova V.V., Logunova N.A.

ON THE QUESTION OF THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE FISHERY COMPLEX

Abstract. The article studies the problem of using artificial intelligence in the fishery complex; The directions of its development are considered, the most significant of which include: tracking operations related to fish products, checking their quality, automating business processes and forecasting demand for fish products. Artificial intelligence has been found to be an effective tool in collecting and analyzing data on fish populations and behavior, their migration routes and locations, catch levels and environmental factors. It is argued that collecting and systematizing information in the value chain of fish products, as well as improving the selectivity of fish catching, will not only significantly reduce production and logistics costs, but also increase the efficiency of fisheries activities and the quality characteristics of fish products.

Keywords: fishery complex, artificial intelligence, information, fish products, automation.

Sushko N.A.

DEVELOPMENT OF A MECHANISM FOR MANAGING FINANCIAL RISKS OF FISHING INDUSTRY ENTERPRISES IN THE CONTEXT OF ENSURING ITS FINANCIAL SECURITY

Abstract. The necessity of reducing financial risks on the results of the company's activities has been determined. Measures to improve the financial risk management system of the enterprise are classified. The functional structure of the financial risk management mechanism of the enterprise has been developed. The relationship of the financial risk management mechanism of an enterprise with other mechanisms of economic regulation is schematically shown. The internal and external threats that affect the financial interests of the enterprise are characterized. The tasks that require priority solutions in order to prevent the impact of financial risks on the company's activities are highlighted. A system of indicators has been developed to strengthen control over accounts receivable in order to reduce the financial risks of the enterprise. There are four types of accounts receivable. Criteria for the classification of accounts receivable of the enterprise are proposed. Measures have been developed to influence accounts receivable. The type of accounts receivable is determined by the example of a fishing industry enterprise.

Keywords: financial risks, financial security, mechanism, indicators, accounts receivable, monitoring.

Tregulova I. P., Egorkina T. A., Umanets V.A.

RISK MANAGEMENT IN TOURISM INDUSTRY ENTERPRISES

Abstract. Operation in a highly competitive environment and seasonal nature determine the characteristics of the activities of travel companies. The article examines the risks of tourism industry enterprises, highlights their main features, and explores the reasons for their occurrence. In order to improve risk management, their classification has been clarified. Since most travel companies are small in size, the risks they face in the process of operation are typical, which makes it possible to apply the acquired experience in solving identified problems by a particular company in relation to the entire tourism industry as a whole. An algorithm for making risk decisions is considered. A comparative description of approaches to risk management is presented. Existing methods for studying the negative impact of risks on the efficiency of tourism industry enterprises are summarized. Information regarding the adjustment of the current and selection of a new risk management strategy has been systematized. Directions for improving the risk management system at tourism enterprises are proposed. The positive aspects of implementing a risk management program are formulated.

Keywords: risk, management, influencing factors, assessment, risk reduction.

Turchaeva I.N., Golovach V.M., Mishakova A.S.

ON THE ISSUE OF ASSESSING THE INVESTMENT POTENTIAL OF THE REGION

Abstract. The article, based on a generalization of regulations, scientific, educational, specialized literature and other sources, presents the authors' opinion on the definition of the category "investment potential of the region." Within the framework of this article, the authors provide two definitions: the first - from the standpoint of the resource approach, the second - within the framework of the systemic approach, i.e., taking into account the functional components, namely the set of private interdependent potentials that form the regional investment potential. The article also outlines the need to assess investment potential and presents in the form of a diagram the methodology recommended by the authors for assessing the investment potential of a region, based on a combination of quantitative and qualitative methods. Based on materials and statistical data for the Kaluga region, some results of the practical application of the methodology under consideration for assessing the investment potential of this region are presented.

Keywords: region, investment activity, investment potential, assessment, indices, scoring.

Yarkina N.N.

EFFICIENCY OF FISHERIES, AQUACULTURE AND FISH PROCESSING MANAGEMENT THROUGH THE PRISM OF INDUSTRY SPECIFICS (ENTREPRENEURIAL LEVEL)

Abstract. The article emphasizes that the research is a continuation of the author's scientific developments in the field of fisheries management, aquaculture and fish processing at the entrepreneurial level and has an applied nature. Its purpose is to substantiate the scientific approach to analysis and direct comparative analysis of the effectiveness of the management of enterprises in the field of fishing, fish farming and fish processing. The research was based on the methods of non-continuous statistical observation, in particular: the main array and monographic survey. The relevance of the use of methodological tools of the resource approach to the analysis and evaluation of the effectiveness of the management of subjects of fishing, aquaculture and fish processing is substantiated, within which the concepts of "the effectiveness of management proper (management activity)" and "the effectiveness of management of production and economic activities" are highlighted. The connection between differentiated indicators of absolute efficiency of management of enterprises of the fisheries complex and the type of their economic activity in the context of industry specifics is shown. It is noted that the system of indicators of absolute and dynamic efficiency makes it possible to adequately assess the effectiveness of the management of enterprises producing fish products, both within the framework of the analysis of the effectiveness of the management of production and economic activities of enterprises as a whole, and within the framework of the analysis of the effectiveness of management work itself.

Keywords: fishing, aquaculture, fish processing, management efficiency, resource approach.

Karpov F.V., Fedorov G.V., Shkadova A.R.

ANALYSIS AND APPLICATION OF THE «PREDATOR – PREY» MODEL IN ECONOMIC PROCESSES

Abstract. The article deals with the Lotka – Volterra mathematical model (also known as the «predator–prey» model). This model has a wide range of applications, allowing one to describe processes, including those occurring in the economy. In economic systems, the model under consideration is actively used in studying the dynamics of development of such interactions as: the ratio of the average income of the urban population to the national average; relationship between

competitors: large and small businesses; the ratio of the country's population to the volume of essential resources (goods) and others. The work pays special attention to the issue of stability, in other words, the ability of systems to adapt to an environment with the presence of external disturbing factors. As examples, the interaction of two groups is considered - predators and victims (groups of representatives of large businesses and small businesses, respectively), which are subject to external influences that contribute to the reduction of both types (various types of government regulations that contribute to this).

Keywords: «predator – prey» model, stability, control theory, equilibrium points, dynamic model, continuous model, differential equations.

Logunov N.S., Belan N.V., Poletaev P.A.

APPLICATION OF A SATELLITE NAVIGATION SYSTEM TO CORRECT A STRAPDOWN INERTIAL NAVIGATION SYSTEM

Abstract. The article discusses the algorithm for correcting a strapdown inertial navigation system from a satellite navigation system. The possibilities of using an inertial navigation system for sea vessels and the scalability of the system are described. Mathematical expressions for the close integration of the operation of an inertial navigation system and a satellite navigation system are presented; results of the operation of the inertial navigation system with correction from the satellite navigation system and when the signal from the external system disappears. It is argued that with the correct determination of accuracy classes and permissible errors of external systems, the accuracy of the inertial navigation system can be significantly increased. It has also been proven that when integrating other external systems, accuracy increases significantly and it becomes possible to identify malfunctions of other systems that determine navigation and/or orientation parameters.

Keywords: satellite navigation system, strapdown inertial navigation system, navigation, mathematical model, correction.

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Beletskaya M.A.

LENGTH-WEIGHT RELATIONSHIP FOR 14 FISH SPECIES FROM THE SOUTHEASTERN COAST OF CRIMEA

Abstract. This study presents of length-weight relationships estimates for 14 species of Black Sea fishes: *Belone belone euxini*, *Trachurus mediterraneus ponticus*, *Merlangius merlangus euxinus*, *Crenilabrus cinereus*, *Crenilabrus ocellatus*, *Crenilabrus roissali*, *Crenilabrus tinca*, *Mullus barbatus ponticus*, *Pomatomus saltatrix*, *Scorpaena porcus*, *Diplodus annularis*, *Spicara flexuosa*, *Trachinus draco*, *Uranoscopus scaber*, inhabiting the southeastern coast of Crimea. A total of 2,938 fish specimens were examined between 2020 and 2022. The sample number ranged from 23 for *Crenilabrus roissali* to 491 for *Mullus barbatus ponticus*. The value of the b exponent in the equation $W=aTL^b$ ranged from 2.7777 for *Mullus barbatus ponticus* to 3.5508 for *Crenilabrus ocellatus*. 6 fish species had an isometric growth type, 6 had a positive allometric growth type, and two species showed negative allometric growth. The values of the coefficient of determination (R^2) were above 0.96.

Keywords: length-weight relationships, marine fish species, Crimea, Black Sea.

Klimuk A.A., Ponomarev A.K., Kalita T.L., Nikiforov-Nikishin A.L.

THE EXPERIENCE OF GROWING FIRST GENERATION HYBRIDS OF THE AFRICAN CATFISH (*CLARIAS GARIOPINUS*) AT LOW TEMPERATURE CONDITIONS

Abstract. This article describes the experience of breeding resistant hybrid African catfish (*Clarias gariepinus*) to low water temperatures. Also, it presents the results of a scientific and economic experiment on growing these hybrids in the conditions of a pond farm in the Belgorod region. It was found that the resulting hybrid of the first generation of clariid catfish ("Mikhailovskaya" ♀×♂ "Tamanskaya") is characterized by a high growth rate and survival rate under RAS conditions. Minor changes in feeding behavior and growth rate of hybrids were established during gradual adaptation to low temperatures (up to 22°C). When growing hybrids in a pond farm in the village of Uraevo, Valuysky urban district, Belgorod region, from July to September, an increase in the total fish biomass was recorded by 7.15 times (from 102 to 728.8 kg, age of individuals is 7 months.). These results allow us to continue research into the possibility of cultivating clariid catfish in pond farms in the Central Federal District of the Russian Federation with further optimization of the technology for growing and obtaining hybrid cold-resistant catfish.

Keywords: catfish, hybrids, cultivation technology, pond farms, RAS, fish farming and biological indicators

Saenko E.M., Korablina I.V., Kosenko Yu.V.

CHARACTERISTICS OF THE CRAYFISH HABITAT IN CONDITIONS OF ANTHROPOGENIC POLLUTION OF THE SAL RIVER BASIN

Abstract. Maximum permissible concentrations of petroleum products for commercial water bodies were found to be exceeded differently in the Sal, Malaya Kuberle and Djurak-Sal rivers. However, in the total amount of petroleum products, the share of biogenic hydrocarbons was about 80 % in the water. In the bottom sediments an increased amount of petroleum products was noted in the station Andreevskaya. Among heavy metals the exceedance of MAC was detected for iron, manganese, copper and mercury in various degrees of multiplicity in the water of the Sal river mouth, in the Andreevskaya and Slobodskaya stations and in the Akshiby river. The higher content of oil products in the bottom sediments and of heavy metals in the water did not lead to a decrease

in the number of crayfishes in the catches. Pollution of water and bottom sediments of the Sal River basin by persistent organochlorine pesticides had a residual character. Data of ecological monitoring allow us to assert that despite the observed anthropogenic transformations of the Sal River basin ecosystem, the change in the main environment-forming parameters does not go beyond multi-year fluctuations, which makes it possible to consider the water area of the Sal River basin to be relatively safe for the life of aquatic biological resources (namely, crayfish).

Keywords: Sal River basin, crayfish, bottom sediments, pollution, oil products, heavy metals, active ingredients of pesticides, crayfish productivity.

Voronina M.S., Gulyaeva A.N., Suchugov Ya.V., Sabantsev V.V., Teskin K.A., Seredkin I.A.
**PHYSICO-MECHANICAL PROPERTIES OF A BIODEGRADABLE STARCH-BASED
COMPOSITION FOR PACKAGING MATERIALS**

Abstract. Currently, the production of polymer materials is constantly growing, especially in the field of packaging. It is important that the materials used for packaging are safe for health, have appropriate mechanical properties that meet specific requirements such as elasticity, flexibility and extensibility. Starch plasters were created for the study. The composition of this composition includes starch, plasticizer (glycerin), water or a mixture of water and acetic acid. Studies have shown that this composition can be useful to solve the problem of environmental pollution caused by the use of conventional plastic packaging. The manufactured starch plasters provide reliable protection of products from moisture. The samples demonstrate high strength and retain their shape, which makes them ideal for packaging products with high humidity.

Keywords: biodegradable, packaging, waste, starch, plastic, bags, biopolymer, analog.

Sytnik N.A.
**DYNAMICS OF HYDROGEN SULFIDE CONCENTRATION IN THE ANAEROBIC
ZONE OF THE BLACK SEA IN MULTIYEAR ASPECT**

Abstract. The analysis of data for the period 1962-2019 has shown that at the present stage there has been a “systemic” shift in the ecosystem of the Black Sea basin due to the joint action of climatic changes and anthropogenic load. The dynamics of hydrogen sulfide concentration in the anaerobic zone of the Black Sea in the multi-year aspect was analyzed in the work, which is important for understanding the ecological processes, environmental protection and sustainable use of natural resources of the Black Sea ecosystem. The results of the study showed: the average hydrogen sulfide concentration varies weakly near the upper boundary of the anaerobic zone ($\sigma_t = 16.4 \text{ kg/m}^3$), but the spatial and temporal variations of the observed concentrations have increased significantly in recent years. At a depth of $\sim 650\text{-}700 \text{ m}$ ($\sigma_t = 17.1 \text{ kg/m}^3$) there is a tendency of concentration decrease, at a depth of 1000 m it remains constant, and in deep layers (below 1750 m) some increase of hydrogen sulfide concentration is traced. The obtained data will be used to develop environmental protection measures to protect the Black Sea ecosystem.

Keywords: Black Sea shelf, hydrogen sulfide zone, ecological state assessment, anaerobic processes, dynamics.

Mironova N.A., Katanaeva Yu.A.
**INVESTIGATION OF THE DRYING PROCESS OF FRUIT SEEDS
IN THE FLUIDIZED BED**

Abstract. At the enterprises of the system of production and processing of fruit and vegetable raw materials, a large amount of waste (secondary raw materials) in the form of fruit seeds is generated daily. The bones, due to the increased initial humidity, require immediate processing after they are extracted from the fruit. The drying process allows you to increase the shelf life and preserve the

quality of the product. There are various methods and designs of drying plants for carrying out heat treatment of products. However, due to the multilayer structure of fruit seeds, the presence of various types of moisture bonds in their components (core and shell), as well as the need to dry them as a whole, studies of drying fruit seeds in a fluidized bed have been carried out in this work. This drying method is widely used in various industries and allows, with the least energy consumption, to obtain a high-quality product with the humidity recommended to preserve the quality of the product and shelf life. Experimental studies have revealed the kinetic patterns of the drying process in the fluidized bed, recommendations for effective processing of fruit seeds have been obtained, and the physical parameters of the product under study have been determined, which will allow, in the future, to design a drying plant.

Keywords: fruit seeds, temperature, fluidized bed, drying kinetics, oil quality.

Sokolov S.A., Kurash M.A., Zotova I.A.

EXPERIMENTAL STUDIES OF THE KINETICS OF APPLE PUMES DRYING

Abstract. In the food industry, when processing apples, a lot of by-products are formed - apple pomace. They contain minerals, vitamins, phenolic compounds (hydroxycinnamic acids, anthocyanins, flavonols and dihydrochalcones). Due to the high moisture content and rapid microbial decomposition of apple pomace, the environment is polluted, which requires further processing. To solve this problem and increase the shelf life of apple pomace, physical or technological technologies are used, one of which is drying. Based on experimental studies, an empirical equation has been proposed for calculating the drying rate in a constant period of crushed apple pomace in a fluidized bed depending on the temperature of the drying agent, the filtration rate through the layer and the specific mass load of the product on the air distribution bottom of the dryer chamber. To construct experimental fluidization curves, a direct method was used, which involves installing impulse tubes at the base and above the free surface of the layer. The correlation between experimental and calculated data is shown. The accuracy of data calculations was assessed using the least squares method. The standard deviation of the calculated and experimental data did not exceed 9 %.

Keywords: apple pomace, fluidization, drying kinetics, humidity, drying rate.

Falko A.L.

A MODERN VIEW ON THE MOVEMENT OF BULK PRODUCT ALONG FLAT SIEVE SEPARATION MACHINES

Abstract. This material presents a series of theoretical studies on the movement of particles of food material on flat sieves of separating machines. The research is based on the already existing classical theory of particle motion along a plane, however, the modern level of mechanical engineering and the widespread use of computer technology make it possible to clarify and simplify some elements of the theory, as well as improve mathematical approaches to calculating equipment and achieving the results of the theory. Therefore, the work presents a number of theoretical descriptions through the prism of their practical implementation in modern production conditions. Namely, the following theories: movement of bulk product on flat sieves; the significance of the dimensions of the sieve cells on the intensity and characteristics of the movement of product particles; parameters of sinusoidal (harmonic) motion of the sieve (force of inertia, acceleration, speed); behavior of bulk product on the surfaces of inclined sieves.

Keywords: sieve, product particle, inertia force, linear motion, friction force, grain cleaning machines.

Diburis K.M.

ASSESSMENT OF THE EXPORT POTENTIAL OF THE FISHERY COMPLEX IN TERMS OF ENSURING REGIONAL FOOD SECURITY

Abstract. The article evaluates the feasibility of developing the export potential of the region within the framework of the fishing industry. The authors propose an algorithm that allows step-by-step assessment of the region's foreign trade from an export perspective. An analysis of the Kaliningrad Region's own production was carried out, and risk zones were identified that affected the reduction in the main production groups. The consumption of the region in terms of fish and fish products is considered. It was revealed that the actual consumption of the region is at an optimal and sufficient level, which has a positive impact on the food security of the region. The main exporting enterprises are identified, the directions of foreign trade are considered, as well as the volume of imports and exports in dynamics. The analysis conducted from the point of view of the region's own production to imports and exports showed that the implementation of a policy in the field of developing the export potential of the region is advisable, since the domestic market is saturated with this type of production and has resources for foreign trade.

Keywords: regional food security, foreign trade activity, export, fisheries complex.

Kirilchuk S.P., Kenzhaliev R.R., Kravtsov D.A.

REVOLUTIONARY METHODOLOGY THE USE OF DIGITAL CURRENCIES IN THE ENTERPRISE ECONOMY

Abstract. Digital currencies, including cryptocurrencies and central bank digital currencies, represent a revolutionary revolution in the world of finance and monetary systems. This article examines the challenges and prospects associated with the introduction of digital currencies in modern economic systems, analyzes their impact on financial markets, the banking system, and potential changes in consumer behavior. The authors of the study provide an overview of the main advantages of digital currencies, such as fast and cheap international payments and anonymity, which can be useful for businesses. However, they also pay attention to the risks and instability of digital currencies, especially those based on blockchain technology. This can create uncertainty and risk for businesses, especially in unstable regions. In addition, the authors note the regulatory and legality issues that businesses may face, especially when converting digital currencies into national currencies.

Keywords: digital currencies, business economics, risks, blockchain technology, security, electronic payments, monetary systems of the future.

Kirsenko V.V.

ASSESSMENT OF THE EFFECTIVENESS OF THE REGIONAL MODEL OF PULSE INNOVATION OF FINANCIAL TECHNOLOGIES ON INCREASING THE COMPETITIVENESS OF THE REGION

Abstract. In a market economy, the most important factor in increasing the competitiveness of the regional model is the structural transformation of interregional interactions in local markets. The result of a balanced innovative regional model based on the correction of financial flows, impulse innovation of FINTECH technologies (financial technologies), is the positive dynamics of regional GDP. This issue is particularly relevant in the framework of the study of mesoeconomic generations caused by a shift in intersectoral proportions in the reproduction process in local markets of the region. In this regard, an important methodological task is the development of regional models that assess these types of consequences caused by the dynamics of innovation in the financial results of industry economic entities and the corresponding subsequent dynamics of gross value added. This study was conducted based on the cointegration modeling technique to analyze the relationships between industries due to changes in important indicator values of

financial technologies, such as financial stability and creditworthiness of companies. Also, the 5-stage Altman model was used for analysis. As part of this study, a model of impulse innovatization of financial technologies in the local market of chemical products of the Republic of Crimea has been developed, which provides for possible impulse changes in the financial stability of prevailing companies in related sectors of a certain local market. The impulses for influencing the intersectoral system are the main parameters of financial technologies that characterize the creditworthiness and financial stability of the largest industry public companies in the local chemical market of the Republic of Crimea, which have the greatest impact on the dynamics of regional GDP and its competitiveness.

Keywords: regional model, local market of chemical products, Republic of Crimea, Leontiev model, Altman model, dynamics of regional GDP, FINTECH, creditworthiness, financial stability, competitiveness of the region.

Kotenev A.D., Orazaliev A.A., Kryjevskaya N.N.

TOOLKIT FOR ENSURING PERSONNEL SECURITY OF THE INTERNAL AFFAIRS AGENCIES OF RUSSIA

Abstract. In conditions of social tension in society caused by various kinds of reasons that have both direct and indirect influence, the coordinated work of all systems and mechanisms included in the structure of internal affairs bodies is very important. Existing approaches to personnel policy do not fully allow creating conditions conducive to the realization of the entire personnel potential, which does not allow us to fully speak about the effectiveness of the state internal affairs system. In this regard, fundamentally new measures and instruments of personnel policy are required, the use of which will contribute not only to the implementation of the principle of legality, but also to ensure the self-development of employees. An important feature is the complexity of the approaches used, which allows, on the basis of a motivational mechanism, to create conditions not only for socio-economic, but also for psychological and pedagogical satisfaction with the service. The authors proposed two groups of personnel policy tools aimed at overcoming the existing situation of personnel outflow, creating a competitive environment in teams, and also reducing the risks of possible layoffs.

Keywords: personnel potential, personnel security, labor motivation, staff turnover, unemployment, internal affairs officer, personnel policy, labor incentives.

Kotenev A.D., Tereshenko O.V., Solovieva L.V.

LIVING STANDARD OF THE POPULATION AS AN INDICATOR OF PERSONNEL SECURITY IN THE TERRITORY

Abstract. Issues of the standard of living of the population, the reasons for its decline, as well as ways to overcome the current situation are currently acquiring special significance, requiring the adoption of a set of measures of a socio-economic nature. In terms of their content, both in cultural-historical and socio-economic projections, the regions of the North Caucasus Federal District represent a special symbiosis of relations that requires fundamentally different approaches to solving the stated problems. The authors analyzed the size and level of wages of these subjects, identified the reasons for their unsatisfactory level, and indicated possible solutions. A paradoxical situation has been established, reflecting the high density of citizens living in the district, with a low socio-economic level of their life. A negative trend has been noted towards the reluctance of local residents to return after receiving education on the territory of another subject of the state, which indicates a decrease in the level of education of the population of the district and a deterioration in the level of personnel security.

Keywords: employment, personnel security, unemployment, wages, standard of living, poverty, labor activity.

Rysina V.A., Shckuro D.V.

DIGITAL RUBLE: THE CONCEPT AND MAIN FEATURES OF ACCOUNTING

Abstract. The article analyzes the essence of the concept of “digital ruble”, reflects the distinctive features of the digital ruble in comparison with fiat money. The advantages of using a digital national currency and the risks associated with its use are disclosed. The main stages of the introduction of the Digital Ruble project are considered. The regulatory framework developed to regulate the process of circulation of the digital ruble in the Russian Federation has been studied. The scheme of the model for making payments in digital rubles is presented. The main aspects of accounting for digital rubles in accordance with the requirements of the current Russian legislative framework are highlighted. Three options are recommended for reflecting the digital ruble account in the company's work plan of accounts. The author's scheme of the main transactions for the recommended account 53 “Digital ruble account” has been compiled. The order of accounting of transactions with the digital ruble in the program “1C: Accounting 8.3” is considered.

Keywords: digital ruble, concept, model, accounting account, posting.

Timchuk E.G., Glebova E.V., Lapteva E.P., Blinova A.L., Zayats E.A.

DEVELOPMENT OF A SUSTAINABLE DEVELOPMENT CONCEPT MODEL FOR FISH INDUSTRY ENTERPRISES BASED ON MANAGEMENT SYSTEMS

Abstract. Today, sustainable development has become one of the most significant concepts stimulating changes in business activities. This is explained by the desire of society to increase the responsibility of business entities for the consequences of their production and other, including commercial, activities on the environment and ecology, as well as the desire on the part of business, especially large ones, to create and maintain a positive image in the eyes of society. However, the implementation of the principles of sustainable development in practice entails global changes in the activities of enterprises. The developed model of the concept for the development of fishing industry enterprises in accordance with the SDGs based on management systems suggests using the tools of quality management systems, depending on their areas of application and the characteristics of the production activities of fishing industry enterprises, as a way to achieve planned results. The practical implementation of the concept based on the developed model will allow fishing industry enterprises to conduct their business activities in accordance with progressive international views and develop social responsibility towards society and future generations.

Keywords: sustainable development, sustainable development goals, development strategy, fishing industry enterprises, concept, model, food safety management systems, energy management systems, occupational safety and health management systems, environmental management systems, lean manufacturing, organic production, quality management systems.

Truba A.S., Truba M.A., Barishevsky E.V.

ANALYSIS OF DATA SOURCES FOR THE STUDY OF THE STATE OF THE FISHING FLEET, THE DOMESTIC MARKET OF FISH PRODUCTS, PROCESSING PRODUCTION FACILITIES, LOGISTICS OF FISH PRODUCTS

Abstract. The article analyzes the quality, completeness and accessibility of data sources for research: the state of the fishing fleet in terms of composition, territorial location, power; the state of processing production facilities by territorial location, types of products produced and production capacity; domestic market of fish products in Russia by type of product and territorial basis; logistics of fishery goods, including transportation, storage of raw materials and finished fishery products from production areas to the main places of consumption. Problems of information support for organizing the process of quantitative and qualitative assessment of the

functioning and development of the fishery complex have been identified. The conducted research will make it possible to scientifically substantiate the methodology for constructing a balance of exploited volumes of aquatic biological resources and methodological approaches to assessing the potential capabilities of industry production capacities.

Keywords: fishing fleet, processing production facilities, domestic market of fish products, logistics of fish products.

Maksimov A.B.

ELONGATION OF A WIDE BEAM DURING CYCLIC DEFORMATION OF A PLASTIC HINGE

Abstract. The effect of cyclic bending of a plastic hinge on changes in the plane section and length of the sample is investigated. It is shown that during hinge bending, the neutral strain line is shifted towards the compressed fibers. Therefore, a metal layer is formed in the central part of the sample deforming by stretching along a zero cycle. The displacement of the neutral deformation layer is due to the higher resistance of the metal flow in the compressed part of the sample than in the stretched one. In the stretched zone, a flat stress state of elongation in the longitudinal direction and compression stress in the transverse direction is formed. Compression stresses in the longitudinal and transverse directions are formed in the compressed region. In the first case, the stress state scheme promotes the flow of metal, and in the second case it hinders the plastic flow. An increase in the number of bending cycles leads to an increase from the zero layer, approaching its thickness during destruction. As the deformation amplitude increases, the value from the zero layer increases.

Keywords: plastic bending, difference in the resistance of steel to stretching and compression, displacement of the neutral line during bending, cyclic bending, elongation of the beam, zero layer.

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Brezhnev L.L., Ponomarev A.K., Minaenko A.P., Cu Nguyen Dinh, Truong Ba Hai
**HYDROCHEMICAL CHARACTERISTICS OF THE UPPER STREAM OF THE
MEKONG RIVER AND ITS BRANCHES IN THE SOUTHERN PART OF THE
SOCIALIST REPUBLIC OF VIETNAM**

Abstract. This paper presents the results of an analysis of the hydrochemical parameters of the water of the Mekong River and its branch (Bassac River) in the upper reaches. The work was carried out within the framework of the research work "Ichthyopathological and epizootic studies of the ichthyofauna of the river. Mekong and freshwater reservoirs of Vietnam" ("Ecolan E-3.6") on the basis of the Southern Branch of Joint Vietnam-Russia Tropical Science and Technology Research Center (Ho Chi Minh City). During the expedition in 2023, employees of the Faculty of Biotechnology and Fisheries of the Moscow State University of Technology and Management named after K. G. Razumovsky examined the upper sections of the Mekong River in Dong Thap Province (Đồng Tháp) and the Bassac Branch in An Giang Province. At control stations, water samples of the surface and pelagic layer were taken and processed, the resulting samples were tested for a group of fishery standards (NO_3 , NH_4 , PO_4 , Fe, pH, O_2). The result of the analysis of the obtained data allowed us to draw a conclusion about the optimal values of the studied indicators for fishery reservoirs, with the exception of increased concentrations of iron in water.

Keywords: hydrochemical parameters, chemical analysis, environmental factors, Mekong, Bassac.

Vorobjova O.A., Sergeeva S.G., Gorbenko E.V., Pavlyuk A.A.
**EXPERIENCE IN USING THE POLARIZATION COEFFICIENT OF THE OOCYTE
NUCLEUS DURING THE SELECTION OF BELUGA FEMALES AT THE DON
STURGEON PLANT IN THE SPAWNING CAMPAIGN OF 2023**

Abstract. In 2023, studies were conducted, the purpose of which was to develop recommendations aimed at increasing the survival rate of beluga juveniles in the embryonic and postembryonic periods of development. The selection of females and the time of obtaining eggs from them were carried out according to the value of the polarization coefficient of the oocyte nucleus. In the first batches, beluga females with a polarization coefficient from 0.01 to 0.07 were used. It was revealed that these manufacturers were more prepared for the perception of pituitary injections. The females were characterized by high body weight and working fertility. The content of plastic and energy substances in oocytes was close to the values typical for "wild" females. Beluga females with a polarization coefficient of 0.09–0.13 produced fewer mature eggs. The noted heterogeneity in the accumulation of energy-plastic substances, as well as the low polarization coefficient of the nucleus, are a consequence of the incompleteness of oocyte maturation. During incubation of such eggs, there was a decrease in fertilization and an increased waste of developing embryos. Despite the difficulty of working with first-time spawning beluga producers, satisfactory results were obtained in the spawning campaign of 2023. 3,244,431 copies were transferred to the pool workshop for rearing. One-day larvae with an average weight of 21.4 mg. The physiological condition of the beluga juveniles at the stage of release into a natural reservoir testified to its satisfactory quality. Compliance with biotechnics, as well as our recommendations aimed at reducing losses when working with producers, made it possible to increase the fish breeding performance of first-time spawning beluga females.

Keywords: beluga *Huso huso* (Linnaeus, 1758), repair and breeding stock, reproductive function, polarization coefficient, fertilization, embryonic development.

Zolotnitsky A.P., Sytnik N.A., Mikhailov V.V., Nikolaeva A.N.

MORPHOLOGICAL CHARACTERIZATION AND ALLOMETRIC GROWTH OF MUSSEL (*MYTILUS GALLOPROVINCIALIS* LAMARCK) GROWING ON COLLECTORS IN THE KERCH STRAIT

Abstract. The peculiarities of morphology and allometric growth of mussels (*Mytilus galloprovincialis* Lam.) in the process of their growth on the Kerch Strait collectors were investigated. The relationships of length (L) from height (H) and width (D) and width from height during mollusk growth were analyzed. On the basis of the available data, habitable indices were determined: the index of elongation (H/L) of the frontal (D/L) and sagittal length (D/H) of the shell in ontogeny. Analysis of the dynamics of these indices revealed a negative allometry of H/L, which decreases with increasing length, while the sagittal curvature of the shell (D/L) in ontogeny was close to isometry. At the same time, the frontal curvature of the shell (D/H) was characterized by a positive relationship with age. The analysis of weight growth of different parts of the mussel body also showed a close relationship between length and total mussel weight (W), as well as the dependence of the weight of the shell (W_r), soft tissues (W_m) and mantle fluid (W_{mg}) on the live weight of the mollusk during the growing process.

Keywords: mussels, length, height, width, habitual parameters, body mass, allometric growth.

Nikiforov-Nikishin D.L., Gavrilin K.V., Kochetkov N.I., Golovacheva N.A.

DEVELOPMENT OF AN EXPERIMENTAL MODEL OF FISH AEROMONOSIS USING DANIO RERIO TEST OBJECT

Abstract. The work examines the course of acute and chronic aeromonosis on a model organism – *Danio rerio*. The acute form of the disease was caused by intraperitoneal injection of a culture of *Aeromonas hydrophila*, and the chronic form was caused by the addition of a high titer of bacteria to the aquatic environment. The results of histological studies revealed significant differences in both the degree of organ damage and the general course of the disease. In the acute form of the disease, key organ changes leading to death were observed in the heart, kidneys and pancreas. The chronic course was accompanied by disorders in the kidneys and pancreas and led to less fish mortality (22.5%). The conducted studies allow us to recommend *Danio rerio* as a laboratory object for testing antibacterial, probiotic and other drugs in case of artificial infection with an infectious agent.

Keywords: aeromonosis, histology, *Danio rerio*, histopathology, lipopolysaccharide.

Ponomarev A.K., Khoreva T.I., Ivanov S.S., Tolmacheva J.V.

REDUCTION OF CANNIBALISM IN THE GIANT FRESHWATER SHRIMP *MACROBRACHIUM ROSENBERGII* WHEN GROWN IN ARTIFICIAL CONDITIONS

Abstract. Over the past decades, the production of crustaceans by aquaculture methods has exceeded their catch from the natural environment. The peculiarities of keeping and breeding crustaceans in RAS differ from their living conditions in nature and have a significant impact on their physiological state and ethology. In this work, an analysis of the phenomenon of cannibalism in crustaceans was carried out, and ways to reduce the level of aggression and cannibalism were considered. The experimental part of the work describes the effect of cannibalism in same-sized and different-sized groups of juvenile *Macrobrachium rosenbergii*. It has been determined that growing shrimp in an installation with shelters made of PVC pipes and substrates simulating thickets of aquatic plants reduces injuries and mortality of individuals as a result of aggressive behavior, with similar size and weight growth rates.

Keywords: cannibalism, aggression, giant freshwater shrimp, *Macrobrachium rosenbergii*, decapod crustaceans, RAS.

Kashutina I.A., Kashutin A.N.

AIR BUBBLES UNDER TURBULENT WATER FLOW AS A PREVIOUS FACTOR OF FLOTATION AND TRANSPORTATION OF SAND WITH ATTACHED ZYGOTES OF BROWN ALGAE *FUCUS DISTICHUS* SUBSP. *EVANESCENS* IN AVACHA BAY (SOUTH-EASTERN KAMCHATKA)

Abstract. The problem of flotation and transportation of fine-grained substrate particles with attached zygotes of the brown alga *Fucus distichus* subsp. *evanescens* in Avacha Bay (southeastern Kamchatka). *Fucus* zygotes are attractive as a model object for understanding the constantly changing areas of its coverage in the littoral of Cape Shlyupochny, due to the transfer of fine-grained material by air bubbles. It has been shown that *fucus* zygotes also settle and fix on substrates with a rough surface, without a bacterial film. An obstacle to its further development was the rolling of this substrate and abrasion by sand during its movement under the influence of the tidal and wave movement of water. Special conditions for the fixation of particles can arise when a kind of crust is formed on the surface of the bubble, consisting of many particles. The ascent of air bubbles, regardless of their existing size range, is carried out in a turbulent flow of coastal waters.

Keywords: Cape Shlyupochny, hydrodynamic impact, air bubbles, conditions for attachment of *F. distichus* zygotes, sand flotation, bubble detachment.

Medvedkova I.I., Sokolov S.A., Yashonkov A.A.

ANALYSIS OF LIPID CONTENT AND PRODUCTS OF THEIR DECOMPOSITION DURING STORAGE FRESH CULTIVATED MUSHROOMS *STROPHARIA RUGOSOANNULALA*

Annotation. The need to expand the range of products, including the addition of various types of mushrooms, requires scientific research in the field of analyzing their nutritional value. Little studied from the point of view of application in nutrition is such a type of mushroom as ringworm. The ringworm *Stropharia rugosoannulata* refers to fungi with wrinkled annular plates. Studies have shown that the lipid content in these mushrooms is low, and it decreases during storage. At the same time, the lipid level decreases faster with an increase in temperature and an increase in shelf life. The concentration of low-molecular-weight aldehyde in the ring also increases with time and with the storage temperature. Studies have shown that the optimal shelf life for cultivated *Stropharia rugosoannulata* mushrooms is three days at a temperature of 0-4 °C.

Keywords: annulus, storage temperature, shelf life, lipids, low molecular weight aldehyde.

Yashonkov A.A., Blinov V.R., Sokolov S.A., Pavlova Yu.I.

COMPARATIVE ANALYSIS OF THE KINETICS OF DRYING BLACK SEA GRASS SHRIMP BY VACUUM DRYING AND FLUIDIZED BED DRYING

Abstract. The article presents the search and comparative studies of two of the less energy-intensive methods of drying meat of boiled Black Sea grass shrimp – in a fluidized bed and vacuum drying. As a result of the conducted experimental studies, data were obtained on the change in the mass of the product under study during the drying process. For the two drying processes studied, the dependences of the moisture content of boiled shrimp meat on the duration of the process and the drying rate curves were constructed and analyzed. It is shown that the obtained dependences of the moisture content of cooked shrimp meat on the duration of the process correspond to those for colloidal capillary-porous bodies, to which the product under study belongs. The above comparative analysis of the productivity of the two processes showed a significant increase in the productivity of the vacuum drying process at a temperature of 90 °C (by 50 kg/hour). However, at a drying temperature of 70 °C, the excess capacity is minimal (an increase of 5 kg/hour).

Keywords: Black Sea grass shrimp, vacuum drying, fluidized bed, drying curves, drying speed, productivity.

Aleksakhina L.V.

MARITIME TRANSPORT AND LOGISTICS IN RUSSIA: MODERN CHALLENGES

Abstract. The article presents a dynamic series of indicators and indicators that make it possible to understand the current state of the navy and maritime transport infrastructure, the planned pace and development tools. The dynamics of the deadweight and the structure of the Russian navy, including those operating under the national flag, are represented. The dynamics of the volume of transshipment of Russian goods with an assessment of the contribution of the largest seaports of Russia is demonstrated, the increase in the capacity of a number of seaports of the Russian Federation is reflected. The situation with the dynamics of the construction of marine transport vessels for Russian companies is characterized, indicating the manufacturing countries. The results of the data analysis are presented and the need to ensure an annual increase in freight traffic with an adequate expansion of the capabilities of the transport and logistics infrastructure is justified, due to the steady growth of business activity of the Russian economy as a whole and in the regional context, in particular, with the activation of the inclusion of the northern regions and.

Keywords: maritime transport, logistics, development, trends, imperatives.

Glebova E.V., Lapteva E.P.

CLASSIFICATION OF ORGANIZATIONAL RISKS OF THE ENTERPRISE IN THE FOOD SAFETY MANAGEMENT SYSTEM

Abstract. The risk-oriented approach is the basis of modern effective management. Recently, the concept of “risk management” has expanded significantly, as international best practices recommend managing risks at both the operational and organizational levels. As a working hypothesis, it has been suggested that it is necessary to classify organizational risks in order to improve the efficiency of their management. As part of the study, an analysis of the provisions of GOST R ISO 22000-2019 “Food safety management systems” was carried out. Requirements for organizations participating in the food product creation chain” [1] based on which classification criteria for organizational risks were proposed, areas of their possible occurrence were identified and they were systematized in accordance with the peculiarities of enterprise activity planning.

Keywords: organizational risks, external organizational risks, internal organizational risks, risk management, areas of risk occurrence, risk identification.

Sergeev L.I., Sergeev D.L.

STUDY OF THE IMPACT OF BUDGET SUPPORT ON THE FUNCTIONING OF THE AGRICULTURAL AND FISHING INDUSTRY OF THE COUNTRY

Abstract. The content of a number of scientific publications in the field of problems of agricultural development, state support for agriculture and fisheries is considered. The dynamics of expenditures of various budgets and financing of agriculture, fisheries and fish farming in the country for 2014-2026 is summarized. The parameters of econometric models of the dependence of the budget system's expenditures on agriculture, fisheries and fish farming on the growth of agricultural products are calculated. The correlation parameters of the links between budget support for agriculture and the fish industry with the results of the work of these industries have been revealed. The result of the increase in agricultural production was obtained mainly at the expense of consolidated regional budgets, which is 2 times higher than at the expense of other budgets. The fact of a weak connection between the catch (extraction) of aquatic biological resources and federal budgetary resources allocated to Rosrybolovstvo was noted. It has been established that the price factor is essential for analyzing the dynamics and content of the processes

of formation of the natural value proportions of enterprises in the fishing industry. The elasticity of revenue to the volume of extraction of aquatic biological resources is analyzed.

Keywords: Agriculture, fisheries and fish farming, industry products, budget expenditures, catch of aquatic biological resources, linear regression, correlation, revenue.

Skorobogatova V.V., Shelchuk E.A.

USING BIG DATA TO IMPROVE MANAGEMENT EFFICIENCY IN MODERN ORGANIZATIONS

Abstract. This article discusses the use of Big Data in the field of improving management efficiency in modern organizations. Big Data has huge potential for optimizing business processes and improving strategic management. One of the main advantages of Big Data in business is the ability to analyze huge amounts of information, data from various sources, which allows an organization to identify hidden patterns, trends, and decision-making options that may not be noticed during normal analysis. The use of big data allows companies to make more informed and objective management decisions based on the analyzed large amounts of data. Big Data is one of the key and progressive direction in the field of information technology to improve management efficiency.

Keywords: Big Data, big data, data analysis, management effectiveness, business analytics, decision- making, strategic planning, risk management.

Sushko N.A.

PROBLEMS OF ENSURING THE ECONOMIC SECURITY OF THE ENTERPRISE

Abstract. The objects of economic security of the enterprise are presented in the form of an integrated system-complementary model. The properties of the specified model are highlighted. The resource-functional components of the economic security of the enterprise are characterized with an emphasis on their intended purpose and the probable risk of the economic security of the enterprise. The resource and functional components of the enterprise's economic security system are listed. The definition is given and the essence of protection against threats is revealed. The process components of the enterprise's economic security system are listed. The characteristics of the process components of the economic security system of the enterprise are given, highlighting their intended purpose and the likely risk of economic security of the enterprise. The components of internal and external transformation processes are considered. A structural and logical scheme for ensuring the economic security of an enterprise at different levels of management is proposed. The stages of enterprise management at the strategic and tactical levels are highlighted.

Keywords: economic security, system, model, complex, components, provision.

Yarkina N.N., Oleksenko O.S.

A SYSTEMATIC APPROACH TO ENSURING THE ECONOMIC SECURITY OF BUSINESS ENTITIES

Abstract. The subject of the study is a systematic approach to ensuring the economic security of business entities. The relevance of the research topic is predetermined by permanent challenges and threats to business, the neutralization and reduction of which require the development of theoretical and applied foundations for ensuring the economic security of business entities. The systematic approach is updated as the main methodical approach within the framework of the methodology for ensuring the economic security of business. The conceptual and functional approaches to the system of ensuring the economic security of business entities are highlighted. Its structural and logical scheme has been developed and described from the standpoint of a conceptual approach. The elemental composition of the mechanism for ensuring the economic

security of business entities is detailed. The elemental composition of the economic security system is presented from the standpoint of a functional approach. The connection between the elements of conceptual and functional approaches to ensuring the economic security of an enterprise is shown and their synergetic effect is emphasized.

Keywords: economic security of business entities, ensuring economic security, a systematic approach.

Maksimov A.B.

THE STUDY OF FRACTURE ON A MODEL MATERIAL WITH A STRENGTH GRADIENT IN THICKNESS

Abstract. According to the literature data, it is established that the destruction of paper occurs according to the laws of linear mechanics of the destruction of solids. In this paper, the destruction of solids with areas of varying strength is modeled on paper samples. The destruction of thick-rolled products with a strength gradient in thickness is modeled. This allowed us to establish some patterns of destruction of the gradient material. It has been experimentally established that the fracture begins in a more durable area and spreads towards the lowest strength. That is, the destruction goes against the strength gradient. In a more general form, it can be said that destruction begins in the layer where the plasticity of the material reaches its maximum value. The loss of the reserve of plasticity of a solid is associated with the onset of neck formation during stretching. The maximum value of uniform elongation can serve as a criterion for the reserve of plasticity of a material. An analytical expression is obtained linking the magnitude of the chipping stress with the parameters of the hardened metal layers under tension.

Keywords: model material, flow stress, material with strength gradient, crack stress, uniform deformation.

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Efimova T.V., Churilova T.Ya., Moiseeva N.A., Buchelnikov A.S., Skorokhod E.Yu.,
Buchelnikova V.A.

PRODUCTIVE CHARACTERISTICS OF PHYTOPLANKTON IN SURFACE LAYER OF THE ATLANTIC REGION OF THE SOUTHERN OCEAN (AUSTRAL SUMMER OF 2020)

Abstract. Photosynthetic characteristics of phytoplankton were measured in surface layer of the Atlantic region of the Southern Ocean in austral summer of 2020. Gross primary production was estimated for the first time based on full spectral approach. Chlorophyll *a* specific photosynthesis rate was $1.2 \pm 0.4 \text{ mgC mgChl}^{-1} \text{ h}^{-1}$ on average. Daily primary production co-varied with chlorophyll *a* concentration. The relationship between these parameters was described by a power function. The obtained relationship can be applied for assessment of the primary production in surface layer of the Southern ocean in summer based on *in situ* and remote sensing data.

Keywords: primary production, photosynthetic rate, spectral approach, chlorophyll *a*, the Atlantic region of the Southern Ocean.

Nikiforov-Nikishin D.L., Kochetkov N.I., Dzhavakhiya V.V., Glagoleva E.V., Ginayatov N.S.,
Nikiforov-Nikishin A.L., Kartashov M.I., Uvaidov M.M.

INFLUENCE OF THE PROBIOTIC PREPARATION “AQUASPORIN” ON FISH- BREEDING-BIOLOGICAL, PHYSIOLOGICAL AND HISTOLOGICAL INDICATORS OF RAINBOW TROUT (ONCORHYNCHUS MYKISS)

Abstract. This paper examines the effect of the probiotic preparation “Aquasporin” on fish-breeding-biological, biochemical, hematological and histological indices of rainbow trout (*Oncorhynchus mykiss*) under long-term experimental conditions (90 days). As a result, of experimental feeding, a reliable increase in the growth rate of fish in the experimental group (10,7 %) was established, as well as a decrease in the feed coefficient to 1.07. The studied feed additive affected hematological parameters, leading to a decrease in the number of monocytes (up to 2 %) and an increase in the number of basophils (up to 4,2 %). Biochemical analysis of fish blood showed that the feed additive led to an increase in protein metabolism parameters (total protein, globulin, albumin), as well as ALT activity and the amount of creatine. In turn, histological preparations of the intestine revealed an increase in the occurrence of immunocompetent cells in the mucous membrane. In liver sections of the experimental group of fish, expansion of sinusoidal capillaries was noted. The results of the experiment demonstrated that the probiotic feed additive “Aquasporin” helps to improve production indicators and stimulate non-specific immunity of fish in industrial aquaculture.

Keywords: rainbow trout, probiotics, feed additive, size and weight parameters, hematology, biochemistry, histology.

Moiseeva N.A., Churilova T.Ya., Skorokhod E.Yu., Salyuk P.A., Efimova T.V., Davydova D.G.,
Sausheva A. A., Samoilov M. A.

RELATIONSHIP CHLOROPHYLL A CONCENTRATION VS. CHLOROPHYLL A FLUORESCENCE MEASURED WITH A SUBMERSIBLE SENSOR IN THE COASTAL WATERS NEAR KAMCHATKA

Abstract. The research was carried out in the coastal waters near Kamchatka in August-September 2023. within the euphotic zone, 3 water layers were observed: the upper mixed layer, the thermocline and the layer between the thermocline and the bottom of the euphotic zone. These 3 water layers differed in the environmental conditions: light and temperature. The phytoplankton photosynthetic parameters (chlorophyll *a* specific light absorption coefficient and fluorescence

quantum yield) changed in different water layers, which led to a change in the coefficient of correlation between chlorophyll *a* concentration and chlorophyll *a* fluorescence measured with a submersible sensor. The use of a unified correlation coefficient for samples from the entire water column within the euphotic zone leads to an inaccurate assessment of chlorophyll *a* concentration based on fluorescence measurements.

Keywords: chlorophyll *a*, fluorescence, WetStar W535-1246, coefficient of light absorption by phytoplankton, coastal waters near Kamchatka.

Makarov A.E., Nugmanov A.H.-H., Aleksanyan I.Yu., Osmolovskiy P.D., Fomenko E.V.
**MATHEMATICAL MODELING OF THE EXTRACTION OF WATER-SOLUBLE
SUBSTANCES FROM PERSIMMON PULP**

Abstract. Persimmon is a dietary food product, the pulp of which contains a large number of biologically active compounds, trace elements, and a vitamin complex. The preservation of fruits in fresh form is one of the existing problems, for this reason, the introduction of modern methods of processing raw materials of plant origin in the production of food products will allow to preserve the beneficial properties of persimmons to a certain extent. The intensification of extraction is carried out on the basis of static, kinetic and hydrodynamic laws. The construction, adaptation to the object of research and the process under study, as well as the solution of a mathematical model, served as the purpose of this study. In general, it can be noted that at any period of the mass transfer process, there are differences in the concentration of extractive substances in the volume of persimmon pulp particles, possibly due to the inertia of the mass transfer energy. In addition, the obtained adaptive models of extraction processes will allow, with varying boundary conditions of its implementation, to implement an iterative procedure, the use of which predicts the amount of substances soluble in the extractant in the composition of fruit raffinate, satisfying the overall material balance, and each iteration should be accompanied by a calculation over the entire volume of the dispersed particle.

Keywords: persimmon pulp, water-soluble substances, extraction, mass transfer equation, mathematical model, finite difference method.

S.V. Shakhov, S.T. Antipov, V.A. Panfilov
ACCELERATED DEVELOPMENT OF FOOD PRODUCTION TECHNOLOGIES

Abstract. The article is devoted to some aspects concerning creation of technologies for the future of the Russian agro-industrial complex. The focus is on the synergetic approach to the development of complex food technologies. The range of issues discussed includes: defining of food technologies of the future; creating end-to-end agro-food technologies for food products; the structure of the synergetic complex “Agro-food technology”; problems solved by agro-food technologies; quantitative indicators of food technologies quality, conditions for the creation of agrobiofactories and agrozoofactories. Particular focus is paid to the industrial concept of the agro-industrial complex of Russia. It has been proven that the development of the food industry is impossible without fundamental scientific research and high-tech production systems. At the same time, the essence of scientific research is determined by the need to create a basis for the systemology of process flows for all processing industries of the agro-industrial complex, including the development of engineering calculation methods and feasibility studies for decision-making when implementing machine systems.

Keywords: food technologies of the future, synergetic systemic agro-industrial complex, quantitative indicators of the quality of technological processes, industrial production and agricultural products processing.

Budagov N.V.

AGRICULTURAL PRODUCTION IN THE CONTEXT OF ENSURING FOOD SECURITY IN THE REGION (BASED ON THE MATERIALS OF THE STAVROPOL REGION)

Abstract. Ensuring the required level of food security at the regional level is of a strategic nature. The problematic nature of the stated issue is due to the effect of economic sanctions, which have both a financial, economic, and technical and technological basis. At the same time, overcoming emerging contradictions is largely connected with the need to build a mechanism for the production of food products and agricultural raw materials, by creating acceptable conditions for participants in agricultural production. The efforts taken by government bodies, both at the federal and regional levels, are usually local in nature and practically do not have a synergistic effect. The authors noted the prospects for agricultural production, including by filling economic niches that are uncharacteristic for the region. Attention is focused on the need to pursue a consistent policy of supporting participants in agricultural production, based on the use of a set of measures.

Keywords: Food products, agricultural raw materials, food security, region, agro-industrial complex, agricultural production, rural areas, government regulation, food independence.

Lapteva E.P., Dorskach L.A.

MODELING THE PROCESS “DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED MANAGEMENT SYSTEM AT AN FISHING INDUSTRY ENTERPRISE” TAKEN INTO ACCOUNT OF THE FEATURES OF DIFFERENT INTEGRATION APPROACHES

Abstract. The article is devoted to the development of methodological foundations for the creation of IMS at fishing industry enterprises, taking into account various integration approaches. The analysis of approaches to integration showed that there are three approaches to the integration of various management systems, each approach has its own advantages and disadvantages, but the choice of approach remains with the enterprise, and therefore the main principles of developing an integrated management system based on integrated, parallel and sequential approaches at a fishing industry enterprise. To design a model of an integrated management system based on an integrated approach, graphical modeling in the form of a block diagram was chosen. For parallel and sequential approaches to designing an integrated management system, a model was built based on functional modeling in the IDEF0 methodology. These models provide a visual understanding of all actions, and reflect the functions and tasks of each stage, and the nature of the relationships between them. The constructed models are able to provide a complete picture of both the functioning of the process of creating an integrated management system and all available information flows.

Keywords: integrated management system, food safety management system, environmental management system, integration approaches, graphical modeling, IDEF0 functional modeling methodology.

Rysina V.A.

ARTIFICIAL INTELLIGENCE IN THE ORGANIZATION OF ACCOUNTING

Abstract. The article examines the main directions of using AI technologies in the organization and management of accounting and related changes in the context of this. The organization of primary accounting in the conditions of artificial intelligence application is characterized. A diagram of the functioning of machine intelligence on the PUD system has been compiled. It has been revealed that AI services in accounting save the labor and financial resources of an organization. The characteristics of Russian accounting intellectual services are given. The main development prospects of accounting in the digital space are listed. It has been established that

artificial intelligence technologies in the accounting sphere are an effective tool in solving accounting problems, which transforms the functioning of modern accounting. It is argued that due to the use of artificial intelligence, the accuracy and reliability of accounting data is increased, a high level of security is ensured, various data formats are effectively used in accounting, and the analytical capabilities of accounting employees are expanded.

Keywords: accounting, primary accounting documents, digital space, artificial intelligence, intelligent services.

Kryuk R.V., Kurbanova M.G., Kolbina A.U., Goloveshkin E.A.

THE USE OF ALTERNATIVE SOURCES OF FUNCTIONAL SUBSTANCES IN THE STRUCTURE OF MODERN NUTRITION

Abstract. The main trend in the modern world is a healthy lifestyle, as well as longevity by means of proper nutrition, but most people do not think about the fact that by consuming the necessary kilocalories, the body does not receive enough vitamins from them and thereby loses the functional properties it needs on a daily basis. The purpose of the study was to search for various articles, abstracts, patents, books that present and describe the functional properties of products such as orange, blueberry and green tea. During the search, the above products were investigated, in addition to the fact that they contain a large number of micro- and macronutrients, they have various functional properties; so orange has antioxidant, antimicrobial properties, in addition, it has a beneficial effect on the cardiovascular system and contributes to the normal functioning of the liver, has a hypoglycemic and hypolipidemic effect.

Keywords: functional foods, healthy lifestyle, functional properties of berries and fruits, functional properties of green tea.

Gorbunov A.V., Brezhnev L.L., Belov V.L., Dobrenko I.A.

APPROBATION OF PROMISING REAGENT-FREE WATER TREATMENT TECHNOLOGIES IN INDUSTRIAL AQUACULTURE, WITH AN ASSESSMENT OF THEIR BIOSAFETY

Abstract. This article presents the results of the R&D phase carried out within the framework of the implementation of the Decree of the Government of the Russian Federation dated 04/09/2010 No. 218. Preliminary tests (approbation) of prototypes of reagentless installations designed to improve the quality of technological waters of aquaculture using ultraviolet radiation (UV) and ultrasound (ultrasound) were carried out. The devices of the hull pressure (UFUZ-K) and submersible (channel) non-pressure (UFUZ-P) type were tested. The approbation was carried out at an operating fish hatchery of cold-water aquaculture (trout), which uses closed-loop water supply installations (RAS) and a circulating water supply system (RWS). The qualitative normative and fish-breeding indicators of the technological aquatic environment were monitored: chromaticity, turbidity, biological oxygen consumption (BOD₅, BOD_{total}), permanganate oxidizability. The technology used in them for biological safety for aquaculture hydrobiocenosis was evaluated in an integrated manner according to the purpose of each tested technological water treatment device.

Keywords: aquaculture, RAS, RWS, quality of process waters, combined use of UV and ultrasonic, water treatment, UFUZ.

Polin A.A., Suetnikov A.V., Polina N.V.

ASSESSMENT OF THE STABILITY OF DEVELOPMENT OF HATCHERY JUVENILE STERLET ACIPENSER RUTHENUS LINNAEUS, 1758 ACCORDING TO THE DEGREE OF FLUTUATING ASYMMETRY OF MERISTIC CHARACTERISTS

Abstract. According to the degree of fluctuating asymmetry of meristic features, an analysis of the stability (stability) of the development of juvenile sterlet grown at sturgeon hatcheries of the Azov-Black Sea fisheries basin was carried out. The samples of fish from the Don sturgeon plant, Rogozhinsky fish hatchery, Grivensky and Temryuk sturgeon hatcheries are considered. The high fish-breeding and biological characteristics of farmed fish (including their fitness coefficients) are shown. At the same time, low stability of the development of individuals was noted, manifested in a high degree of fluctuating asymmetry of meristic features of fish. The stability of development was significantly lower in juvenile starlet grown in fish hatcheries of the Azov-Kuban basin, relative to the Azov-Don basin. It is noted that the indicators of the stability of the development of juvenile sterlets from different plants are consistent with the data on survival in the process of their cultivation.

Keywords: sterlet, Azov-Black Sea fishery basin, fish hatcheries, artificial reproduction, fluctuating asymmetry, development sustainability, meristic parameters.

Shaganov V.V., Belogurova R.E.

GROWTH AND FEEDING OF THE PEACOCK BLENNY *SALARIA PAVO* (PISCES: BLENNIIDAE) IN THE KERCH STRAIT (THE CRIMEAN PENINSULA)

Abstract. This paper provides data on the size and mass composition, age, growth rate and feeding of a new species of the combtooth blenny family (Pisces: Blenniidae) in the Kerch Strait – the peacock blenny *Salaria pavo* (Risso, 1810). The studied individuals of blenny from the Kerch Strait had sizes (SL) from 7.3 to 11.7 cm, on average – 9.6 ± 0.09 cm, and a weight from 7.12 to 27.63 g, on average 15.06 ± 0.46 g. The age of the caught fish ranged from 2 to 4 years; the modal group (about 60% for females and males) made up three-year-olds. The increase in the linear size

of dogs (SL) in the third year of life was 0.86 cm, in the fourth – 0.8 cm. In the food lumps of the studied specimens, crustaceans dominated in frequency (51.7%), among which representatives of the Isopoda order occupied the leading role (37.1%). Free-living polychaete were in second place in the diet of this species in terms of frequency of occurrence (33.7%). Currently, it is possible to state the fact of the expansion of the area of the peacock blenny in the northern direction and its constant presence in the waters of the Kerch Strait.

Keywords: peacock blenny, *Salaria pavo* (Risso, 1810), Kerch strait, growth, feeding.

Gamayunov O. A.

ECOLOGICAL URBANISM IS AN INNOVATIVE APPROACH TO PLANNING THE URBAN ENVIRONMENT

Abstract. The article examines the concept of ecological urbanism, its stages of formation and application in the planning of modern cities. The relevance of the topic is due to the fact that at the present stage of society's development, urban planning must meet modern requirements and principles of sustainable development. Eco-urbanism is a relatively new trend in urban planning, which originated in the middle of the last century and now represents a modern, innovative approach to creating a favorable urban environment. As a result of the research, the main stages of the formation of eco-urbanism were formulated, the approaches on which the practical application of the concept is based were presented, the stages of the introduction of eco-urbanism were detailed and innovative components such as the use of environmental services in improving the quality of life of the urban population were presented.

Keywords: Urban environment, ecological urbanism, planning, ecosystem services, sustainable development, green spaces.

Sukharensko E.V., Vodolazskaya I.V.

CHARACTERISTICS OF BIOSAFETY INDICATORS OF THE RAPANA (*RAPANA VENOSA*, VALENCIENNES, 1846) OF THE KERCH STRAIT

Abstract. *Rapana venosa* is found along the entire coast of the Black and Azov Seas and is a promising fishery target. The safety of this type of raw material is of particular importance, which is relevant in the context of global environmental pollution. According to the study, in 2024, the maximum cadmium content in rapana meat was 2.5 times; lead – 90.9 times; mercury – 100 times lower than the maximum permissible level (MPL). The content of cesium-137 and strontium-90 in rapana meat in 2023 and 2024 was approximately at the same level. These indicators are more than 40 times (for cesium) and 47 times (for strontium) lower than the MPL. The results of determining the content of pesticides in rapana meat show that in 2023 and 2024 these indicators are more than 4 times lower than the MPL. In 2024 the maximum indicators of content of mesophilic aerobic and facultative anaerobic microorganisms in rapana meat were 19 % lower than similar indicators in 2023. The obtained results of determination of the content of heavy metals, pesticides and radionuclides, as well as QMAFAnM in the meat of *Rapana venosa* give grounds to conclude that this mollusk can be used as raw material for the production of feed and food products, as well as therapeutic and prophylactic drugs.

Keywords: rapana, heavy metals, pesticides, radionuclides, biosafety.

Sytnik N.A.

IMPROVEMENT OF THE ECOLOGICAL SITUATION IN THE COASTAL PARTS OF THE BLACK SEA ON THE BASIS OF LOCAL STABILIZATION OF HYDROGEN SULFIDE ZONES

Abstract. Ecological problems of occurrence of hydrogen sulfide zones in coastal areas of the Black Sea are considered. The relevance of the topic is caused by the spread of hydrogen sulfide

zone to the shallow part of the Black Sea, rich in fish stocks, which leads to its death. At present the rise of hydrogen sulfide waters in the Black Sea has a local character. This makes it expedient to develop methods and devices for local stabilization of the surface oxygen-containing layer. The vacuum method of lifting and withdrawal of deep water is offered, efficiency of which is confirmed by experimental researches on specially created installation. The technology of deep water purification consists of several stages, which provide water lifting, its purification, collection and storage of hydrogen sulfide, return of purified water. The most enorgo- and material-intensive are the systems which provide realization of stages of lifting and return of deep water. In work advantages of vacuum method of water lifting from depths of 200-250 m are shown. This method is realized in the experimental installation created on the principles of the theory of similarity. Further development of this direction assumes creation of ship installations on local stabilization of hydrogen sulphide zones of the Black Sea, which can contribute to restoration of natural equilibrium disturbed by anthropogenic activity.

Keywords: Black Sea shelf, hydrogen sulfide zone, local stabilization, pilot plant.

Bityutskaya O.E., Bulli L.I., Donchenko L.V., Lavrinenko O.I., Mazalova N.F., Makarenko A.O.

CLAM CHAMELEA GALLINA (LINNAEUS, 1758) AS A POTENTIAL RAW MATERIAL FOR DELICACY FOOD

Abstract. *Chamelea gallina* (Linnaeus, 1758) is considered an aborigine of the Black Sea and is the most widespread species and object of world trade. Clusters of mollusks have also been noted in the Kerch Strait, which belongs to the waters of the Sea of Azov. The article presents averaged data on the size and mass composition of *Ch. gallina*: the maximum length of the mollusk was 30 mm with a body weight of 0.69 g; the flaps account for 65.5% of the total mass of the mollusk; meat yield was 12.8%. The variation series of the distribution of the length and mass of the mollusk were compiled. Studies of the chemical composition and energy value have been carried out: shellfish meat was watered, the content of clam protein substances reached 77% a.d.m., carbohydrates – 16% a.d.m.; meat was low in calories. The protein-water and lipid-protein coefficients of meat were calculated: 15.3–19.9% and 0.06, respectively. The analysis of the amino acid composition of shellfish proteins was carried out, the amino acid score and biological value were calculated. The content of mineral elements (calcium, magnesium, phosphorus, iodine, etc.) was determined. It was found that the values of toxic elements in shellfish meat did not exceed the permissible levels of hygienic safety requirements. A brief description of the organoleptic properties of *Ch. gallina* meat was given. The obtained results of the study allow us to speak about the value of the mollusk meat for the preparation of gourmet food products.

Keywords: clams, *Chamelea gallina*, venus, size and mass composition, nutritional value.

Kirichenko V.A., Gromov S.V.

A MATHEMATICAL MODEL OF THE VACUUM EVAPORATIVE COOLING PROCESS IN A PASTEURIZATION AND COOLING PLANT

Abstract. The article presents a mathematical model of the process of vacuum-evaporative cooling of wet polyurethane foam used as a refrigerant (water) evaporator in the design of a shell-and-tube heat exchanger for cooling pasteurized food liquids. The developed mathematical model makes it possible to determine the mass of water vapor removed from wet polyurethane foam located in the inter-tube space of a shell-and-tube heat exchanger; pressure in the inter-tube space of a shell-and-tube heat exchanger in accordance with the removed mass of water vapor; temperature of saturated water vapor corresponding to a certain pressure; total evaporation of water from wet polyurethane foam; pressure in the inter-tube space of a shell-and-tube heat exchanger, taking into account the intake evaporated water into it. Thus, it is possible to determine all the parameters necessary for the design of pasteurization and cooling plants.

Keywords: pasteurization, liquid food products, mathematical model, vacuum evaporative cooling.

Mukhamedov T.A., Mukhamedova S.M.
**COMPARATIVE ASSESSMENT OF QUALITY INDICATORS
HORSE MEAT OF DRY AND WET MATURATION**

Abstract. This article is devoted to the dry and wet maturation of horse meat lasting 14 and 21 days and the study of its quality indicators. The object of the study was the longest muscle (Longissimus Dorsi) from the spinal-lumbar cut of horse meat. Fat and connective tissue were removed from the muscle surface, each horse meat sample was cut into four samples with an average weight of 3.4 kg, and then they were randomly distributed according to duration (14 and 21 days) and maturation method (dry and wet). For dry maturation of horse meat, the dry-aging Samaref dry maturation cabinet (SAMAREFDE 700 RFPVBK, Samaref, Italy) was used. For wet maturation of horse meat, vacuum bags of the polyamide type with polyethylene (PA/PE), 120 microns thick, packed in a Turbovac apparatus (Turbovac ST-320, Turbovac, the Netherlands) were used. The results of the study of samples of horse meat of dry and wet maturation according to organoleptic, physico-chemical, microbiological parameters and indicators of chemical and mineral composition are presented.

Keywords: horse meat, dry and wet maturation, chemical and mineral composition.

Sukharenenko E.V., Stratii A.V.
**EFFECT OF FLAX ON ORGANOLEPTIC PROPERTIES OF MINCED PRODUCTS
FROM HYDROBIONTS**

Abstract. The expediency of adding crushed flax meal to multicomponent minced meat compositions is due to its unique physico-chemical properties. A significant part of the polysaccharides of flaxseed meal is represented by carbohydrates of flaxseed mucus, which are prebiotics, help reduce blood cholesterol and glycemic index, and also significantly affect the moisture-retaining ability of the product. The study of the effect of flax meal on the organoleptic properties of minced meat compositions opens up new horizons in the field of innovative seafood technologies. The effect of flax meal on the texture and organoleptic characteristics of minced meat from aqueous raw materials is shown. As a result of modeling the properties of experimental samples, it was found that the most balanced consumer characteristics are demonstrated by a mixture containing 75 % pilengas fillet, 25 % squid meat and 5 % ground flax meal. The inclusion of flax meal in minced meat compositions is a perspective.

Keywords: food products from hydrobionts, organoleptic characteristics, minced compositions from hydrobionts, flax seeds.

Yasnov A.S., Nugmanov A.H.-H., Aleksanyan I.Yu., Osmolovskiy P.D., Bakin I.A.
**IDENTIFICATION OF THERMOPHYSICAL CHARACTERISTICS AND
PARAMETERS OF THE DRYING PROCESS OF CATFISH LIVER IN A THIN LAYER**

Abstract. To identify rational modes of preservation of wet thermolabile materials, including fish, using moisture removal, as well as modeling this process, it is necessary to study the thermophysical characteristics of the drying object, as well as the parameters of heat and moisture transfer. In this study, the object of study is the liver of the common catfish (*Silurus glanis*), both in raw and dried conditions, when exposed to microwave radiation. As a result of the conducted research, the values of the thermophysical characteristics and parameters of the dehydration process of catfish liver were revealed within the technologically justified framework of their variation, which served as the basis for identifying rational modes of preservation of wet thermolabile materials using microwave drying. A comparison of the data obtained with the results of similar studies by other authors shows that the experimental results obtained adequately correlate with them and, therefore, can be successfully used in the food industry.

Keywords: catfish liver, humidity, drying, thermophysical characteristics, heat transfer, criterion equation, technological limitations.

Kotenev A.D., Mesherin A.I., Mamontov D.Y.

INTERNATIONAL THREATS TO THE FUNCTIONING OF THE AGRO-FOOD MARKET IN THE CONTEXT OF ENSURING FOOD SECURITY

Abstract. The functioning of the international agro-food market is subject to constant negative impact caused by the presence of various threats of both socio-economic and political-legal nature. The presence of such externalities complicates the actions of national governments in the field of ensuring the required level of food security. In these conditions, it is necessary to adopt joint interstate decisions aimed at developing constructive measures to prevent existing threats. At the same time, the disunity of participants in the international agro-food market gives rise to barriers that are negative for all its participants. The authors present theories of behavior of participants in food markets, identify factors that hinder their development, and make assumptions about the destructive influence of individual states on the existing mechanism of food distribution in the international arena. The noted role of Russia as a global player in the world food market is confirmed by the corresponding conclusions.

Keywords: agro-food crisis, food security, international threats, food products, government regulation, agricultural raw materials, economic security, agricultural production.

Kotenev A.D., Tereshenko O.V., Solovieva L.V.

ASSESSMENT OF THE STANDARD OF LIVING OF THE POPULATION IN CONDITIONS OF UNCERTAINTY

Abstract. In the conditions of socio-economic uncertainty caused by the actions of internal and external negative factors, the most important task of the authorities of both the federal and regional (local) levels is to ensure the stability of the standard of living of the population. The complexity of the stated problem is due to the presence of gaps in both theoretical aspects and practical approaches that require the adoption of a set of measures. Based on the analysis of theoretical and methodological views on assessing the standard of living of the population, the author's position on the causes of the low standard of living of the population, as well as an interpretation of the definition that combines a number of interrelated components - social, economic and cultural. The reasons for the decline in the standard of living of the population of some federal districts are established, in comparison with others - the prevalence of rural residents over urban residents and the lack of employment in the industries that are leaders in wages. The factors contributing to the outflow of highly qualified personnel are identified, which are due to both purely economic reasons and socio-cultural ones, requiring urgent measures from both the state and society as a whole.

Keywords: standard of living, unemployment, cash income, purchasing power, employment, human resources, quality of life.

Kravtsov S.A., Truba A.S.

COMPREHENSIVE ANALYSIS OF THE FISHERIES COMPLEX OF KAMCHATKA KRAI: SWOT AND PESTEL TOOLS

Abstract. The article presents a comprehensive analysis of the fisheries complex of the Kamchatka Territory using the SWOT and PESTEL methods. The fisheries industry in the region plays a key role in the economy, providing jobs and food security. SWOT analysis helps to identify the strengths and weaknesses of the industry, as well as the opportunities and threats it faces in a rapidly changing market environment. PESTEL analysis examines external factors influencing the development of the fisheries complex, including political, economic, social, technological, environmental and legislative aspects. International policy, government support, supply and

demand, exchange rates and environmental protection are found to require particularly careful monitoring and adaptation of strategies to minimise risks and exploit opportunities. The results of the study will help stakeholders, including investors, representatives of executive authorities and researchers, to develop strategies aimed at sustainable development of the fisheries sector and increasing its competitiveness.

Keywords: SWOT, PESTEL, analysis, strengths, weaknesses, opportunities, threats, matrix, strategic planning, factors, strategy.

Kuzicheva N.Yu., Karamnova N.V., Solomakhin M.A.

PRINCIPLES AND PATTERNS OF STRATEGIC DEVELOPMENT OF HORTICULTURE

Abstract. The article discusses the content of the principles and laws of the strategic development of horticulture. The principles are considered as a strict standard for managing transformation processes occurring in the industry. The following principles are characterized: targeted development on a strategic basis in the economic space; balanced development opportunities; increasing efficiency of strategic development; sufficiency of food supply; diversity of the external environment, consumer preferences, technological diversity, multi-structured agrarian economy; scientific validity of the parameters of strategic development. The regularities of strategic development of horticulture are revealed, periodically manifesting themselves depending on the conditions of the external and internal environment of agribusiness, namely: manifestation of the determining influence on horticulture of the realized innovative potential of the industry; development of horticulture in households as a type of insurance coverage of affordable fruits for the population; increase in strategic risks with deepening intensification of horticulture.

Keywords: gardening, principles, patterns, development, strategy.

Piskun E.I., Shabalina N.V.

SUSTAINABLE DEVELOPMENT OF YACHT TOURISM IN THE RUSSIAN FEDERATION

Abstract. The issues of sustainable development of yacht tourism in the Russian Federation are considered. It is emphasized that yacht tourism, like any other type of tourism, creates a multiplicative economic effect and contributes to the development of related industries, which ensures the sustainable development of the region. Special attention is paid to the sustainable development of yachting tourism in the city of Sevastopol, which involves the creation of a tourist and recreational cluster that creates both the basis for regional prosperity and the recreation area of the country's citizens. The development of yacht tourism in Sevastopol plays a key role in stimulating the formation of specialized clusters and activating mechanisms of public-private partnership. The model of the formation of the competitive advantages of the city of Sevastopol in the context of the development of yacht tourism, including the implementation of a number of economic strategies, is described, their advantages are highlighted. It is proved that the sustainable development of yacht tourism in the region will ensure the careful use of the natural environment, the effective formation of socio-cultural space, form new settlements, marinas will become centers of cultural life and entertainment, the development of the hotel industry and restaurant business, sustainable development of the region's economy.

Keywords: sustainable development, yacht tourism, tourism and recreation cluster, regional economy.

Sergeev L.I., Sergeev D.L.

STUDY OF THE RELATIONSHIP BETWEEN THE TOTAL PRICE OF FISH PRODUCTS AND THE VOLUME OF AQUATIC BIORESOURCES PRODUCTION IN THE COUNTRY

Abstract. Some studies of domestic scientists on issues of economics, management and reproduction of products in the fishing industry are considered. The logic of macroeconomic natural – value equilibrium of the system of purchase and sale of goods and benefits is presented as a parabola in the corresponding system of the total volume and total price of sales of goods. The dynamics of the aggregate indicators of revenue, sales prices of fisheries complex products, production and their indices for 2005–2023 is analyzed. The regression dependence of the production of water biomass on the sales price of fisheries complex enterprises' products is revealed. The parameters of the dynamic equilibrium of the sales price and catch of water biomass are established. The dynamics of the aggregate annual price indices and annual production indices of water biomass for 2006–2023 are analyzed. The change in the absolute indicators of the annual increase in prices for fish products and the annual increase in the catch of water biomass for 2006–2023 is considered. The dependence of elasticity – the ratio of the index of change in the catch of water biomass on the index of growth in the selling price of fish products in the industry is constructed. A constant change in the parameters of the market equilibrium of the price of fish products in the industry relative to the change (dynamics) of its average value in the range from 0.71 to 1.15 points is revealed. The hypothesis of the study has been confirmed – the growth of the aggregate price of sales of fish products significantly outpaces the increase in the volume of catch of aquatic biological resources, which requires special regulation of the mechanisms for optimizing the processes of reproduction of natural-value proportions of the development of fisheries activities in the country.

Keywords: fishing industry, aggregate demand, aggregate price, market equilibrium, dynamics of indicators, elasticity, extraction of water resources, revenue.

Sushentsova S.S., Barishevsky E.V.

ORGANIZATIONAL AND ECONOMIC CONDITIONS FOR THE FORMATION OF A UNIFIED SYSTEM OF AGRICULTURAL COOPERATION IN RUSSIA

Abstract. Modern conditions of digitalization of the agricultural economy, changes in the agricultural production structure and sectoral specialization are causing changes in cooperative relations. The current state forms of support, the desire of cooperative participants to receive more profit from increasing market share and increasing the number of consumers, the desire to profitably use modern communication media to organize the sale of products and purchase the necessary means of production, works and services, encourage the organization of a unified system of cooperatives. Therefore, it is especially important at present to support the creation of favorable organizational and economic conditions for the formation of an innovative mechanism of cooperative relations based on the principles of consistency, rational manageability, profitability, openness, dynamism and others. The methods of expert assessments, scientific, literary and analytical generalizations were used in the research process. The creation of a unified system of cooperation will ensure a new level of quality of development of various types of cooperatives, unlock the potential in expanding the spheres of cooperative relations, improve the forms of organization of state support and ensure the sustainability of rural development.

Keywords: organizational and economic conditions, cooperation, system, profitability, social responsibility, state regulation, management, personnel, information, digitalization.

Sushko N.A.

INFORMATION AND ANALYTICAL SUPPORT OF THE MECHANISM OF REPRODUCTION OF FIXED ASSETS IN ORDER TO ENSURE THE ECONOMIC SECURITY OF THE ENTERPRISE

Abstract. A schematic representation of the information and analytical support system for the management mechanism for the reproduction of fixed assets of the enterprise is presented. It is determined that information including normative and factual data should be used to assess the level of efficiency of the system of reproduction of fixed assets. The main elements of the specified system are characterized: object, purpose, tasks, principles, subsystems, functions, tools, information support, the result of the functionality of the system. A model of the structure of the information and analytical support system for the management mechanism of the reproduction system of fixed assets of the enterprise is constructed. The content of all subsystems included in the model is disclosed: predictive, analytical, accounting and control subsystems. The tools of the information and analytical support system for the reproduction of fixed assets are presented. The organization and sequence of monitoring of the information and analytical support system for the reproduction of fixed assets of the enterprise is schematically shown. The provisions defining the emergence of the need for monitoring the information and analytical support system for the reproduction of fixed assets of the enterprise are highlighted.

Keywords: system, fixed assets, model, reproduction, information and analytical support.

Yarkina N.N., Yuras D.S.

FINANCIAL SECURITY IN THE SYSTEM OF ECONOMIC SECURITY OF THE ENTERPRISE

Abstract. The article considers the problem of ensuring financial security as an element of the enterprise's economic security system. On the basis of the presented sources, the systematization of the approaches of various authors to the interpretation of the concepts of "economic security of the enterprise", "financial security of the enterprise" is carried out. An essential analysis of the factors-threats to the economic security of the enterprise is presented. The concept of "economic security of an enterprise" is considered both in general and from its substantive side, taking into account internal components. The purpose and place of financial security in the complex of other elements of economic security of the enterprise are indicated. An integrated approach to its provision is emphasized. The key aspects that characterize the place of financial security in the economic security system of the enterprise are considered. The results of the conducted research are positioned as an intermediate stage in the study of the problem of improving the financial security system of the enterprise.

Key words: enterprise, economic security, financial security, economic security system security, factors, threats, methods for assessing financial security.

Vlashchuk V.N.

MODERN FINANCIAL INSTRUMENTS FOR SAVING RUSSIANS IN CONDITIONS OF SANCTIONS RESTRICTIONS AND HIGH KEY INTEREST RATES

Abstract. Sanctions restrictions on financial institutions had a significant impact on the macroeconomic level, which had a negative impact on financial instruments and an economic impact on international economic processes and relations formed between economic entities. The result was an increase in inflation and inflationary expectations among the population, which causes changes in the monetary system to increase the key rate and the movement of the money supply into conservative instruments. Studies devoted to the study of financial instruments have revealed the insufficiency of disclosure of savings issues in the context of sanctions restrictions and a high key rate. The article discusses the areas of savings. The main trends of financial

instruments have been identified, which make it possible to assess the effectiveness of financial instruments for saving Russians in conditions of sanctions restrictions and a high key rate. Complex problems affecting the increase in savings risks are formulated.

Keywords: financial instruments, savings, sanctions, interest, financial institutions.

Ilyin B.V.

ON THE APPROACH TO PRESENTING THE DESCRIPTION OF THE SUBJECT AREA IN THE DATABASE

Abstract. The article considers the process of information modeling of the domain in the design of an automated information system database, implemented as a sequence of display stages: domain → mental model → language model → written model → logical model. The basic concepts used at each stage in displaying the components of the corresponding model are considered. Increasing the semantic expressiveness of the information model is realized by introducing multilevel conceptual structures into its composition, formed using generalization and aggregation methods. The process of information modeling ends with the presentation of the domain model in the form of a uniformly structured textual description, formalized using the language of predicate logic of the first order, objectively reflecting the semantics of the domain. The result of the research is a proposal to "immerse" the logical model of the domain in a relational representation for storage in a database.

Keywords: subject area, information model, database.

Maksimov A.B.

ELONGATION OF A WIDE BEAM DURING CYCLIC DEFORMATION OF A PLASTIC HINGE

Abstract. The paper studies the hardening of 10G2C1 steel during cyclic deformation by plastic bending with an amplitude of deformation along the outer fiber of 5.5%. It is shown that with cyclic deformation, the bending strength of metal layers is less than with unilateral tensile deformation with the same degree of deformation. The decrease in hardening during cyclic deformation is due to the Bauschinger effect. It was found that with an increase in the amplitude of deformation from 1.5 to 4.7%, the difference in tensile hardening increases from 60MPa. As is known, the Bauschinger effect is explained by the formation of oriented residual elastic stresses of the opposite sign compared to the previous deformation. The magnitude of this difference in hardening during forward and reverse deformation can be equal to the magnitude of the oriented residual elastic stresses. In this regard, the magnitude of the oriented residual elastic stresses will be proportional to the dislocation blocking stress expressed in the Petch-Hall equation. Thus, the presented method for determining the oriented residual elastic stresses can be used to determine the quality of thermal and deformation processing of metal.

Keywords: structural steel, plastic cyclic bending, hardening, uniform elongation, residual life of steel.

Makarov M.V.

**THE FAUNA OF THE GASTROPODA IN THE EPIPHYTON OF THE SEAGRASS
ZOSTERA SP. OFF THE COAST OF CRIMEA**

Abstract. Own data on the species composition, abundance, biomass and trophic affiliation of Gastropoda in the epiphyton of seagrass of the genus *Zostera* in 5 different areas along the coast of Crimea from the Donuzlav estuary in the Northwest of the peninsula to Kazantip in the East were analyzed and summarized. A total of 13 species of gastropods from 2001 to 2024 were recorded. Many species (*Brachystomia eulimoides*, *Hydrobia acuta*, *Rissoa splendida*, *Setia valvatoidea* and *Steromphala adriatica*) in this biotope off the coast of Crimea were found for the first time. No species in all the studied areas were found. The average abundance of Gastropods ranged from 116 ind./kg in Kruglaya Bay to 6937 ind./kg in Donuzlav. The average biomass ranged from 0.11 g/kg in Inkerman (the top of Sevastopol Bay) to 51.66 g/kg in Donuzlav. In general, 5 groups were noted by trophic affiliation. Phytophages dominated in terms of the number of species, abundance and biomass.

Keywords: species composition, abundance, biomass, distribution, trophic.

Stukov A.V., Moskul G.A.

**ECOLOGICAL, BIOLOGICAL AND MORPHOLOGICAL CHARACTERISTICS OF
RIVER PERCH (*PERCA FLUVIATILIS* LINNAEUS, 1758) OF KRASNODAR
RESERVOIR (KUBAN BASIN)**

Abstract. The article presents ecological, biological and morphological characteristics of the river perch (*Perca fluviatilis* Linnaeus, 1758) population of the Krasnodar Reservoir (Kuban basin). It is noted that a local population of perch has formed in the Krasnodar Reservoir, which does not make long migrations. Fattening and wintering of fish occur in the reservoir, and spawning occurs in the rivers flowing into it. The work describes the features of reproduction, nutrition, growth rate and morphology of the river perch population of the Krasnodar Reservoir. Data are presented on the timing of sexual maturation, reproduction ecology, absolute and relative fecundity, absolute growth, specific growth rate, qualitative and quantitative composition of food, morphology (meristic and plastic features) of different age groups of fish. Analysis of meristic and plastic features of river perch of the Krasnodar Reservoir using methods of variation statistics showed that they do not go beyond the variations of features characteristic of the species (*Perca fluviatilis* Linnaeus, 1758).

Keywords: Krasnodar reservoir, river perch, ecology, biology, morphology.

Zolotnitsky A.P., Sytnik N.A., Zhavoronkova A.M.

**ECOLOGICAL ASPECTS OF QUANTITATIVE PATTERNS OF SEASONAL
GROWTH OF THE INVASIVE MOLLUSK ANADARA KAGOSHIMENSIS
(TOKUNAGA, 1906) OF THE AZOV-BLACK SEA BASIN**

Abstract. The bivalve mollusk *Anadara kagoshimensis* is a relatively recent immigrant to the Azov-Black Sea basin and is currently one of the dominant species and a promising object of mariculture in the Azov and Black Seas. The dynamics of the most important biological characteristic of anadara - absolute growth rate of the mollusk depending on the shell length - was analyzed in this work. It was found that with increasing length the linear growth rate of anadara decreased, the linear growth trajectory deviated markedly from the theoretical curve, especially in winter and summer periods. A positive correlation of this index with water temperature was revealed. Based on the obtained data, a mathematical model of multiple regression was proposed,

where the rate of linear growth of this species is represented as a function of 2 parameters - shell length and water temperature. The presented equation, in general, satisfactorily describes the dynamics of the growth rate of anadara, and the observed deviations are mainly due to changes in the growth rate of the mollusk associated with the temperature regime and salinity of water in the northern and southern water areas of the Azov-Black Sea basin, as well as reproductive processes of anadara in these areas.

Keywords: *Anadara kagoshimensis*, shell length, growth rate, water temperature, mathematical model.

Gromov S.V., Kirichenko V.A.

MODELING OF POWER CHARACTERISTICS IN THE PROCESS OF CUTTING VEGETABLES

Abstract. In this article, the modeling of the force characteristics of the process of cutting vegetables with a uniform texture is carried out. Attention is focused on the fact that the cutting tool changes the trajectory of movement: vertically or obliquely relative to the surface of the product being processed, it begins to move parallel to the cutting edge, which means that the cutting force is noticeably reduced. The relationship between the cutting force and deformation (cutting depth) is considered using the example of cutting potatoes. It is shown that during the process of cutting potatoes, there is a constant increase in the cutting force, and, having reached a critical value, the cutting force decreases as the cutting depth increases. It is proven that the increase in force during blade penetration, up to approximately the midpoint, is explained by the cylindrical shape of the raw material and indicates the homogeneity of the texture. Particular attention is paid to the type of cutting tool, namely the blade, which can have different shapes and design parameters – sharpness and sharpening angle.

Keywords: vegetables, potatoes, cutting, cutting, blade cutting edge, cutting tool, cutting force, modeling.

Medvedkova I.I., Sokolov S.A., Yashonkov A.A.

DYNAMICS OF ENZYME CONTENT DURING STORAGE OF FRESH CULTIVATED BROWN AGARICUS BISPORUS MUSHROOMS

Abstract. Any biochemical changes in «breathing» products occur with the participation of enzymes and are quite closely related to each other. Each of the studied enzymes plays a specific role in nitrogen and carbohydrate metabolism. As a result of the research, a fairly high concentration of enzymes has been revealed in brown champignons, the fluctuations in the content of which during the storage period are constant and stable for various storage options, but with increasing temperature and shelf life, this fluctuation occurs faster. Therefore, it should be noted that based on the conducted studies, the most favorable storage temperature is the range 0÷4°C a shelf life of 4 days, since the enzyme content changes irreversibly with increasing storage temperature.

Keywords: cultivated champignons, enzyme activity, storage process, storage temperature, physiological changes.

Pyankova Yu.V., Sevatorov N.N.

OPTIMIZATION OF CYSTOSEIRA BARBATA DRYING FOR THE EXTRACTION OF BIOACTIVE COMPOUNDS USING HIGH PRESSURE

Abstract. The study focuses on optimizing drying and high-pressure extraction (HPE) techniques to preserve bioactive compounds (fucoidans, phlorotannins) in *Cystoseira barbata* seaweed. Lyophilization (freeze-drying) demonstrated superior results, with losses of 10.9 % for fucoidans and 6.3 % for polyphenols, whereas solar drying caused significant degradation of 47.8 %

fucoidans and 56.3 % phlorotannins. Optimal HPE parameters (500 MPa, 15 minutes, 1:1 water-ethanol mixture) achieved a fucoidan yield of 15.8 ± 1.1 % (35 % higher than ultrasonic extraction) and retained 89.5 % antioxidant activity. Convective drying at 40 °C, despite an 18 % loss of phlorotannins, reduced energy consumption by 18 % compared to lyophilization, making it industrially advantageous. The combination of 40 °C drying and 500 MPa HPE is proposed as an efficient technology, enhancing bioactive compound yields and reducing extraction time by 24-fold. These findings hold significance for pharmaceutical and food industries; further research on seasonal dynamics and hybrid methods is recommended.

Keywords: drying, brown algae, high-pressure extraction, fucoidans, phlorotannins.

Strelchenko V.V., Nugmanov A.H.-H., Aleksanyan I.U., Dulger N.V.

OBTAINING PECTIN-CONTAINING EXTRACTS FROM PUMPKIN VARIETY “KROSHKA” AND APPROACHES TO THEIR APPLICATION IN THE TECHNOLOGY OF BIOPOLYMER PACKAGING MATERIALS

Abstract. The paper studies the use of pumpkin peel of the “Kroshka” variety as a source of pectin using an innovative extraction method using microwave processing. The main attention is paid to the comparison of the traditional acid extraction method and microwave technology. The microwave method demonstrated a significant reduction in time, an increase in the yield of pectin and a decrease in energy costs. Pectin and its techno-functional properties are characterized, and methods for its application are proposed, including the creation of polymer films with the addition of glycerol and microcrystalline cellulose. It has been experimentally established that the use of microwave heating at different powers and with varying pH allows optimizing the extraction process, achieving better results in pectin yield without losing its quality characteristics. The use of green solvents, such as water acidified with citric acid, emphasizes the environmental safety of the method. Microwave drying of pectin films significantly reduced the processing time, ensuring uniformity of the structure and maintaining flexibility. The results of the work demonstrate the potential of microwave extraction and drying for scaling up to industrial level, which opens up prospects for integrating the method into the production of packaging materials and other biomaterials.

Keywords: food industry, pectin films, microwave drying, glycerin, cellulose, citric acid.

Falko A.L.

OPTIMIZATION OF OPERATING PARAMETERS OF HIGH-SPEED CYLINDRICAL TRIERS

Abstract. The technological park of agro-industrial enterprises is characterized by the presence of a complex of machines that ensure the separation of grain masses of various crops from foreign impurities with simultaneous or sequential calibration of grains according to geometric parameters. The fundamental need for the implementation of these technological operations remains at all stages of agricultural production development. The modern market of agricultural machinery offers a wide range of mechanisms and machines for cleaning and sorting grain. Among them, cylindrical and disk type triers have become widely used, having proven themselves as an effective solution for separating grain masses. Recent research into the use of high-speed cylindrical triers shows that their designs can significantly optimize their operating parameters and significantly improve technical characteristics. This work confirms this possibility and shows ways of such optimization. The work discusses new, more accurate approaches to determining the angle of grain rise in the trier cylinder cell, the optimal cylinder rotation speed, sliding zones and grain loss.

Keywords: high-speed cylindrical trier, grain, impurities, weed seeds, cellular cylinder, grain friction angle.

Kotenev A.D., Budagov N.V., Tereshenko O.V.

PRIORITIES IN ENSURING FOOD SECURITY: REGIONAL ASPECT

Abstract. Food aspects of national security of the state in the conditions of negative impact of sanctions regimes in modern conditions require deep scientific and practical analysis and development of effective support measures. The authors conducted a study of the problems of ensuring food security at the regional level in the conditions of the need to achieve economic and physical availability of food, as well as compliance with the requirements and standards of its quality. It was determined that within the framework of the existing rational standards of food consumption, taking into account modern requirements of healthy nutrition, as well as the purchasing power of the average per capita income of the population in the Stavropol Territory, the economic availability of food products is not ensured. The authors proposed measures aimed primarily at reducing food prices in the regional markets, as well as conducting state food interventions. The role of participants in the regional agro-food market in the formation of the range of food products in the Stavropol market is noted.

Keywords: food security, food intervention, food availability, commodity shortages, agricultural raw materials, government support.

Kotenev A.D., Tereshenko O.V., Solovieva L.V.

AGRARIAN POLICY UNDER CONDITIONS OF SANCTIONS PRESSURE: CURRENT STATE AND IMPACT ON FOOD SECURITY OF THE STATE

Abstract. The sanctions pressure caused by the impact of the imposed restrictions causes significant harm to both individual sectors of the economy and the entire state. The authors reviewed theoretical and methodological approaches to its definition, noted the influence of a group of factors that have both internal and external origins, and updated its basic priorities. The analysis of the changes that are taking place helped to identify their causes, some of which have a political connotation. Detailing the directions of the state agrarian policy implemented by the government allowed us to formulate the author's point of view, highlighting its basic priorities. Modern economic realities require more prompt attention from both executive authorities and economic entities. It was noted that there is a need to adjust the implemented directions of the agrarian policy, both from the standpoint of counteracting the influence of sanctions, solving social problems, and building an effective mechanism for ensuring the required level of food security.

Keywords: agrarian policy, food security, food independence, sanctions, economic security, state support, assessment of support measures.

Merkusheva M.V.

PROMOTION OF FISH AND SEAFOOD CONSUMPTION CULTURE: BARRIERS AND OPPORTUNITIES

Abstract. The article discusses the problem of promoting a culture of fish and seafood consumption among various population groups. A generalization of the emerging trends has been carried out and the main barriers preventing the effective promotion of the culture of fish and seafood consumption by domestic consumers have been identified. Based on the study of the world and domestic experience of market promotion, possible solutions to this problem are presented, taking into account the specifics of the formation of commodity and marketing policy, as well as the intensification of efforts to promote fish products on the market. With regard to the product policy of fish processing enterprises, the directions of its improvement in relation to the most promising target audience of consumers are proposed. Approaches to the use of promotion tools are presented, taking into account the involvement of representatives of the HoReCa segment and retail in this process.

Keywords: promotion, fish and seafood, product policy, advertising, awareness.

Murov V.M.

BUSINESS PROCESSES OF OCEAN FISHING COMPANY

Abstract. Based on a critical analysis of the scientific literature, an author's definition of the end-to-end business process of a fishing vessel in an oceanic fishery and its complex business processes was proposed as a set of works and sequential operations managed by the owner of the process (the captain of the vessel), using "inputs" as extracted aquatic biological resources, with the help of performers transforms their "exits" i.e. in finished fish products, which is the result of an end-to-end business process that represents a direct or indirect benefit to the fishing company and creates value for its consumers. The proposed model of the business process structure of a fishing company, classifying them, makes it possible to assess the efficiency of fish production, which can be used both to build a business model of an enterprise and to effectively organize the structures of business processes that actually exist in the production of fish products.

Keywords: business processes, fish products, classification of business processes, fishing vessels, end-to-end and complex business processes of extraction and processing of aquatic biological resources, DFD and WFD description of business processes.

Truba A.S., Truba M.A., Chetverikov O.K.

ANALYSIS OF THE INFLUENCE OF FACTORS ON THE DEVELOPMENT OF FRESHWATER AQUACULTURE

Abstract. The article assesses the current state of aquaculture, analyzes the influence of endo- and exogenous factors on the development of freshwater aquaculture, including territorial distribution, volumes and types of products produced and production capacity. It is proven that freshwater aquaculture plays a key role in ensuring food security of the Russian Federation, being the main type of fish farming in the internal regions of the country. It has been established that exogenous factors that have the greatest impact on the state of fish farms include the following: natural and climatic factors, water body areas, natural fish productivity, number of employees, government support, fixed assets, investments (capital investments), production capacity, demand for fish, import. Endogenous factors are characterized by the following components: intensification, artificial fish productivity, fish planting material, feed base, material incentives for workers, development of regional integration associations, use of production capacity, digitalization of fish farming.

Keywords: aquaculture, industrial fish farming, commercial aquaculture, industrial aquaculture, pasture aquaculture, aquatic biological resources, statistical data, factors.

Ivanov V.P.

BIOLOGICAL DEFINITION OF LIFE

Abstract. The definition of life is clarified and the content of this concept is revealed. Life is a unique property of matter, represented by a large community of cellular organisms that have the ability to exchange substances with the environment, capable in the course of evolution, changing and adapting to external conditions, reproducing similar individuals with the transfer of their genetic qualities to them. Reproduction is the main function of life, to which all others are subordinated: nutrition, growth, development, maturation, etc. Characteristic features of life are the connection with the environment, the use of solar energy, movement, mutations. Having appeared on Earth 4 billion years ago, life is an indefinitely long evolutionary process, which, due to the countless biodiversity of species, and as a result of the development of all layers of the biosphere by living organisms, has the potential prospect of further preservation and development even in conditions of extreme disasters.

Keywords: cellular organisms, metabolism, movement, reproduction, adaptation.

Maksimov A.B.

MECHANICAL PROPERTIES OF STRUCTURAL STEEL UNDER THERMAL DEFORMATION CYCLIC PLASTIC BENDING

Abstract. The effect of bending deformation in the temperature range 200–650 °C is investigated with a deformation amplitude of 2 % and a number of bending cycles up to 44 on the mechanical properties of low-alloy structural steels 09G2, 10G2C1 and 16G2AF. The best combination of strength, plastic and viscosity properties is provided with the number of bending cycles in the range of 10–20. The greatest hardening of steels is achieved by deformation by cyclic bending in the range 300–500 °C and exceeds the level of hardening of the cold-deformed state by 20–40 % (yield strength) with a decrease in elongation by 2.5–5 % and almost the same impact strength. This is due to the higher density of dislocations and the degree of their blocking by impurity atoms during thermal deformation. The nature of the change in the mechanical properties of steels during deformation in the range 200–680 °C does not differ from the general scheme of changing the mechanical properties of steels.

Keywords: structural low-alloy steel, plastic cyclic bending, thermal deformation, mechanical properties.

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Brezhnev L.L., Ivanov S.S., Khoreva T.I., Cu Nguyen Dinh, Tran Van Tien
**FISHERY STUDY OF THE MEKONG RIVER DELTA AND ITS BRANCHES IN THE
SOUTHERN PART OF THE SOCIALIST REPUBLIC OF VIETNAM**

Abstract. This article discusses the hydrochemical aspect of the fishery survey of the Mekong River Delta. The study was carried out within the framework of the Ecolan 3.6 project "Ichthyopathological and epizootic studies of the ichthyofauna of the Mekong River and freshwater bodies of Vietnam". The expedition took place in October 2024, where joint studies were carried out by employees of the Faculty of Biotechnology and Fisheries of the Federal State Budgetary Educational Institution of Higher Education "K.G. Razumovsky Moscow State Technical University (PKU)" and responsible representatives of the Southern Branch of the Tropcenter. The expedition work was carried out in the southern provinces of Tra Vinh, Soc Trang and Vinh Long, where the Bassac and Co Chien rivers are located. During the expedition, water samples and samples of internal organs of both aquaculture and wild fish were collected for chemical analysis for the presence of toxic elements. The analysis revealed a significant presence of heavy metals in the water and their accumulation in internal organs.

Keywords: hydrochemical parameters, chemical analysis, environmental factors, Mekong, Bassac.

Gamayunov O.A.

**ANALYSIS OF THE WORLD PRACTICES OF ECOLOGICAL TOURISM ALONG
THE 45TH PARALLEL OF THE NORTHERN HEMISPHERE WITH AN EMPHASIS
ON THE REPUBLIC OF CRIMEA**

Abstract. The article is devoted to the study of ecotourism practices as a tool for sustainable development of regions located along the 45th parallel of the Northern Hemisphere (as "lifeline" or "golden parallel"), a unique geographical zone combining temperate climatic conditions, high biodiversity and cultural and historical heritage (The Great Lakes of North America, France, Italy, Crimea and the Caucasus, Krasnodar and Stavropol Territories, etc.). The relevance of the topic is due to the fact that most research in the field of ecotourism focuses on tropical or Arctic zones, while the temperate latitudes of the 45th parallel remain poorly studied. As a result of the study, based on the analysis of world practices in the field of ecotourism, adaptation mechanisms were proposed for the introduction of international experience to the conditions of the Republic of Crimea, where ecotourism can become a driver of the economic development of the region.

Keywords: ecological tourism, Republic of Crimea, 45th parallel, sustainable development.

Ivanov S.S., Brezhnev L.L., Ponomarev A.K., Bakhareva A.A., Saprykin V.P.

**INFLUENCE OF WATER SALINITY ON THE GENERATIVE FUNCTION OF
MACROBRACHIUM ROSENBERGII SHRIMP PRODUCERS**

Abstract. The study of the effect of water salinity on the culture, reproduction and growth of giant freshwater prawns *M. rosenbergii* will undoubtedly contribute to the increase of their industrial production. In the present study, the fertility of female *M. rosenbergii* grown under culture conditions at different water salinities (0 ‰, 5 ‰, 10 ‰, 15 ‰ and 20 ‰) was investigated. The increase in water salinity decreased the average weight of female prawns (57.4 ± 1.1 g, 51.1 ± 1.1 g, 39.8 ± 0.9 g, 35.6 ± 1.1 g and 29.9 ± 0.9 g at 0 ‰, 5 ‰, 10 ‰, 15 ‰ and 20 ‰) and delayed their sexual maturation, while reducing their fertility. The appearance of eggs in females directly depended on the salinity level of the water in which they were cultured (4 months, 4.5 months, 7 months, 8 months in water with a salinity of 0 ‰, 5 ‰, 10 ‰, 15 ‰). In the group with a salinity

of 20 ‰, no females with eggs on their pleopods were noted for 11 months. The number of eggs and larvae positively correlated with the weight of the female. The total number of larvae from one female varied not only depending on the salinity, but also depending on the number of larvae per gram of the female's weight. Females reared at lower salinity produced more larvae compared to females reared in high salinity water (26,784±789; 24,138±918; 16,381±996; and 11,934±867 in water with 0 ‰, 5 ‰, 10 ‰, 15 ‰ salinity, respectively). The number of larvae produced per gram of female is inversely proportional to the salinity level (1,054±21; 858±17; 587±17; 453±14 at 0 ‰, 5 ‰, 10 ‰, 15 ‰ salinity, respectively). The results of the study show that by changing the salinity of water during broodstock maintenance, it is possible to regulate the synchronization of shrimp larval production and significantly reduce mortality. individuals of the broodstock, which in turn will allow for a reduction in the number of broodstock in industrial aquaculture conditions.

Keywords: *Macrobrachium rosenbergii*, soda salinity, broodstock, reproduction, larvae.

Klimuk A.A.

ANALYSIS OF BIOCHEMICAL PARAMETERS OF BLOOD OF JUVENILE AFRICAN CATFISH CLARIAS GARIEPINUS UNDER CONDITIONS OF LOW HOLDING TEMPERATURES

Abstract. The biochemical parameters of blood (11 indices) of two different-age groups of juvenile African catfish weighing 50–95 and 150–200 g were studied at gradually decreasing temperatures from 25, 22, 17 to 15 °C (the rate of decrease was 2 °C/day). The dependence of the concentrations of total protein, globulins and cortisol in the blood serum of catfish on the maintenance temperatures was revealed (regression analysis data). Reduced levels of total protein, globulin and glucose indicated a decrease in metabolic activity. It was shown that catfish weighing 50–90 g at 17 and 15 °C had impaired liver function, revealed by a significant increase in alkaline phosphatase (by 3 times at 15 °C) and lactate dehydrogenase (by 4 times at 17 and 15 °C). Cortisol levels also increased at 17 and 15 °C, indicating high stress levels. Some parameters (aspartate aminotransferase, alanine aminotransferase, albumin, and urea) were indifferent to temperature. It is recommended to stock fish ponds with juvenile African catfish weighing 50 to 95 g at water temperatures of more than 22.0 °C, and 150 to 200 g at $t > 20.0$ °C.

Keywords: African catfish, biochemistry, low temperatures, acclimation, cortisol, stress.

Arabova Z.M., Aleksanyan I.Yu., Nugmanov A.H.-H., Osmolovskiy P.D., Khadaev A.V.,
Mukhambetova I.R.

ENERGY ASSESSMENT OF DEHYDRATION OF FISH ROE AND LECITHIN CLOT BASED ON IT BY THERMODYNAMIC ANALYSIS OF SORPTION STATICS

Abstract. To assess the energy costs of removing moisture from the caviar fish raw materials, as well as from the lecithin clot obtained during the concentration of caviar extracts, a thermodynamic analysis of the process of their sorption with water is carried out, which is impossible without studying the hygroscopic properties of the objects of study and the construction of sorption isotherms. Analysis of the interaction of moisture with the studied raw materials and sorption isotherms makes it possible to identify and evaluate the variation of the energy components of the Gibbs-Helmholtz ratio at constant pressure and temperature. This article presents the results of obtaining moisture sorption isotherms from dehydrated carp, walleye and catfish caviar, as well as a lecithin-containing clot, which is a concentrated extract of this caviar, at air temperatures of 25 °C and 35 °C. Based on sorption isotherms and their thermodynamic analysis, patterns of variation of the indicated components have been identified and constructed when the equilibrium humidity of the objects of study changes at variable temperatures, which is advisable for determining the total specific heat of vaporization under various dehydration regimes of the objects under study.

Keywords: caviar fish raw materials, lecithin clot, drying, hygroscopic characteristics, isotherms

of sorption, thermodynamics, energy intensity of dehydration.

Keywords: caviar fish raw materials, lecithin clot, drying, hygroscopic characteristics, isotherms of sorption, thermodynamics, energy intensity of dehydration.

Kuchikhin Yu.A., Nikiforov-Nikishin A.L., Klimov V.A., Voskanyan O.S.

INFLUENCE OF SOY PROTEIN CONCENTRATE IN RAINBOW TROUT FEED ON ORGANOLEPTIC INDICATORS AND AMINO ACID COMPOSITION OF FISH PRODUCTS

Abstract. The paper presents the results of assessing the change in consumer properties of rainbow trout (*Oncorhynchus mykiss*) fish products when replacing fish meal in feed with soy protein concentrate (SPC) in concentrations of 10 %, 17 %, 24 % and 30 % of the feed weight. After 90 days of feeding, it was found that high levels of SBC (24 %, 30 %) negatively affect the organoleptic properties of meat after heat treatment (taste, smell, appearance, consistency), while lower concentrations (10 %, 17 %) did not cause significant differences from the control. The quality of the broth remained the same in all experimental groups. Analysis of the nutrient composition revealed a significant decrease in crude fat at high doses of SBC, while maintaining the protein level. In addition, high concentrations of SBC led to a significant decrease in essential amino acids (lysine, methionine) and an increase in glycine and glutamic acid in muscles. The studies showed that the use of SBC in concentrations above 17 % can lead to deterioration in the quality and nutritional value of fish products. SBC concentrations below 17 % can be recommended as an alternative to fish meal without reducing the quality of the meat of farmed fish.

Keywords: aquaculture, fish products, feeding, meat quality, nutritional value, amino acid profile.

Chibich N.V., Yakovlev O.V.

QUALITY STUDY OF A NEW RANGE OF EVACUATED LIGHTLY SALTED FISH PRODUCTS FROM FISH OF INLAND RESERVOIRS

Abstract. Modern methods of enriching fish products in order to increase their nutritional value have been studied. The quality of a new range of evacuated lightly salted fish products with specified consumer properties and increased nutritional value has been investigated. The new range was made from low-ripening raw materials with pH regulation during salting through the use of organic acids and subsequent enrichment of the resulting semi-finished product with vegetable oils with a high content of polyunsaturated fatty acids in the vacuum system. Research has confirmed the safety and quality of the final product throughout the entire storage period, for which the QFD approach was previously used to predict. The shelf life of lightly salted products with improved consumer characteristics, packed in vacuum packaging for 60 days, has been established. at temperatures from 0 ° C to minus 3 ° C.

Keywords: pilengas, silver carp, maturation process, nutritional value, enrichment, polyunsaturated fatty acids.

Yashonkov A.A., Pavlova Yu.I., Ustinova M.E., Dushkin A.I., Senin E.O.

FEATURES OF CALCULATION OF WORKING SHAFTS OF TECHNOLOGICAL EQUIPMENT

Abstract. The transition, as part of import substitution, of food industry enterprises in the Russian Federation to modern domestic technological equipment requires its manufacturers to ensure high reliability and maintainability of parts, assemblies, machines and mechanisms in general, with minimal metal consumption and material costs, which significantly affects the selling price of finished products. This paper presents the research results and presents the calculation features of the working shafts of technological equipment in the food industry using the example of shafts of

mixing and whipping machines, including the determination of tangential stresses during torsion of a circular shaft with a semicircular groove in polar coordinates and an updated calculation of shafts taking into account static fatigue. The use of the proposed calculations of the working shafts of technological equipment in its design will reduce their metal consumption, energy consumption and improve the design of mixing and whipping machines.

Keywords: calculation of technological equipment, torsion, strength calculations, working shafts, tangential stresses.

Yanovskaya A.A., Vinnik U.V.

DIGITAL ECOSYSTEMS: IMPLEMENTATION FEATURES AND IMPACT ON THE LABOR MARKET

Abstract. The article provides a study of large Russian digital ecosystems. The author's position was based on the need to implement the goals and objectives set out in the official document "On the National Development Goals of Russia for the period up to 2030 and for the future up to 2036", which are aimed at developing digitalization in economic sectors and ensuring the technological sovereignty of the country. By applying an ecosystem approach to economics, it is possible to unite and simultaneously integrate a wide range of consumers, business processes and digital services, which is exactly what digital ecosystems are aimed at. The conducted research made it possible to determine the functionality of digital ecosystems, as well as to identify the transformational impact on the labor market. Specific elements are identified, and the main components of the digital ecosystem are presented. Based on the systematization of materials, the authors propose recommendations for the implementation of digital ecosystems. The analysis of the main financial indicators of Russian digital ecosystems is carried out, and the growth trends of users of digital ecosystems are noted.

Keywords: digital ecosystem, labor market, business processes, employment.

Yarkina N.N.

FISHERIES MANAGEMENT: CORPORATE CULTURE

Abstract. Corporate culture is considered as an effective tool for managing fishing activities within the framework of its socio-psychological methods. The methodological approach to corporate culture is updated, on the basis of which its complex characteristic as an integral socio-economic phenomenon is given. The main attributes of corporate culture are characterized from the standpoint of systemic, value-oriented, functional, process, integration and historical methodological approaches. The functions of the corporate culture are detailed. «Sustainability» is emphasized as the main value-oriented guideline for the activities and development of fishing and aquaculture enterprises. The definition of sustainable fisheries management is given, which is based on the implementation of the triune principle of responsibility – environmental, social and economic. It is noted that responsible fisheries and aquaculture rely on an ecosystem approach aimed at a joint harmonious solution to the economic, social and environmental problems of modern society. A sample of the universal mission statement of fisheries enterprises is given. As an example, the individual attributes of the corporate culture of JSC «NOREBO HOLDING» are considered.

Key words: corporate culture, fisheries management tool, methodological approach, corporate values, corporate culture functions, sustainable fisheries and aquaculture, responsibility.

Isupov A.V., Dyachuk S.V., Aleksakhin V.Y.

DEVELOPMENT OF A LOGISTICS MODEL

"OPERATOR + KARAVAN ROBOTIC VEHICLE INTERACTION SYSTEM, DESIGNED FOR OPERATION IN DIFFICULT CONDITIONS OF THE NORTHERN TERRITORIES OF RUSSIA

Abstract. The article presents an approach to the development of a logistics model based on the formation of a vehicle system (a technical module for vehicle operation) when traveling in the difficult conditions of the northern territories of Russia in a caravan. At the head of the caravan is a vehicle directly or remotely piloted by a human, the rest of the vehicles in the caravan follow the flagship based on the data transmitted from it, their interpretation and the formation of the route of movement. In the proposed model, information is transmitted between the participants of the caravan by radio. When implementing such a technical solution, there is no dependence of work efficiency on environmental changes (weather conditions, etc.), the system can function without reference to landmarks on the ground, it is characterized by convenience, simplicity and economic feasibility.

Keywords: robotic system, unmanned transport, logistics, caravan.

Maksimov A.B.

COMPARATIVE ANALYSIS OF ULTRASONIC FLAW DETECTION AND COERCITIMETRY AS METHODS OF NON-DESTRUCTIVE TESTING

Abstract. The paper provides a comparative analysis of non-destructive testing methods: ultrasonic and magnetic (coercitimetrie.) It is shown that the resolution of the ultrasonic method used in industry is limited by the wavelength of ultrasound and is 3×10^{-4} m. This corresponds to the definition of a developing microcrack. A further decrease in the wavelength (an increase in the frequency of the ultrasound wave) leads to an intense attenuation of the amplitude in the metal and is therefore impractical to use. The use of coercitimetrie makes it possible to determine structural changes up to 10^{-8} m in size. This is due to the influence of dislocation formations on the movement of domain walls. Such sizes of structural defects correspond to incipient microcracks. The considered methods for determining the degree of microstructure degradation should be used in their working segment. They are not opposed to each other, but complement each other. Therefore, it is recommended that these methods work in pairs.

Keywords: ultrasound, flaw detection, coercive force, non-destructive testing, metal quality.

Brezhnev L.L., Ivanov S.S., Ponomarev A.K., Saprykin V.P.

INFLUENCE OF WATER pH LEVEL ON DEVELOPMENT OF POSTLARVAE AND EARLY JUVENILES OF FRESHWATER SHRIMP *MACROBRACHIUM ROSENBERGII*

Abstract. Acidification of rainwater (acid rain) caused by industrial emissions is currently a serious threat to aquatic ecosystems. The article investigates the effect of water pH on the development, survival and mineral composition of the exoskeleton of postlarvae and early juveniles of the giant freshwater prawn *Macrobrachium rosenbergii*. The experiment was conducted under controlled conditions at four pH levels (7.5; 6.5; 5.5 and 4.5) for 40 days. The results showed that neutral and slightly acidic environments (pH 7.5 and 6.5) provide maximum growth (body length up to 4.51 cm, weight up to 3.43 g) and survival (90–95 %). When pH was reduced to 5.5 and 4.5, productivity was significantly reduced: growth was slower (by 13.5 % and 25.5 %, respectively), body weight and survival were reduced (up to 45% at pH 4.5). Spectrophotometric and chemical analyses showed a direct relationship between calcium content in the exoskeleton and water acidity: at pH 7.5 and 6.5, its concentration was 8.2 and 8.0 mg/g, while at pH 5.5 and 4.5, it was only 3.5 and 2.2 mg/g. This is due to the dissolution of calcium carbonate (CaCO_3) in an acidic environment, which weakens the shell and disrupts molting. The negative impact of low pH on the protein structures of the exoskeleton was additionally confirmed. The study confirms the threat of anthropogenic acidification of water bodies in Southeast Asia for the wild population and aquaculture of *M. rosenbergii*, and shows the need for pH control in artificial cultivation. The data obtained are relevant for expanding shrimp production in regions with stable environmental conditions, including Russia.

Keywords: *Macrobrachium rosenbergii*, water pH, water acidification, postlarval survival, exoskeleton quality, exoskeleton calcium, aquaculture.

Gaffarova V.M., Kuchikhin Y.A., Shuster A.M., Yahina V.N., Klimov V.A.

EVALUATION OF IMMUNOLOGICAL PERFORMANCE IN RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) USING MICROBIOLOGICALLY ORIGINAL PROTEIN IN FEED

Abstract. In this study, the effect of replacing fish meal in rainbow trout feed with the protein of microbiological origin Promethaine (MP) on immunological parameters of peripheral blood after a prolonged experiment (90 days) was investigated. In order to assess the immune status of the experimental individuals, the following complex of modified tests was used: bactericidal activity of blood serum (BAB); bactericidal activity of whole blood (BAWB), titer of agglutinating antibodies (TAA). According to the study results, it was revealed that MP in the dose range from 6% to 18% does not exert a significant negative effect on the intensity of anti-infective immunity of fish. In addition, a relationship was revealed between the BAB indicator and the fish-farming-biological ($R^2 = 0.73$) and physiological ($R^2 = 0.79$) parameters of the experimental groups. The studies indicate the possibility of using the complex of the described methods for assessing non-specific immunity of fish in the study of feed additives and feed components.

Keywords: immunology, *Aeromonas hydrophilia*, bactericidal activity of blood, physiology, microbial protein, single-cell protein.

Orlyanskiy F.V., Bondarenko L.G.

GROWTH, NUTRITION AND MORPHOLOGICAL DEVELOPMENT OF EARLY LARVAE OF HERBIVOROUS FISHES ON ARTIFICIAL FOODS

Abstract. The aim of the research is to study the influence of artificial feeds of different composition on their consumption, growth rate and age of onset of each stages of morphological development of early larvae of grass carp and silver carp feeding on these feeds. The attractiveness of the feeds was judged by the filling of the digestive tract. the stages of development were determined according to G.S. Soin. The stages and phases of larval morphological development were determined according to G.S. Soin. The larvae of herbivorous fish began to feed on artificial feed at the stage of endogenous-exogenous feeding; the period of adaptation of grass carp to grains was shorter than that of silver carp. The larvae of both species consumed feed ST-18 more actively. The age at which the stages of morphological development of herbivorous fish larvae began depended on the feed used. According to the test results, early larvae of grass carp and silver carp, contained on the ST-18 feed, by the amount of feed consumed, the specific growth rate and The morphological development was superior to that of the larvae fed with KRLS feed.

Keywords: larvae, silver carp, grass carp, artificial feed, nutrition, stages of development.

Sukharenenko E.V., Vodolazskaya I.V.

COMPARATIVE CHARACTERISTICS OF WATER RAW MATERIALS BIOLOGICAL SAFETY ON THE EXAMPLE OF MOLLUSKS OF THE KERCH STRAIT

Abstract. *Rapana venosa* (Valenciennes, 1846) and *Mytilus galloprovincialis* (Lamarck, 1819) are considered to be promising objects of commercial fishing in the Black Sea and the Sea of Azov. In the context of high anthropogenic pressure, the safety of these raw materials is of particular importance. A comprehensive study of the microbiological, toxicological, and radiological indicators of the soft tissues of rapana and mussels is relevant for an objective assessment of the level of contamination in these mollusks. It has been shown that the average contamination of mussels' soft tissues is 1.63 times higher than that of rapa in 2023, and 1.79 times higher in 2024. The total content of heavy metals (cadmium, lead, arsenic, and mercury) in rapa meat is 3.8 times higher (2023) and 4.9 times higher (2024) than the level of these metals in mussels' meat. It has been established that cadmium is predominantly accumulated in the soft tissues of the abalone, while lead is accumulated in the soft tissues of the mussel. The maximum amounts of radionuclides in the studied samples are 38 times higher (for cesium-137) and 30 times (for strontium-90) below the MPC. The obtained results of the content of mesophilic aerobic and facultative anaerobic microorganisms, lead, arsenic, cadmium, mercury, cesium-137, strontium-90 in the soft tissues of the rapana and mussels give grounds to assert that these mollusks are a safe raw material for the production of food products and medical and preventive preparations.

Keywords: rapana, mussels, mycobiological control, heavy metals, radionuclides, biosafety.

Sytnik N.A.

STUDY OF MASS TRANSFER PROCESSES OF A JET DESORBER FOR VACUUM SHIPBOARD UNITS FOR CLEANING HYDROGEN SULFIDE ZONES OF THE BLACK SEA

Abstract. The paper considers the problem of local stabilization of the hydrogen sulfide zone of the Black Sea using marine vacuum purification units equipped with jet desorbers. The main attention is paid to the optimization of the design of the mass exchange apparatus with perforated plates, ensuring the effective removal of dissolved hydrogen sulfide from deep waters. A comprehensive study was conducted, including hydrodynamic modeling and experimental tests of

a laboratory sample of the desorber. In the course of the work, the optimal design parameters were determined: the diameter of the holes in the plates (6–8 mm), their arrangement (alternation of central and peripheral zones), the distance between the plates (0.5–0.8 m) and the water flow rate (1.0–1.5 m/s). It was found that the proposed design allows to increase the desorption efficiency by 20–25% compared to traditional solutions due to the increase in the water-gas contact surface and improved flow mixing. The obtained results are of practical importance for designing modular marine units with a capacity of up to 3000 m³/h, intended for purification of hydrogen sulphide waters of the Black Sea.

Keywords: hydrogen sulfide, Black Sea, desorber, vacuum unit, mass transfer, hydrodynamics, perforated plates, seawater purification.

Sytnik N.A., Khudyakova G.A., Kolmykova A.A.

SYNERGY OF CIRCULAR AND BLUE ECONOMY IN THE REPUBLIC OF CRIMEA: BARRIERS AND WAYS OF IMPLEMENTATION

Abstract. In the context of anthropogenic transformation of natural systems and the crisis of the linear economy, the coastal territories of the Republic of Crimea demonstrate the need to switch to innovative models of environmental management. The article explores the possibility of synergy between circular (closed) and blue (marine) economies as a strategy for the sustainable development of the region. An integrated approach is applied, combining geoecological analysis, assessment of technological structures and institutional modeling. Key barriers are analyzed, including legislative restrictions, lack of infrastructure and investments, and ways to overcome them are proposed through the introduction of innovative technologies, the development of intersectoral cooperation and the adaptation of international experience. Systemic limitations have been identified, including imbalances in legal regulation, technological backwardness of the processing complex and a shortage of “green” financing mechanisms. Based on proven international practices, an adaptive model has been developed that includes biotechnological utilization of marine resources, creation of integrated coastal clusters and implementation of digital monitoring platforms. The results of the study are valuable for the development of regional programs for the sustainable development of coastal territories.

Keywords: circular economy, blue economy, sustainable development, Republic of Crimea, resource efficiency, marine ecosystems.

Vo Tr.K., Nugmanov A.H.-H., Aleksanyan I.Yu., Osmolovskiy P.D.,
Elmurzaev A.A., Aisungurov N.D.

INVESTIGATION OF THE KINETICS OF CONVECTIVE DRYING OF DURIAN SLICES COATED WITH A PROTECTIVE MATERIAL

Abstract. Vietnam occupies an important place in agriculture, producing many valuable export crops, but their commercial value is declining due to insufficient attention to storage and processing conditions. Therefore, modern methods of preservation and processing of raw materials are a key area of scientific research. Recent joint research by Vietnamese and international scientists has shown that the application of various innovative technologies to agricultural raw materials, combined with the use of polymer packaging materials based on alginate during its storage, leads to a significant reduction in losses during its transportation, as well as the development of end products that meet the food demand of the whole country and thereby increase, export volumes. The article presents the results that make it possible to rationalize the convective method of drying durian slices to a final humidity of 25 % by selecting the operating parameters, taking into account the fact that the temperature of the thermal agent is 100 °C and its further increase leads to a decrease in the strength of the polymer coating, which leads to a deterioration in the sensory parameters of the finished material with the loss of a proportion of its nutritional

components.

Keywords: durian slices, biodegradable coating, drying, kinetic patterns, specific productivity, mathematical description, dehydration mechanism.

Kravchenko N.V., Shtenina D.V., Belyakova I.A.

EXTRACTION OF SAPONINS FROM LICORICE ROOT AND METHODS OF ITS INTENSIFICATION

Abstract. The article presents the results of a study of the extraction of saponins from plant material. Rational conditions for obtaining extracts by the method of hot extraction, based on the interaction of plant raw materials with constant mixing, are proposed. As an extractant, alcohol, drinking water and skim milk are used. The influence of the magnitude of the hydromodule, the size of the particles and the duration of extraction on the dynamics of accumulation of glycyrrhizic acid, which is a triterpene saponin, is determined. The fractional composition of the extracts was analyzed using IR spectroscopy, the results of which indicate that they identified C=O groups at 1600 nm, which can be attributed to $\nu_{C=O}$ carboxylate anion, glycyrrhizic acid of saponins and OH groups of starch and water. The presence of these substances makes it possible to predict the appearance of extracts of surface-active properties. Simultaneously, the processes of intensification of the extraction process from plant raw materials with the use of various mechanical effects were studied. Extraction studies were carried out with infusion at rest, mixing, vibration, ultrasound, etc.

Keywords: triterpene saponins, glycyrrhizic acid, licorice root, extraction, vibration, intensification, plant raw materials.

Makhov S.M.

INNOVATIVE BIODEGRADABLE PACKAGING MATERIALS: FROM LABORATORY RESEARCH TO INDUSTRIAL IMPLEMENTATION

Abstract. The article provides a comprehensive overview of innovative biodegradable packaging materials, from the stage of laboratory development to industrial implementation. The main focus is on four key types of biopolymers: polylactide (PLA), polyhydroxyalkanoates (PHA), thermoplastic starch (TPS), and cellulose derivatives. Their chemical and physico-mechanical properties, biodegradability, as well as barriers and application prospects in the packaging industry are disclosed. Modern production technologies, examples of implementation in industry and the market, as well as problems of cost, composting infrastructure and regulatory regulation are considered. Based on the analysis, it is concluded that there is a need for an interdisciplinary approach, the integration of biodegradable materials into circular economy models and the development of cooperation between the scientific community, business and the state. The article highlights the importance of biodegradable packaging as an important tool for sustainable development and combating plastic pollution.

Keywords: biodegradable materials, polylactic acid (PLA), polyhydroxyalkanoates (PHA), thermoplastic starch (TPS), cellulose-based packaging, environmental sustainability, compostable packaging.

Sokolov S.A., Yashonkov A.A., Ageev O.V., Blinov V.R., Agadzhanian N.A.

EXPERIMENTAL STUDIES OF DRYING KINETICS IN A FLUIDIZED BED OF PELLETS FROM SHRIMP SHELL WASTE

Abstract. The paper summarizes the results of experimental studies of the kinetics of drying crushed shell waste of the Azov-Black Sea grass shrimp under fluidized bed conditions. By-

products produced during the processing of crustaceans carry a greater environmental risk. But, along with this, they are a real source of natural carotenoids. Various extraction methods have recently been used to extract carotenoids from crustacean waste, but all of these methods involve the use of dried feedstock. This is due to the very short shelf life of these wastes due to rapid biochemical decomposition, which eliminates the possibility of further processing and worsens the environmental and sanitary-epidemiological situation in the production area. Drying is one of the best forms of preserving shell waste from spoilage and their shelf life. The article presents the results of experiments on the drying of shell waste in a pseudo-liquefied layer. The advantages of pre-treatment of waste by granulation are shown, which reduces the initial moisture content and thereby reduces the drying time.

Keywords: shell waste, shrimp, drying, fluidization, temperature.

Falko A.L., Illarionov M.I.

DETERMINATION OF THE SPEED OF VIBRATIONAL TRANSPORTATION OF BULK FOOD MASSES

Abstract. The work is aimed at identifying the actual value of the vibrational movement speed of bulk food materials, the determination of which depends on a huge number of technical factors and process conditions, which is a complex scientific and technical task. The author attempted to present the most basic parameters and factors influencing the process of vibration movement, the consideration and maintenance of which is mandatory when determining the speed of vibration movement of bulk food materials. The paper shows the dependencies of the influence of the main parameters on the process under consideration and their rational values applicable in practice, based on the author's sufficient practical experience in the field of experimentation with vibration conveying machines. The mathematical equations for determining the parameters of vibration movement presented in the work are currently the most accurate in the field of operation and practical adjustment of vibration transport machines.

Keywords: vibration movement, vibration parameters, working element, vibration frequency, vibration amplitude, vibration direction angle, vibration acceleration.

Aleksakhina L.V., Litvinenko A.V.

IMPROVING MARKETING ACTIVITIES OF BAKERY INDUSTRY ENTERPRISES: REGIONAL ASPECT

Abstract. The article presents an approach to improving the marketing activities of the bakery industry enterprises in the regional aspect, which involves expanding the characteristics of basic food products, along with the traditional quality and safety for all citizens, in order to ensure the required sales volumes that correspond to the rational consumption norms and take into account the regional demands, taking into account the current situation in the region. The importance of the role of the bakery industry in ensuring the region's food security as a supplier of a relatively cheap and energy-efficient strategic product is demonstrated, as the availability and quality of this product directly determine social stability and well-being in the region and in the country as a whole. The regional specifics of implementing marketing activities within the proposed regional and sectoral space are presented. The components of the enterprise marketing program are characterized.

Keywords: marketing, region, bakery industry, improvement.

Ezheliy S.M.

CONDITION ANALYSIS AND PROSPECTS OF PROCESSING OF AQUATIC BIOLOGICAL RESOURCES IN THE KALININGRAD REGION

Abstract. The article analyzes the state of the aquatic biological resources processing industry using the Kaliningrad Region as an example, and shows the role of the industry in the fisheries sector and in the regional economy. The influence of external factors is investigated, the role of small and medium-sized businesses in the development of the industry is revealed, and the risks are described. About half of the existing fish-processing plants are at risk of cash gaps, which are neutralized through government assistance. More efficient use of industrial capacities is limited by the current situation with the supply of raw materials, logistical problems and the sale of finished products. A conclusion is drawn about the trends of capital consolidation within vertically integrated structures. Constructive assumptions have been made about the need to develop cooperative relations between local fishing, fish farming companies and the HoReCa segment.

Keywords: fisheries complex, processing of aquatic biological resources, HoReCa, aquaculture, sector factors of influence.

Kotenev A.D., Kryjevskaya N.N., Zhikrivetskaya Yu.V.

QUALITY OF LIFE IN MODERN RUSSIAN SOCIETY

Abstract. Economic imbalances, coupled with prolonged inflation, changes in national currency purchasing power, budget deficits, and sanction spikes, have pushed a significant portion of the population to the brink of survival. State social policies are not fully meeting emerging needs, including non-material ones. The concept of quality of life has been expanded to include components reflecting the accessibility of vital goods and services, the required level of monetary income considering self-realization, and the receptiveness to changes in moral and cultural-historical development. Authors note a significant lag in monetary income for citizens in four out of eight federal districts compared to the national average. The critical situation in the North Caucasian Federal District is highlighted, where this indicator lags the national average by a third. The capital traditionally leads due to its more dynamic development compared to other regions.

Keywords: quality of life, well-being, standard of living, socio-economic conditions of life, monetary income, life priorities, economic availability of goods, financial situation.

Kotenev A.D., Sajneva S.V., Vasilenko E.V.

LIVING STANDARDS OF THE POPULATION IN CONDITIONS OF PERSONNEL SHORTAGE

Abstract. The article presents the results of the analysis of the problems of personnel provision of economic entities on the example of Stavropol Krai, in the context of the standard of living of the region's population. Attention is focused on the complexity of the issues under consideration, combining both socio-economic and political-organizational aspects, overcoming which is a vital factor in the context of both internal and external negative impact on the economic processes of the state. The analysis of the dynamics of the average monthly salary allowed us to focus on the presence of a negative situation, in which the region in question is an outsider, both in the structure of the federal district and the state as a whole. The distribution of the number of economically active population demonstrates a paradoxical situation of the outflow of personnel from the industry, which is the main one for Stavropol Krai - agriculture. The reasons are both purely economic aspects associated with the uncompetitive size of wages, and social ones - the decline in the prestige of agricultural activity among young people. The author points out the need to take a set of urgent measures aimed at solving the problems under consideration, which affect both the standard of living of the population and the investment attractiveness of the region.

Keywords: human resources, standard of living, unemployment, personnel shortage, quality of life, wages, migration processes.

Makarova O.V., Nazarov G.O.

RISK MANAGEMENT METHODS IN AUDITING

Abstract. The article systematizes scientific knowledge about the risks arising in the business activities of audit firms as subjects of entrepreneurial activity. The analysis of existing risk management methods in scientific and professional literature is carried out. The factors influencing the choice of audit risk management methods are highlighted: the type of risk, the subject of risk management, the object of management, and the level of risk. The risks of auditing are divided into professional risks of an auditor and risks of an audit business (audit firm). A methodology has been developed for selecting and applying risk management methods unique to audit entities by their types and management entities: the auditor, the management of an audit firm, and the state. Among the proposed methods, the main ones are risk avoidance, risk prevention, obtaining additional information, risk insurance, and self-financing.

Keywords: audit risk, audit business risk, risk management methods, avoidance, prevention, risk insurance, self-financing.

Merkusheva M.V.

COLD LOGISTICS IN THE FISHING INDUSTRY: PROBLEMS AND PROSPECTS

Abstract. The article discusses the key features of the organization of the “cold chain”, focused on the supply of frozen fish products. The presented brief analysis of the state and prospects for the development of cold logistics indicates a high potential for economic growth, especially in the Russian fishing industry, taking into account geographical features. The whole set of problems can be divided into legislative and legal, organizational and managerial, infrastructural and logistical. Based on a systematic approach to analyzing the current situation in the cold logistics of fish products, critical areas for its improvement have been identified: harmonization of the regulatory framework aimed at increasing the degree of cross-functional interaction between all participants in the cold chain, further development of transport and logistics infrastructure, including from a geographical perspective, increasing the efficiency of using existing cold chain resources.

Keywords: cold chain, fish products, supplies, transport infrastructure.

Rysina V.A., Spiridonova A.L.

FEATURES OF ACCOUNTING AND TAXATION OF OPERATIONS WITH CRYPTOCURRENCY IN THE RUSSIAN FEDERATION

Abstract. The article briefly examines the essence of the concept of “cryptocurrency”, reflects its distinctive features, and describes the main types of cryptocurrencies used. The main advantages of cryptocurrencies and the risks associated with their use are revealed. The scheme of the main elements of the concept of “digital currency” in the Russian Federation is presented. The Russian regulatory framework has been studied, which regulates the mechanism of operations with cryptocurrency and the mining process. The main aspects of accounting for transactions with cryptocurrency are highlighted, and recommendations are given on how to change the accounting policy of the organization. The fragment of the working chart of accounts for accounting of crypto assets, created in the 1C: Accounting 8.3 program, is given. Schemas of the main accounting records have been compiled for the recommended subaccounts used to account for the purchase and sale of cryptocurrencies and mining. The features of the taxation procedure for transactions with cryptocurrency in the Russian Federation are considered.

Keywords: cryptocurrency, mining, digital currency, miner, account, tax, taxpayer.

Semin A.N., Mikhailyuk O.N., Belikova O.A., Semukhina A.M.

ON THE TRENDS OF DEVELOPMENT OF PRODUCTION AND SALES OF SEAFOOD AND FISH IN THE SYSTEM OF FOOD SUPPLY FOR THE POPULATION

Abstract. The article analyzes the trends in the production and catch of biological aquatic resources within the framework of the implementation of the medium-term Strategy for the Development of the Agro-Industrial and Fisheries Complexes. The range of factors influencing the state of the fishing industry and market conditions is established, key problems are identified and practical recommendations are proposed to improve the competitiveness and profitability of economic entities in the fisheries complex. As part of the problem under study, an analysis of the activities of a typical trading enterprise operating in the Yekaterinburg market since 2013 and specializing in the sale of aquatic bioresources (OKVED 47.1, category: microenterprise) is presented. The study focuses on the development of sustainable development strategies for enterprises in this sector in the face of new challenges.

Keywords: food security, fish production, Russian fish products, Strategy for the Development of the Agro-Industrial and Fisheries Complexes, sales analysis, competitive advantage, range of fish products.

Semin A.N., Tronina M.V.

ON THE DEVELOPMENT OF THE FISHERIES COMPLEX OF RUSSIA: LESSONS OF HISTORY AND NEW REALITIES

Abstract. The fisheries sector plays an important role in the economic and social life of Russia. It ensures food security, stimulates trade and economic relations and creates jobs. Today, it is necessary to move as quickly as possible from the basic approaches to long-term planning to the target principles of managing large economic systems. This will make it possible to change the structure of the economy from a raw material economy to a value-added economy. The implementation of long-term priorities and goals of Russia's socio-economic development requires increased efficiency of the state mechanism. For the successful implementation of reforms, it is necessary to develop and implement effective target models for the development of large economic systems, the management of which is based on the active participation of the state, which should act as a regulator and investor. The historical method of scientific research helps to identify the specifics of the formation and development of the fishing industry in our country, and the analysis of the historical process allows us to better understand and evaluate the current sectoral problems of using the country's water resources.

Keywords: fisheries, fisheries complex, fish consumption, pre-revolutionary stage of development, Soviet stage of development, development strategy, efficiency factors, promising models.

V.A. Umanets, M.A. Osipova

MODERN DEVELOPMENT VECTORS OF THE FISHERIES COMPLEX OF THE REPUBLIC OF CRIMEA AND THE CITY OF SEVASTOPOL FROM THE POSITION OF A STRATEGIC APPROACH

Abstract. The paper analyzes the performance of the fisheries complex efficiency and identifies trends and patterns of its development in the context of federal districts and certain territorial entities. It has been established that the effective performance of the regional fisheries complex is impossible without the use of a strategic approach based on the implementation of a comprehensive mechanism for strategic management of economic entities of all forms of ownership in order to create competitive advantages, ensure their viability, and support their strategic development potential. It has been proven that despite the importance of the industry, the existing fisheries potential is used insufficiently, and the great majority of Crimean fishing and

fish-processing enterprises and organizations are on the verge of bankruptcy. Modern development vectors of the fisheries complex of the Republic of Crimea and the city of Sevastopol within the framework of the basic subsystems of its functional and component structure have been identified. **Keywords:** fisheries complex, strategic approach, trends, patterns, catch, commercial aquaculture production.

Yushayeva R.S.-E., Israilov M.V.

THEORETICAL FOUNDATIONS OF THE STATE SOCIO-ECONOMIC POLICY

Abstract. The state socio-economic policy of the Russian government, consisting of a set of guiding principles, goals and strategies to preserve the legal obligations of the social sphere, is the most important urgent problem. In this regard, this article is devoted to the theoretical issues of the formation and development of state socio-economic policy: the concept, essence, purpose, objectives and specifics of state socio-economic policy are defined. It is noted that the main goal of socio-economic policy, which is an integral part of state policy, is to reduce the harmful effects of such social ills as individual and social inequality, as well as socio-economic transformations. A special place is given to the definition of the conceptual framework based on the different opinions of Russian researchers. The analysis of all definitions provides the basis to identify several general areas that most accurately reflect the specifics of the concept of "state socio-economic policy". The materials presented in the article make it possible to determine the priority tasks of conducting socio-economic policy by the state.

Keywords: state, politics, socio-economic policy.

Yarkina N.N., Luneva V.V.

ENTREPRENEURIAL RISK MANAGEMENT FUNCTIONS IN THE ENTERPRISE MANAGEMENT SYSTEM

Abstract. The article reveals the essence of the concept of "entrepreneurial risk"; the functions of entrepreneurial risk management are identified as an integral part of the general functions of enterprise management; the general functions of enterprise management and its entrepreneurial risk are characterized, including planning, organization, motivation, control and coordination; the features of general management functions are shown, taking into account the specifics of the subject research; among the specific functions of business risk management, prognostic, preventive, protective, regulatory, innovative and control are emphasized; the relationship of general functions of enterprise management and business risk with specific management functions regarding enterprise risks is shown; the experience of integrating business risk management functions with enterprise management functions is analyzed using the example of domestic and foreign companies in various industries.

Keywords: enterprise, entrepreneurial risk, management, functions, integration experience.

Kashutin A.N., Klimova A.V., Kashutina I.A., Barysheva L.A.

POLLUTANTS IN KAMCHATKA RIVERS: HOW FISH PROCESSING AND GOLD MINING RUNOFFS KILL THE PENINSULA'S SPAWNING RIVERS

Abstract. The destabilization of ecosystems of surface water bodies in a unique region of the Far East – Kamchatka Krai – is discussed. The specificity of river waters – their high dynamism and good aeration – do not contribute to the intensive development of microorganisms in them, therefore Kamchatka Krai is the world's largest natural incubator-spawning ground for Pacific salmon in fresh water bodies. Traditionally, the greatest contribution to the economic development of Kamchatka Krai has been and continues to be made by the fishing industry. At the same time, seasonal fish processing enterprises (artels) that do not have treatment facilities and deep processing of raw fish are the main suppliers of pollutants and heavy metals to natural incubator-spawning grounds, exceeding the MAC for lead by 4.1 times, for nitrite nitrogen and for cadmium by 9.4 times. The ecological situation during gold mining is closely connected with the reproduction of salmon fish species in the rivers of the peninsula. The river is the final accumulation zone of almost all toxic waste: Cu^{2+} , Mn^{4+} , Pb^{2+} , Cd^{2+} , Fe^{3+} , Zn^{2+} , etc., which subsequently end up in water bodies.

Keywords: Kamchatka Peninsula, Pacific salmon hatchery and spawning ground, pollutants, gold mining industry, industrial waste storage facility.

Klimova A.P., Bakhareva A.A., Kochetkov N.I.

EFFECT OF FULVIC ACID ON SIZE AND WEIGHT INDICATORS AND HISTOLOGY OF THE DIGESTIVE SYSTEM OF DANIO RERIO (*DANIO RERIO*)

Abstract. The article investigates the effect of fulvic acid, a promising biologically active feed additive, when added to feed (at concentrations of 2 %, 3 % and 4 %) on weight gain and histological structure of the midgut and liver of the test object *Danio rerio*. It was found that fulvic acid in the entire range of concentrations does not have a significant effect on the growth rates and total biomass of zebrafish. The relative weight gain in the control group was 15.7 %, while in the groups with the addition of acid at concentrations of 2 %, 3 % and 4 % it was 17.2 %, 16.8 % and 14.6 %, respectively. It is shown that the use of fulvic acid in the studied concentration ranges does not cause pronounced pathological changes, however, at a high dose (4 %), a decrease in the secretory activity of goblet cells in the intestine is observed. The obtained data confirm the safety of this humic acid and the possibility of its use as a feed additive in aquaculture. The need for additional studies aimed at assessing the long-term effects of its use, taking into account a number of physiological indicators of the objects being grown, is noted.

Keywords: humic substances, feed additives, fulvic acid, safety, histological examination, biological safety.

Kochetkov N.I., Klimuk A.A., Reznikova D.A., Marsova M.V., Klimova A.P.

EFFECTS OF THE PROBIOTIC *LACTOBACILLUS BREVIS* 47F ON GROWTH, HEMATOLOGICAL AND BIOCHEMICAL BLOOD PARAMETERS, ANTIOXIDANT STATUS, AND INTESTINAL AND LIVER HISTOLOGY OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)

Abstract. This study presents the effects of the probiotic *Lactobacillus brevis* 47f on a number of physiological parameters of juvenile rainbow trout (*Oncorhynchus mykiss*). The addition of the probiotic to the feed at a concentration of 1×10^8 CFU/g led to an increase in final weight (162.43 g vs. 155.24 g in the control) and fish biomass (4060.6 g vs. 3881 ± 49 g), and a decrease in the

feed conversion ratio to 0.87. Additionally, the experimental group showed significantly higher relative weight gain and average daily weight gain rates. Alanine aminotransferase activity, total protein, albumin, and globulin content increased in the blood serum of experimental fish. The probiotic had no significant effect on the cellular composition of peripheral blood, except for an increase in the relative number of monocytes (from 2.54 % in the control to 1.89 % in the experiment). In the liver of fish treated with the probiotic, catalase (51.13 units/mg protein) and superoxide dismutase (88.52 units/mg protein) activities increased, as did the concentration of reduced glutathione (3.43 mmol/g protein). Measurement of histomorphometric indices revealed an increase in the height of the intestinal epithelium and the number of immunocompetent cells in the intestinal mucosa (lamina propria lymphocytes, eosinophilic cells), as well as an increase in the cytoplasmic area of liver hepatocytes. The positive effect of probiotic strain *L. brevis* 47f on the physiological parameters of the fish indicates that its use as a feed component in aquaculture is promising.

Keywords: aquaculture, confined water supply, *Lactobacillus brevis*, probiotic, antioxidant defense, immunity, histomorphometry.

Polin A.A.

**EXPERIMENTAL FARMING OF JUVENILE LONG-CLAWED CRAYFISH
PONTASTACUS LEPTODACTYLUS ESCHSCHOLTZ, 1823
IN POND CAGES AT THE "VZMORYE" AQUACULTURE RESEARCH CENTER
(ROSTOV REGION)**

Abstract. Experimental rearing of long-clawed crayfish juveniles in submersible pond cages was conducted at the "Vzmorye" Scientific and Production Center of Aquaculture of the Azov-Black Sea Branch of the State Scientific Center of the Russian Federation the Federal State Budgetary Scientific Institution "Russian Federal Research Institute of Fisheries and Oceanography". The experiments were conducted at varying stocking densities: 15, 20, and 30 individuals per cage (33, 44, and 66 ind./m², respectively). The experimental rearing period lasted 93 days. By the end of the rearing period, the average increase in length was 113 % and in weight was 590 %. Survival rates during the rearing period at various stocking densities ranged from 35.0 to 62.5 %, with an average of 45.4 %. Analysis of survival and growth rate data for the study groups revealed that the optimal initial stocking density was 44 ind./m². A comparison of the results of rearing juveniles in cage ponds with those of a group reared under controlled conditions in an aquarium complex revealed higher rearing efficiency in the cage ponds.

Keywords: long-clawed crayfish, juveniles, Azov-Black Sea fishery basin, "Vzmorye" Scientific and Production Center of Aquaculture, ponds, cages, body length, body weight, survival rate, stocking density.

Sytnik N.A.

**ENHANCING MUNICIPAL SOLID WASTE UTILIZATION THROUGH COMBINED
TECHNOLOGICAL SOLUTIONS AND EVALUATION OF THEIR RESOURCE
EFFICIENCY AND ENVIRONMENTAL IMPACT**

Abstract. The article addresses the urgent problem of improving the municipal solid waste management system in the Russian Federation. Using a systematic approach and life cycle assessment methodology, a comprehensive analysis of modern technological solutions has been conducted, including mechanical separation methods, alternative fuel (RDF) production, aerobic and anaerobic biodegradation, thermal drying, and bioconversion. The study reveals significant potential for enhancing waste utilization efficiency through the combination of technologies considering their resource intensity and environmental impact. Particular attention is paid to the assessment of pollutant emissions and resource consumption at different stages of technological processes. Scientifically based recommendations have been developed for the formation of

integrated waste processing systems that optimize material and energy flows. It is shown that a differentiated approach to selecting technological solutions, taking into account regional characteristics of waste generation and composition, ensures the achievement of circular economy targets.

Keywords: municipal solid waste, recycling, resource intensity, environmental impact, technological solutions, combined methods.

Turkulova V.N., Rutkovskaya A.A., Poplavskiy A.A.

**PRACTICE OF FULL-CYCLE REARING OF THE AUSTRALIAN REDCLAW
CRAYFISH *CHERAX QUADRICARINATUS* (VON MARTENS, 1868) IN THE
AQUARIUM FACILITY OF THE CENTER OF SECTORAL EXPERTISE AT THE
FSBEI HE "KSMTU"**

Abstract. The strategy for the development of the fisheries sector in the Russian Federation for the period until 2030 envisions an increase in the yield of commercial aquaculture up to 618 thousand tons, supplemented by an expansion of the range of cultivated species. Broadening the diversity of the aquaculture species composition is possible through the introduction of new decapod species. In Russia, commercial cultivation of native slow-growing species of freshwater crayfish—narrow-clawed (Danube) crayfish and broad-fingered (European) crayfish—remains in its nascent state. A viable alternative would be the cultivation of fast-growing thermophilic Australian redclaw crayfish. It is even more relevant for the southern regions of Russia. Given the promise of this species, research into full-cycle cultivation of the Australian redclaw crayfish has been conducted at the aquarium facility of the Center of Sectoral Expertise, KSMTU, with the aim of developing a feasible technology. It has been shown that, when this species is reared in age-diverse groups at the optimal temperature range 26–28 °C and under favorable biotic and abiotic conditions, its full-cycle cultivation can be achieved. It has been established that the redclaw crayfish reaches sexual maturity in 6 months; the minimum weight of the females at their first maturity ranges from 18.5 to 37 g, and the length, respectively, ranges from 6–7 cm to 9–10 cm. Mature females are capable of reproducing twice a year; the number of eggs in small females weighing 18–20 g is 83–85, and in large females weighing 115 g it is 338. The duration of embryogenesis at the temperature 26–28 °C ranges from 25 to 32 days. Freshly hatched larvae have an average weight of 0.010–0.012 g; at the age of 30–32 days they weigh, on average, 0.2–0.8 g, and on the 60th day they reach 1.6–2.81 g. The redclaw crayfish individuals reared in the aquarium facility have been found to reach a marketable weight of 50–60 g within 5–6 months.

Keywords: commercial crayfish farming, Australian redclaw crayfish, full-cycle cultivation, aquarium facility, temperature, hydrochemical parameters, growth rate, maturation, reproduction.

Shaganov V.V., Zinabadinova S.S.

**DIET OF COMMON BLENNIES (BLENNIIDAE) IN THE COASTAL ZONE OF THE
EASTERN SOUTHERN COAST OF CRIMEA (BLACK SEA)**

Abstract. This study provides data on the diet and trophic relationships of three common fish species of the family Blenniidae in the coastal zone of the Eastern Southern Coast of Crimea (Black Sea) – the Sphinx blenny *Aidablennius sphinx* (Valenciennes, 1836), the Rusty blenny *Parablennius sanguinolentus* (Pallas, 1814) and the Peacock blenny *Salaria pavo* (Risso, 1810). An analysis of the dietary spectrum of species was conducted and based on the study of intestinal contents, taxonomic identification of food items and an assessment of the frequency of their occurrence. The discussion of the results is based on studies of the biotopic and bathymetric distribution of species. Low food similarity coefficients are typical for the mass representatives species of the family Blenniidae in the coastal zone of the eastern southern coast of Crimea, in conditions of a rich food supply and well-defined trophic differentiation. Based on the nature of their dietary specialization, these species belong to three different trophic groups: herbivore (*P.*

sanguinolentus), carnivore (*S. pavo*), and omnivore (*A. sphinx*).

Keywords: Blenniidae, benthic fishes, feeding, trophic groups, Black Sea.

Arabova Z.M., Bredikhin S.A., Aleksanyan I.Y., Nugmanov A.H.-H., Osmolovskiy P.D.,
Bulychev D.V.

THERMOPHYSICAL CHARACTERISTICS OF CAVIAR AND LECITHIN CLOT OBTAINED ON ITS BASIS

Abstract. The article is devoted to the identification of the thermophysical characteristics of caviar and its lecithin clot. The caviar of freshwater fish species caught in the Lower Volga basin of the Astrakhan region, corresponding to the morphological characteristics of the fourth stage of maturity, as well as lecithin-containing clot made from it, were used as an object. The specific heat capacity, thermal conductivity and thermal conductivity coefficients were determined, taking into account the humidity of the study objects. The humidity of the objects varied in the range of technological restrictions on moisture removal (for caviar from 66 % to 10 %, for clot from 78 % to 13 %). The variation of the specific heat in the studied material was assumed to be linear with acceptable accuracy and ranged from 3193 to 1975 J/(kg·K) and from 3850 to 2247 J/(kg·K), respectively. The coefficient of thermal conductivity did not change linearly due to its non-compliance with the additivity rule, the average value of this indicator for caviar was from 0.430 to 0.110 W/(m·K), for clot – from 0.183 to 0.125 W/(m·K). The coefficient of thermal conductivity (m²/s) did not vary linearly, the average value of this indicator for caviar ranged from 4.8·10⁻⁸ to 12.2·10⁻⁸ m²/s, for clot – from 6.4·10⁻⁸ to 5.2·10⁻⁸ m²/s.

Keywords: caviar raw materials, lecithin clot, heat treatment, thermophysical characteristics, physical density, variation of parameters, mathematical description.

Bityutskaya O.E.

ECOSYSTEM APPROACH TO THE FORMATION OF PERSONALIZED FOOD PARADIGM

Abstract. Article explore the historical development of nutrition theories and paradigms, and discuss how the current paradigm is shifting from simplistic and general guidelines to a more complex and multifaceted approach that considers individual health, mental well-being, ethical considerations, environmental impact, and cultural and personal identity. A proposed ecosystem model that forms a paradigm of personalized nutrition based on the synergy of data, technology and expertise. The main structural elements are: collection and analysis of personal data (foundation), analytical core and algorithms (system brain), personal recommendations (output information); the cyclicity of the system is ensured by monitoring and the feedback system, and the unifying element is professional support. The paradigm of personalized nutrition demassifies the approach to health, marking the transition from the area of general councils to high-tech precision medicine.

Keywords: ecosystem approach, nutrition paradigm, ecosystem, personalized nutrition.

Kirichenko V.A., Gromov S.V.

MATHEMATICAL MODELING OF THE PROCESS OF TRANSPORTATION OF BULK FOOD PRODUCTS BY PNEUMATIC TRANSPORT

Abstract. In order to effectively implement complex systems for controlling the process of transporting bulk food products by pneumatic transport, it is necessary to create new mathematical models that take into account real working conditions. Existing mathematical models often do not take into account particle migration, hydrodynamic and electrical forces, which leads to their

inaccuracy. The paper developed a mathematical model of the process of transportation of bulk food products, which is based on differential equations of motion of individual particles in the air flow, and also takes into account the behavior of particles during a collision according to the accepted limit conditions. Limit conditions are formed taking into account the influence of modes of transportation of bulk food products and geometry of product pipeline channels. In the course of theoretical studies, the necessary parameters were determined to control the product pneumatic transportation process. The implementation of the research results will increase the productivity of pneumatic transport systems, reliability and safety of work, and reduce energy consumption.

Keywords: pneumatic transport, bulk food products, mathematical modeling, dynamic regulation, productivity.

Kolina T.P., Ageev O.V., Yashonkov A.A.

IMPROVING THE PERFORMANCE OF DISC KNIVES MADE OF 95X18 STEEL FOR FILLETING MACHINES BY CHEMICAL HEAT TREATMENT

Abstract. The article presents the results of research on improving the performance of disc knives made of 95X18 steel for filleting machines by chemical heat treatment. It has been established that traditional hardening methods (boration, ion plasma treatment) do not provide the required set of properties for this application. A technology of nitrocementation in an activated granular medium at temperatures of 960-980 °C with subsequent quenching and low tempering has been developed. The formation of a diffusion layer with a thickness of 120-210 microns and a microhardness of 831-1070 H_{0.5} has been experimentally confirmed. The optimal tempering mode (250-300 °C) has been set, providing a balance of hardness and toughness (2.4-2.9 J/cm²). The preservation of corrosion resistance in salt and sulfur-containing media is shown. Production tests have confirmed a 2.1-fold increase in knife durability while improving the quality of fish filleting.

Keywords: steel 95X18, chemical and thermal treatment, nitrocementation, disc knives, wear resistance, corrosion resistance, filleting machines, diffusion layer.

Sergeeva L.V.

RESEARCH OF CONSUMER PROPERTIES OF BREAD WITH INCREASED NUTRITIONAL VALUE

Abstract. Society is increasingly paying attention to the composition and characteristics of consumed products. There is a clear need to change the structure of food consumption by including foods of enhanced nutritional value in the daily diet. To achieve this goal, the use of specific food ingredients is recommended. One such ingredient can be plant-based raw materials, namely sprouted seeds. The use of sprouted seeds in the formulation of grain crisps will contribute to increasing the nutritional value of the finished products. The article presents research on the consumer properties of developed crisps with sprouted flax and sunflower seeds. As a result of the biological value assessment, high indicators of the nutritional value of amino acid and fatty acid compositions were determined. These facts will ensure a concentrated portion of essential nutrients when consuming the developed food product and will help prevent alimentary diseases. The analysis of consumer properties regarding the assessment of the physiological value of grain crisps with sprouted flax and sunflower seeds indicates the expediency of including the developed product in the diet of all population groups aged 18 to 64 years.

Keywords: bread, amino acids, fats, vitamins, minerals, biological value, physiological value.

Tsarkov M.D., Antipov A.V., Kalita T.L. Klimov V.A.

OBTAINING LYOPHILIZED BIOMASS OF SCENEDESMUS QUADRICAUDA USING A HOUSEHOLD SUBLIMATION UNIT CC-02

Abstract. The green alga *Scenedesmus quadricauda* is known as a potential feed additive rich in

protein, carotenoids, and polyunsaturated fatty acids. However, traditional thermal processing methods often result in cell destruction and the loss of significant amounts of biologically active substances during the production of dry microalgal biomass. This study tested the operation of a modified CC-02 household freeze-drying unit and demonstrated its effectiveness using the example of producing dry algal biomass of the green alga *S. quadricauda* (Turp.) Bréb. Morphological and biochemical analysis of the freeze-dried biomass revealed that the algal cells were not deformed, retained their shape, and maintained the integrity of the coenobium, including the spines on the outer cells. The total lipid, protein, and ash contents were 15.4 %, 35.2 %, and 2.2 %, respectively.

Keywords: freeze-drying, thermogram, *Scenedesmus* biomass, freezing, final drying.

Demchuk O.V., Zlobina M.S.

ACTUAL PROBLEMS OF ANALYZING THE EFFICIENCY OF USING THE WORKING CAPITAL OF AN ENTERPRISE AND THE DIRECTIONS OF ITS IMPROVEMENT

Abstract. The presented article is devoted to the problems of the lack of a universal methodologically verified and practically applicable toolkit for assessing the efficiency of using working capital in modern conditions. Industry-specific features, seasonal fluctuations, and limited information base can pose challenges in conducting an analysis of the efficiency of using a company's working capital in its production and economic activities. Traditional indicators of turnover, liquidity, and profitability of working capital, when used in isolation during the analysis process, do not provide a comprehensive understanding of the quality of working capital management and do not fully reveal the reserves available to the company. In this regard, it is advisable to systematize the principles and methodological techniques of working capital analysis, to combine well-known approaches to assess the effectiveness of its use, taking into account industry specifics.

Keywords: working capital, analysis problems, analysis principles, efficiency of working capital use, modeling of working capital use efficiency, financial investments, total profitability.

Dusaeva E.M., Kurmanova A.Kh.

ARCTIC FISHERIES AND FISH FARMING IN THE CONTEXT OF THE DEVELOPMENT OF THE TRANS-ARCTIC TRANSPORT CORRIDOR

Abstract. The article explores the conditions for utilizing the Trans-Arctic transport corridor to deliver Arctic fishery and aquaculture products to the domestic markets of central Russia. It is demonstrated that Arctic fishing, as a crucial maritime economic activity supporting employment and food security, holds significant potential for increased catch volumes due to the migration of new fish species into Arctic seas driven by climate change. The study analyzes catch volumes of key aquatic bioresources in Arctic seas and the sales volumes of aquaculture products in Russia's Arctic zone. It is substantiated that the development of marine, coastal, and territorial ecosystems in Arctic regions depends on organizing industrial fishing based on scientific expedition data regarding fish stocks in Arctic waters.

Keywords: Arctic seas, aquatic biological resources, fisheries, aquaculture, investments, Trans-Arctic transport corridor.

Kondrashin V.A., Danilina E.P., Moskina I.Y., Klimovich N.V.

INNOVATIVE DEVELOPMENT OF MEDICAL ORGANIZATIONS: KEY TRENDS AND SCENARIOS

Abstract. The article examines issues of innovative development of medical organizations under the influence of modern medical trends. A review of theoretical approaches, regulatory initiatives

and analysis results of key technological, organizational and economic factors determining the readiness of medical organizations to implement advanced solutions is conducted. The authors systematize key areas of transformation, including digitalization, artificial intelligence, personalized medicine, medical tourism, and the formation of medical ecosystems. Based on a SWOT analysis, the strengths and weaknesses of implementing innovative trends in medical organizations, as well as opportunities and threats of the external environment, are identified. As a result of synthesizing the data, three possible scenarios for innovative development are proposed: conservative, moderate, and leading, with a description of their pace, focus, financial requirements, and target audience. The choice of scenario is determined by the initial potential and resources of a specific medical organization.

Keywords: innovative development, medical organizations, digital transformation, medical trends, digital technologies, innovation processes.

Kotenev A.D., Hatagova S.V.

RETROSPECTIVE ANALYSIS OF PERSONNEL RESOURCES IN REGIONAL COOPERATIVE STRUCTURES

Abstract. This article presents the results of a retrospective analysis of human resources in cooperative structures in the Southern and North Caucasus Federal Districts. A study of staff turnover rates and the average number of employees in regional cooperative structures allowed the authors to identify the main causes of staff outflow, both macroeconomic and local in nature. The history of the cooperative movement in Russia demonstrates the importance and strategic feasibility of business structures, both in terms of product production (service provision) and employment in remote areas. An analysis of the activities of business cooperative structures revealed that the declining prestige of work in the agricultural sector is the cause of staff outflow from rural areas, leading to their total "extinction." It is also noted that cooperative structures serve not only a purely economic role but also address social issues in the regions, requiring targeted assistance from government authorities at both the municipal and regional levels.

Keywords: cooperative structure, staffing, motivation, unemployment, consumer union, staff turnover, region.

Kuzicheva N.Yu., Murtazaev A.T., Pompaeva S.N.

ECONOMIC LEVERS OF THE POULTRY FARMING ECONOMIC MECHANISM

Abstract. The article presents an analysis of the development of poultry farming in farms of all categories in the Russian Federation, shows the high dynamism of transformations in it. Regulation of this process is carried out in a system of interconnected mechanisms covering macro-, meso- and micro-levels of management with the decisive importance of state support in organizing relations between the subjects of the country's economy. The components of the mechanism for regulating the development of poultry farming are indicated, which are universal for all its types, including intersections, goals and regulations. A comparative analysis of various subsystems of the poultry farming development mechanism in the Russian Federation is given, indicating the supersystem value of the economic mechanism. It is shown that its economic levers are applied within the legal framework and have investment, regulatory and financial and economic significance.

Keywords: poultry farming, economic mechanism, economic mechanism, organizational and economic mechanism, levers, tools, efficiency.

Mikhel K.V., Ivanov A.V.

MODERN PRACTICE AND HISTORICAL EXPERIENCE OF FISH PROCESSING IN RUSSIA

Abstract. This article presents a multifaceted analysis of the historical evolution, current status, and strategic development prospects of the fish processing industry in the Russian Federation. The study's methodological basis is a systems approach, comparative historical analysis, and structural-functional analysis. Particular attention is paid to assessing key industry challenges, such as the physical and moral depreciation of fixed assets, a shortage of skilled personnel, regional disparities, and the raw materials-based nature of exports. State support mechanisms are examined, including investment quota programs and aquaculture development incentives. The scientific novelty lies in the comprehensive justification of priority areas for industry modernization based on clustering, technological modernization, and digital transformation. A conclusion is drawn regarding the need to implement a coordinated industry policy aimed at transitioning from raw material exports to the production of high-value-added products, which is essential for ensuring the industry's competitiveness, food security, and the sustainable socioeconomic development of the country's coastal regions.

Keywords: fishing industry, fish processing, deep processing, modernization, investment quotas, government regulation, regional clusters, aquaculture, technological innovation, digitalization, import substitution, food security.

Skorobogatova V.V., Sviridova E.A.

ACCOUNTING FOR OPERATIONAL RISKS IN THE CONTEXT OF SANCTIONS RESTRICTIONS: ADAPTATION OF ACCOUNTING POLICY

Abstract. This article addresses current issues of operational risk management in the context of sanctions pressure and the adaptation of Russian companies' accounting policies to modern economic challenges. Specific practical examples are used to demonstrate methods for assessing asset impairment, reflecting rising logistics costs, and creating provisions for doubtful accounts receivable. The step-by-step process of transforming accounting processes is examined in detail – from diagnosing key business process vulnerabilities to reorganizing internal document management procedures and improving employee skills. Considerable attention is paid to ensuring reliable and complete disclosure of financial information in financial statements in accordance with new requirements. The study confirms that a comprehensive restructuring of accounting policies not only minimizes the risks of material misstatements and auditor comments but also promotes greater company transparency, which is crucial for maintaining the trust of investors and credit institutions. The practical recommendations developed by the authors will enable business entities to promptly respond to the changing regulatory environment and ensure business resilience in an unfavorable external environment.

Key words: economic sanctions, accounting policy, sanctions restrictions, development prospects, operational risks.

Sushko N.A., Makarov A.Yu.

THE IMPACT OF DIGITAL TRANSFORMATION ON IMPROVING THE ACCURACY AND RELIABILITY OF PREDICTING AN ENTERPRISE'S ECONOMIC INDICATORS

Abstract. The article is devoted to the study of the impact of digital transformation on improving the accuracy and reliability of forecasting economic indicators of an enterprise. It examines the transition from traditional forecasting methods to the use of Big Data technologies, machine learning, and artificial intelligence. The key advantages of digitalization, including the speed of decision-making, reduction of costs, and increased investment attractiveness, as well as the associated risks, such as cybersecurity and high implementation costs, are identified. Using the

example of the fishing industry, a three-factor regression model is constructed to demonstrate the impact of imports, depreciation of fixed assets, and the number of employees on profit. Based on the obtained model, the amount of profit was predicted for the period up to 2029. It has been proven that the digitalization of forecasting processes is becoming a strategic imperative for increasing the competitiveness and financial stability of enterprises.

Keywords: digital transformation, forecasting, big data (Big Data), machine learning (Machine Learning), artificial intelligence (AI), accuracy, fishing industry, regression analysis, and modeling.

Kharin A.G., Ogiy O.G., Mnatsakanyan R.A., Mnatsakanyan D.A.

AN OVERVIEW OF THE FINANCIAL POTENTIAL OF RUSSIA'S FISHING INDUSTRY

Abstract. This review provides a comprehensive assessment of the financial potential of the Russian fishery complex. Using data from Rosstat and the Unified Interdepartmental Statistical Information System (EMISS), the analysis examines key sources of the industry's financial resources, including revenue, net financial result (profit minus loss), depreciation charges, and borrowed funds. Positive trends are identified, such as significant revenue growth and increased investment activity, particularly in marine industrial fishing and aquaculture. Simultaneously, growing risks are noted, including declining return on assets, rising losses, and a high debt burden in the capture sector. The primary directions of financial resource allocation are identified, with current operational expenditures prevailing. The study concludes that enhanced state support and improved capital efficiency are crucial for transitioning the industry onto a trajectory of sustainable and innovation-driven development.

Keywords: financial potential, fishery complex, net financial result, investment activity, return on assets, state support.

Shestak O.I.

THE INSTITUTIONAL TRAP OF THE RUSSIAN FISHERIES COMPLEX: ANALYSIS OF THE PRODUCTION-CONSUMPTION LINK DYSFUNCTION IN THE POST-SOVIET PERIOD

Abstract. The article is devoted to identifying the institutional trap of the Russian fisheries complex, which manifests itself in a systemic disconnect between production and consumption. Based on the analysis of a large dataset from 1991–2023, a paradox is revealed: an increase in the catch volumes of aquatic biological resources does not lead to a higher share of fish in the household consumer basket but is often accompanied by its decrease. It is proven that the key causes of this dysfunction are the export orientation of the industry, the price inaccessibility of fish products, and structural distortions in domestic supply. The inadequacy of using the “per capita consumption” indicator as a target benchmark for the development of the fisheries complex is substantiated. A new model for sectoral policy is proposed, involving a transition from the traditional raw material export model to the development of deep processing and a differentiated regional approach.

Keywords: fisheries, fisheries complex, institutional trap, food security, fish consumption, sectoral policy, institutional dysfunctions.

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RISK CULTURE IN THE SYSTEM OF INTEGRATED MANAGEMENT OF ENTREPRENEURIAL RISKS OF FISHERY ENTERPRISES

Abstract. Based on the research objective, the article provides a comprehensive study of the risk culture phenomenon, highlighting its systemic role in integrated risk management and offering practical recommendations for its formation and development in the fisheries sector. The study is based on current scientific and practical perspectives on risk culture in the context of enterprise risk management, particularly the COSO ERM (Enterprise Risk Management) 2017: Integrating with Strategy and Performance concept. The article presents a classification of the risks of fisheries enterprises, emphasizing their industry-specific features, which is necessary for the identification of business risks as the initial stage of integrated risk management. The article also provides a description of business risk management. Risk culture is considered as a part of corporate culture that determines the attitude towards risks and the principles of risk management. Among the main principles of risk culture in fisheries, the following are highlighted: common goals and values, universal acceptance and implementation, continuous improvement, transparent and timely communication, and responsibility. As recommendations for the formation and development of an effective risk culture in the fisheries sector, a consistent system of practical measures is outlined to create a sustainable and competitive business model in the context of modern market uncertainty.

Keywords: risk culture, integrated management, business risks, fisheries enterprises.

Kemalova L.I.

DIGITAL EDUCATIONAL ENVIRONMENT AS A FACTOR IN THE TRANSFORMATION OF MODERN PEDAGOGICAL PRACTICES

Abstract. This article analyzes the impact of the digital environment on modern education. It emphasizes that the integration of digital technologies is changing the way teachers work, the formats for organizing the educational process itself, teaching methods, and the system for assessing student knowledge. These conditions necessitate the development of effective strategies to help teachers adapt to new realities and develop and implement new teaching methods and techniques in a digital educational environment. Examples of the use of pedagogical practices in the context of digitalization, such as gamification of the educational process, collaborative practices, and others, are analyzed. It is noted that certain difficulties exist in the process of implementing pedagogical practices in a digitalized environment, which must be overcome by developing the digital competencies of teachers themselves and optimizing the educational process. The article examines the advantages of a digital educational environment and the challenges faced by participants in the educational process. It also emphasizes the importance of using traditional teaching methods alongside digital formats.

Keywords: digital educational environment, pedagogical practices, digital competencies, higher education, digital transformation.