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Abstract Book

Conference on Agribusiness, Environmental Engineering and Biotechnologies» (AGRITECH-2019)

June, 20-22

2019

Krasnoyarsk, Russia

Science & Technology City Hall

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IOP Conference Series

INTERNATIONAL CONFERENCE PROGRAMME

International Conference on Agribusiness, Environmental Engineering and Biotechnologies - AGRITECH-2019

(Krasnoyarsk, Russia, June 20-22, 2019)

Conference website:

http:// domnit.ru/conference/agritech-2019

Krasnoyarsk

2019

ABOUT THE CONFERENCE

International and Russian Union of Scientific and Engineering Associations, Krasnoyarsk Regional Union of Scientific and Engineering Associations, Krasnoyarsk Science and Technology City Hall are organizing an International Scientific Conference on Agribusiness, Environmental Engineering and Biotechnologies - AGRITECH-2019. The Conference will take place in Krasnoyarsk in June 20-22, 2019.

We invite scientists, specialists and research teams as well as representatives of the enterprises working in the spheres of agribusiness, agritech engineering, automation and digitization of agriculture, environmental engineering and management to participate in the Conference.

The purpose of the Conference is to share the results and prospects of the achievements in using advanced scientific, innovative and information technologies in environmental sciences, agriculture and agribusiness.

THE WORK OF THE CONFERENCE IS PLANNED IN THE FOLLOWING DIRECTIONS:

- Agribusiness, Economics and Organization of Agritech Engineering
- Information Technologies, Automation Engineering and Digitization of Agriculture
- Chemical and Biological Technologies in Agriculture: from Molecules to Ecosystems
- Environmental Engineering and Management, Mining and Soil Treatment Technology
- Chemical, Ecological, Oil and Gas Engineering
- Biodiversity and Ecosystem Stability

The papers meeting the requirements of the Conference will be published in IOP Conference series: Earth and Environmental Science (EES), indexed in Web of Science and Scopus.

The open access IOP Conference Series provides a fast, versatile and cost-effective proceedings publication service for your conference. Key publishing subject areas include: physics, materials science, environmental science, bioscience, engineering, computational science and mathematics.

The official languages of the Workshop are Russian and English.

Conference venue

The Conference will take place in June 20-22, 2019 in Krasnoyarsk State Agrarian University: 44-I, Elena Stasova Street, Krasnoyarsk, Russia.

Contact details

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The detailed information is available at: www.domnit.ru/conference/agritech-2019

CONTENTS

Overview of the International Conference on Agribusiness, Environmental Engineering and Biotechnologies – AGRITECH - 2019

The purpose of the Conference is to share the results and prospects of the achievements in using advanced high-tech chemical, biological and information technologies in agriculture and agribusiness, in the fields of energy, chemical, environmental, oil and gas engineering, mining and soil treatment technologies, as well as in modern areas of biodiversity and ecosystem stability research.

The Conference "AGRITECH-2019" was jointly organised by the International and Russian Union of Scientific and Engineering Associations (Moscow, Russia), Krasnoyarsk Regional Union of Scientific and Engineering Associations, Krasnoyarsk Science and Technology City Hall and Krasnoyarsk State Agrarian University.

The Program Committee and Editorial Board included prominent professors and scientists from the Russian Academy of Sciences, University of Maribor (Slovenia), Xingtai University (China), Ruhr University in Bochum (Germany), Siberian Federal University (Russia), Reshetnev Siberian State University of Science and Technology (Russia), Krasnoyarsk State Agrarian University (Russia) as well as specialists from Russian and foreign leading industrial enterprises.

A wide range of fundamental and applied problems in various biological and agri-technological systems has undergone consideration during the meeting.

The Conference was organised in 6 main directions:

- Agribusiness, Economics and Organization of Agritech Engineering.
- Information Technologies, Automation Engineering and Digitization of Agriculture.
- Chemical, Ecological, Oil and Gas Engineering.
- Biological Technologies in Agriculture: from Molecules to Ecosystems.
- Environmental Engineering and Management, Mining and Soil Treatment Technology.
- Biodiversity and Ecosystem Stability.

The program of the Conference which took place in Krasnoyarsk State Agrarian University included keynote and plenary talks as well as numerous presentations of the participants (figure 1).

The event has offered a platform for bringing together students, postdocs, innovative academics and industrial experts to exchange their ideas and contribute new engineering approaches to research agri-mechanical and automation processes in various technological-, biological- and eco-systems. Great interest was aroused by the section devoted to economics and organization of agritech engineering, biological technologies, biodiversity and ecosystem stability.

The Conference provided the premier interdisciplinary and multidisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, concerns, practical challenges encountered and the solutions adopted in the fields of environmental and biological sciences, agritech engineering, chemical, mining and soil treatment technologies, digitization of agriculture, etc. Although the schedule of the Conference was very tight, there were very vivid discussions among the participants. The participants who could not come to the Conference due to different reasons including the problem of high transportation costs presented on-site presentations which are available on the web-site of the Conference.

All participants were invited to present their papers in this Volume and all submitted manuscripts went through the independent peer review process. We are very grateful to all reviewers from Russia, China, USA, Slovenia, Germany and Republic of Kazakhstan for their time and highly professional comments. We deeply believe that their reviews gave opportunity to improve the scientific quality of the presented papers which may be useful for academic, scientific and agri-industrial partners.

More than 450 reports were submitted to the Organizing Committee of the Conference. 363 reports were selected for inclusion into this Volume after the review process. All the papers were subjected to rigorous peer-review by conference committee members and international reviewers. The papers were selected based on their quality and relevance to the Conference directions. The proceedings present to the readers the recent advances in the field of agribusiness, economics and organization of agritech engineering, biological and information technologies, environmental, chemical, ecological, power, oil and gas engineering. These papers reflect modern engineering approaches in all Conference directions, broaden the researches of the previous Conferences [1-2].

Figure 1. Plenary talks and sections.

The international scope of the Conference was confirmed by the participation of representatives from 6 countries besides Russia (Germany, Kazakhstan, Vietnam, China, Ukraine, Uzbekistan):

- Al-Farabi Kazakh National University, Almaty, Kazakhstan,
- Almaty Technological University, Almaty, Kazakhstan
- Almaty University of Power Engineering and Telecommunications, Kazakhstan,
- Atyrau State University named after H. Dosmukhamedov, Kazakhstan
- Gmbh Anvilex, Germany,
- Kazakh Academy of Transport and Communications named after M. Tynyshpayev, Almaty, Kazakhstan,
- L. Gumilev Eurasian National University, Kazakhstan
- National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine
- Nazarbayev intellectual school, Almaty, Kazakhstan
- Vietnam Maritime University, Le Chan, Hai Phong, Vietnam
- Vietnam National University, Ha Noi, Vietnam;
- Zhangir Khan West Kazakhstan Agrarian Technical University, Kazakhstan
- Research Institute for Irrigation and Water Problems, Tashkent, Uzbekistan;
- Tashkent Institute of Engineers of Irrigation and Agricultural Mechanization, Uzbekistan.

The participants from Russia (more than 30 regions) represented over 200 universities, scientific institutes and organisations, industrial enterprises:

- E. Favorsky Irkutsk Institute of Chemistry,
- A.V. Zhirmunsky National Scientific Center of Marine Biology;
- Academy of Marketing and Social Information Technologies, Krasnodar,
- Achinsk branches of Krasnoyarsk state agricultural university,
- Agricultural Productive Cooperative “Kolkhos Prigorodny”, Yoshkar-Ola,
- Amur State University, Blagoveshchensk,
- ANO CPE MOMENTUM, Moscow,
- ANO CPE MOMENTUM, Chelyabinsk,
- Astrakhan State Technical University
- Astrakhan State University of Architecture and Civil Engineering,
- Baikal Institute of Nature Management of Siberian Branch of the Russian Academy of Sciences, Ulan-Ude,
- Baikal State University, Irkutsk,
- Banzarov Buryat State University; Ulan-Ude,
- Bashkir Research Institute of Agriculture – Subdivision of the Ufa Federal Research Centre of the Russian Academy of Sciences Ufa,
- Bashkir State Agrarian University, Ufa,
- Bauman Moscow state technical university, Moscow,
- Belgorod IVL, Belgorod,
- Belgorod State Agricultural University named after V.Y. Gorin,
- Birsk branch of Bashkir State University, Birsk,
- Blagonravov Institute of Mechanical Engineering, Russian Academy of Sciences
- BSH Bitovie pribory, Saint -Petersburg,
- Bunin Yelets State University, Yelets,
- Buryat State University, Ulan-Ude,
- Center of agrochemical service "Omsk"; Omsk,
- Chechen State Pedagogical University, Groznyy;
- Chechen State University, Grozny,
- Chelyabinsk State University, Chelyabinsk,
- Chuvash State Agricultural Academy, Cheboksary,
- Chuvash State University, Cheboksary,
- Complex Melioration and Protective Afforestation of the Russian Academy of Sciences, Volgograd,
- Department of Mathematics and Mathematical Modeling of Novokuznetsk Institute (Branch) of Kemerovo State University, Novokuznetsk,
- Emerson, Russian Federation
- Far Eastern Federal University;
- Far Eastern Higher Combined-Arms Command School, Blagoveshchensk;
- Far Eastern State Agrarian University, Blagoveshchensk,
- Federal Center for Toxicological, Radiation and Biological Safety, Kazan,
- Federal Centre for Agricultural Consulting and Retraining of Agro-Industrial Complex Personnel, Moscow
- Federal research center "Informatics and management" of the Russian Academy of Sciences,
- Federal Research Center "Krasnoyarsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences",
- Federal Research Center of Agroecology,
- Federal Scientific Center “All-Russian Research and Technological Poultry Institute” of Russian Academy of Sciences, Sergiev Posad,
- Federal Scientific Center for Medical and Preventive Health Risk Management Technologies of the Federal Supervision

Agency for Customer Protection and Human Welfare, Perm,
- Federal state budgetary institution center of agrochemical service "Krasnodar",
- Federal State Budgetary Scientific Institution «All-Russian Rice Research Institute», Krasnodar,
- Financial University under the Government of the Russian Federation, Ufa Branch
- FRC Kazan Scientific Center,
- G.P. Somov Research Institute of Epidemiology and Microbiology;
- Gubkin branch of Belgorod state technological University named after V. G. Shukhov, Gubkin, Belgorod region,
- I.V.Tananaev Institute of Chemistry and Technology of Rare Elements and Mineral Raw Materials of the Kola Science Centre of the RAS, Apatity,
- Institute of Computational Modelling SB RAS, Krasnoyarsk,
- Institute of Continuous Education in Forestry, Divnogorsk
- Irkutsk National Research Technical University, Irkutsk,
- Irkutsk Scientific Research Institute of Agriculture,
- Irkutsk State Agrarian University named after A. A. Ezhevsky,
- Irkutsk State Transport University,
- Ivanovo State Polytechnic University,
- Izhevsk State Agricultural Academy, Russia
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- K.G. Razumovsky Moscow State University of technologies and management,
- Kabardino-Balkar state agrarian university named after M M Kokov, Nalchik,
- Kalashnikov Izhevsk State Technical University;
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- Murmansk Marine Biological Institute,
- Murmansk State Technical University,
- N. F. Katanov Khakas State University, Abakan,
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- National Library of Bashkortostan;
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- North Cavcasus Federal Agricultural Research center,
- Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk,
- Northern Trans-Ural state agricultural university, Tyumen,
- Nosov Magnitogorsk State Technical University, Magnitogorsk;
- Novosibirsk State University of Economics and Management,
- NTC Privodnaya Tekhnika, Chelyabinsk
- Omsk Agricultural research center, Omsk, Russia
- Omsk Scientific Center, Omsk,
- Omsk State Agrarian University named after P.A. Stolypin;
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- Rostov State University of Economics, Rostov-on-Don,
- Russian National Research Medical University named after N.I. Pirogov, Moscow,
- Russian Presidential Academy of National Economy and Public Administration, Perm branch
- Russian State Centre for Quality and Standardization of Veterinary Drugs and Feed ("VGNKI"),
- Russian state social University, Moscow,
- Saint Petersburg State Electrotechnical University;
- Saint Petersburg State Forest Technical University, Saint-Petersburg,
- Saint Petersburg state technological University
- Saint Petersburg State University of Aerospace Instrumentation,
- Saint Petersburg State University of Architecture and Civil Engineering,
- Saint Petersburg State University of Industrial Technology and Design,
- Saint-Petersburg Mining University,
- Saint-Petersburg State University,
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- Samara State Technical University,
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- Siberian Federal University, Krasnoyarsk
- Siberian Institute of Plant Physiology and Biochemistry, Irkutsk,
- Siberian Law Institute of the Ministry of Internal Affairs of Russia Russian Federation,
- Siberian University of Consumer
- Cooperatives, Novosibirsk,
- South Ural Institute of Management and Economics,
- South Ural State University, Chelyabinsk,
- SRO, JSC "ECO-Engineering", Achinsk;
- State regional center for standardization, metrology and testing in the Krasnoyarsk territory, Republic of Khakassia and Republic of Tuva;
- Stavropol branch of the Moscow Pedagogical State University, Stavropol,
- Stavropol State Agrarian University
- T.F. Gorbachev Kuzbass State Technical University, Kemerovo,
- Tatar Scientific Researh Institute of Agriultural Chemistry and Soil Science,
- The All-Russian State University of Justice (RLA of the Ministry of Justice of Russia), Moscow,
- Togliatti State University, Togliatti,
- Transbaikal State University, Chita,
- Tuvan State University, Kyzyl;
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We chose the IOP Conference Series: Earth and Environmental Science (EES) to provide all contributors with the opportunity to publish their papers in an international, peer-reviewed journal. This is understood and appreciated by all the participants of our Conference, and therefore this Volume provides an excellent overview of the main topics of our Conference.

We express our gratitude to Rector of Krasnoyarsk State Agrarian University, Professor Nataly I Pyzhikova who was the co-chairs of the Programme Committee of AGRITECH-2019 for the organisation of the Conference and preparation of the papers for this Volume. AGRITECH Conference Committee highly appreciate the contribution of the Director of the Institute of Economics and Management of Krasnoyarsk State Agrarian University Zinaida Shaporova for cooperation in organisation of AGRITECH-2019. We are grateful to scientists and professors of Krasnoyarsk State Agrarian University, Siberian Federal University, All-Russian Research and Technological Institute of Poultry of the Russian Academy of Sciences (Sergiev Posad), Federal Scientific Center VIEV (Moscow), Stavropol State Agrarian University, Mari State University (Yoshkar-Ola), Togliatti State University, Irkutsk, Omsk, Chelyabinsk, Moscow, Samara, Saratov, Chechen Universities for active participation in the Conference.

On behalf of the conference committee and organizers, we would like to thank all the authors who contributed to this Volume as well as to the reviewers, speakers and all the conference participants for their support to AGRITECH-2019.

We express gratitude to IOP Publishing for an opportunity to publish the Proceedings of the Workshop to provide open access and to make them available for worldwide recognition.

References

[1] 2018 *IOP Conf. Ser.: Mater. Sci. Eng.* **450** 011001
[2] 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **537** 011001

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Regulatory effect of essential oils on the production of primary and secondary biogenic free radicals in vitro

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Abstract. Using molecular enhancers of chemiluminescence, the regulatory effects of several essential oils on the production of primary and secondary biogenic free radicals in vitro were investigated. For the more correct extrapolation of the results, the human blood phagocytes as biogenic source of free radicals was used in an experimental model during latex stimulation and without it. The antioxidant activity of pine essential oil against primary and secondary biogenic radicals was identified, and the prooxidant activity of eucalyptus essential oil against primary and secondary biogenic radicals was determined. Unlike both of these substrates, the modulating effect of lavender essential oil was identified. Under the influence of this substance luminol-dependent chemiluminescence increased, while lucigenin-dependent chemiluminescence decreased without changing the basal activity of phagocytes. Essential oils of lemon and peppermint acted as radical-specific antioxidants. Under the influence of peppermint essential oil, the production of primary not secondary radicals decreased significantly. Under the influence of lemon essential oil, the production of secondary radicals decreased while production of superoxide did not change significantly. Based on the results are obtained, it is possible to develop or adjust the schemes of health-improving and preventive procedures, as well as to optimize the choice of adaptogens chemical forms.

Technological culture of future engineers in the context of modern socio-economic development of the society

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Abstract: At present, the technological stage of the development of society is intended to establish the priority of the method over the result of activity. Therefore, society needs a comprehensive approach to the choice of intellectual and material ways of its activities from the mass of alternative options and to the evaluation of its results. In this vein, technological culture

is a value aspect of modern and future education. It is characterized by multidimensionality, creative character and includes not only production, but also sociocultural aspects. Technological culture includes such personal qualities of a person, which allow technologically competently to solve any problems from the fields of activity of the engineer. In addition, creative solutions of social and economic problems depend on the degree of formation of character and qualities that characterize the future orientation of the personality of future specialists. Therefore, technical universities are faced with the task of developing the qualifications of university graduates in the professional sphere, creating conditions for the development of such personal qualities as creative self-development, humanitarian and technical outlook, intellectual maturity, responsibility. In the existing practice of teaching specialized technical disciplines, the process of introducing the fundamentals of technological culture, unfortunately, is sometimes very difficult. In these cases, it is necessary to overcome the inertia of technocratic thinking and the lack of understanding of the importance of the idea of developing a technological culture and the personal properties and qualities that are significant for it.

Technological approach to environmental greening of large cities

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Abstract. The relevance of this article is due to the fact that the improvement and greening of large cities is the most important sphere of activity of the municipal economy. It is in this area that the conditions are created for the population, which provides a high standard of living. Thus, conditions are created for a healthy, comfortable, comfortable life for an individual at the place of residence, and for a larger mass of residents of the city, district, quarter, micro district. When carrying out a set of measures, they can significantly improve the environmental condition and appearance of cities and towns; create more comfortable microclimatic, sanitary and aesthetic conditions on the streets, in residential apartments, public places (parks, boulevards, squares, etc.). The implementation of the project proposed in the article will allow the self-government bodies and housing and communal services to improve the efficiency of works on urban greening, to provide an opportunity for agricultural organizations and horticultural farms to carry out work on tree transplanting and land cultivation using an accessible (mobile) unit.

Reverse priority mechanisms in allocation of resources

L V Rossikhina[1, 2], A V Kalach[2], S A Borsuchenko[3], R B Golovkin[4] and S N Mamedov[4]

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[2] Voronezh Institute of the Federal Penitentiary Service of the Russian Federation, 1a Irkutskaya St, Voronezh, 394072, Russia
[3] The All-Russian State University of Justice (RLA of the Ministry of Justice of Russia), 2 Azovskaya St., Moscow, 117638, Russia
[4] Institute of Law, Vladimir State University named after Alexander and Nikolay Stoletovs, 8 Studencheskaya St, Vladimir, 600005, Russia

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Abstract. The paper describes a problem of allocation of a limited resource under the conditions of probabilistic indeterminacy as related to the quantity of resource allocated. The active system consists of the Center and consumers (agents). The Center has a resource being allocated among the consumers based on their requests. When requests are announced, the consumers have information only on the function of allocation of resource being allocated by the Center. The priority mechanisms of resource allocation based on the reverse priority principle (the priority function is a decreasing request function) are studied for a deterministic case when the amount of resource available at the Center is known by the consumers as well as under the conditions of probabilistic indeterminacy. Nash Equilibria are determined for different priority functions provided the objective functions of consumers increase monotonically in relation to the resource quantity. A business game is proposed to study the mechanism of reverse priorities in resource allocation problems (deterministic and probabilistic cases). Informal and formal descriptions of games are included. Gaming algorithm is proposed. The results of experiments are presented for deterministic and probabilistic cases with different priority functions, which confirm the key theoretical conclusions.

The restoration of the friction surfaces by laser cladding

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Abstract. The paper deals with laser cladding of wear-resistant coatings for restoring friction surfaces. It describes the modes of cladding technological process, and presents the results of

wear tests. Wear-resistant coating based on the Ni-Cr-B-Si and alumina system, which exceeds 30HGSA steel by 11.5 times by wear resistance.

Quality management of the enriched flour confectionery with application of the qualimetrical analysis

I Yu Reznichenko, A M Chistyakov, Yu V Ustinova and N Yu Ruban

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Abstract. The article analyzes the improvement of the quality of enriched cookies to meet the expectations of consumers. This paper shows the application of QFD methodology for a new type of enriched flour confectionery. The analysis allowed to determine the relationship between consumer expectations and technical characteristics of the new product, to prioritize physical and chemical indicators that determine the functional orientation of the product, to identify the most important criteria for consumers. The matrix of consumer requirements, which allows to predict the improvement of the quality of the new product. The results allowed to determine the direction of improving the quality of enriched cookies, to form a range of consumer properties. The results were tested in the production conditions of the enterprise of the Kemerovo region.

Development of small innovative entrepreneurship in the regions of Russia

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Abstract. The region studied in the article is characterized by the development of programs supporting small innovative entrepreneurship: there is a competition for the award of the

Krasnodar Region Administration in the field of innovation activity “Best Project”, grants for the development of innovative technologies are also provided to subjects of innovation activity, and information support for innovation activity is being developed. To help small investment businesses from the regional budget are allocated grants for the purchase of fixed assets. There are common weaknesses in the development of administrative and production infrastructure of innovation activity of Kuban, which are expressed by the inefficiency of business incubators and the majority of technology parks at universities, limited conditions for the successful launch of serial and mass highly specialized production of competitive innovative products.

Physical characteristics of the seeds layer and estimation of the degree of the activator volume

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Abstract. Analysis of the results of scientific research suggests that the authors used small volumes of the seed layer to study the effect of an electric field on the seeds. The electrical parameters of the seed layer in a small-sized activator allowed the authors to freely operate with a wide range of impact signals. When switching to the industrial level in the activator, a large volume of a layer of seeds is processed. The actual electrical parameters of the power source, activator, and seed layer limit the range of electrical parameters of possible effects. Therefore, for the industrial development of these electrical technologies, it is necessary to adjust the previously determined parameters of the seed treatment modes. The positive effect of the electric field on the seeds is due to the quantitatively dosed energy impact. However, the assessment of the impact on any one of the electrical parameters (electric field intensity, frequency, etc.) is insufficient. The cause is non-uniform processing of the seed layer. The rational thickness of the seed layer and its maximum compaction in the volume of the activator make it possible to create a uniform electric field strength of the required size and, as a result, an appropriate dose of exposure to increase the sowing qualities of the seeds. For the formation of electrical parameters and the description of the processes occurring in the activator in the presence of a moving seed layer, it is necessary to take into account a number of factors. One of the important factors is the structure of the seeds of plants. The structural and functional unit of a seed is a cell that has, in addition to its biological, chemical properties, a number of physical characteristics. The heterogeneity of the composite components of different seed mass determines its physical properties. These features are also taken into account when developing technological schemes for the operation of an activator with a moving layer.

Use of pome fruit stock of apple trees for soils bioindication in the North of Central black earth economic region

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Abstract. In the vegetative experience, there is no close correlation between the bonitet of different types of soils and the vegetative productivity of apple seedlings. The most intensive growth on the forest soils of pome fruit stock is a characteristic feature of the biology of its wild-growing relative of the forest apple tree originated and evolved in forest ecosystems. At the same time, poor development of the root system on more fertile black earth, but intensive on forest ones, indicates the adaptation mechanism of roots in the search for nutrients and moisture.

Development of innovative activity of information and advice services based on crowdsourcing

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Abstract. Enhancement of agricultural production’s efficiency significantly depends on whether achievements of science and advanced practice are applied in activity of the industry’s enterprises. Presently, one of the most important organisational structures intended to provide new knowledge to agricultural enterprises is information and advice services. The article shows the necessity to specify functions of information and advice services as well as their orientation at distribution and mastering of innovation by agricultural enterprises when transiting from economy of the industry to innovative model of development. The role of crowdsourcing as a tool for development of innovative activity of information and advice services has been determined. The main directions for application of crowdsourcing in order to develop innovative activity of information and advice services have been revealed. The most important stages of a crowdsourcing project have been identified.

Self-assessment development of the future doctor professionally significant personal qualities from the position of a dynamic approach

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Abstract. The paper presents a study on the formation of the self-esteem of personal, professionally important qualities of a future doctor among first-year students of the medical faculty of a medical university. The aim of the study was to identify the formation dynamics of objective self-esteem in the development of specialist professionally important personal qualities, within the framework of the developed and applied diagnostic program in the learning process of the discipline "Psychology and pedagogy." At the beginning of training activities in one of the first classes in the study of the discipline, the students were given the opportunity to evaluate themselves subjectively regarding the formation of professionally important qualities in accordance with the student's psychodiagnostic card. In the course of training activities in the classroom on “Psychology and pedagogy”, students studied their personal qualities for one semester in accordance with the program of the discipline using the valid techniques described in the paper. At the final stage of mastering the discipline, a repeated self-assessment was conducted taking into account the results of the applied methods. Analysis of the results of the applied methods gave rise to a review of self-esteem and allowed to compare the primary (subjective) self-assessment of the personal qualities of students with the secondary (refined, objective) self-assessment. The result of the study was the analysis of the dynamics of self-esteem.

Features of the development stability of tree plantations of large city industrial zones

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Abstract. Expansion of urbanized areas and activity of technogenic systems led to the emergence and operation of a set of environmental factors that determine the flow of life processes in new conditions. Under the influence of anthropogenic factors including man-made (industry, energy, transport) and economic activities (construction, utilities, recreational load) in the environment, a number of environmental problems arise and develop, aggravated by unfavourable weather conditions for dispersion of harmful impurities in the air, which is especially important for Krasnoyarsk city. Biological monitoring is necessary to assess the environmental consequences of human impact, to ensure the necessary level of environmental quality and the environmental safety of the urban environment. Recently, researchers have been analysing the degree of impact of environmental factors through developmental sustainability (fluctuating asymmetry). This paper shows an assessment of the stability of the development of tree plantations growing in the zone of influence of an aluminium plant and heat and power engineering enterprises. For the study the most common tree species were selected, which are widely used for landscaping cities: apple berry, wild cherry, balsam poplar, elm squat. The representativeness of the data obtained is confirmed by appropriate statistical processing. Morphometric indicators of the lamina (j3, j4, j5) of apple and berry apple trees sensitive to negative environmental factors, intensified under the influence of emissions from an aluminum plant, are revealed. An identical response of indicator species belonging to the same family was found.

Artificial intelligence in agriculture of Kabardino-Balkaria: current state, problems and prospects

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Abstract. Kabardino-Balkaria, occupying a little more than 0.07 % of the total area of Russia, produces almost 1.0 % of agricultural products, including 0.85 % of grain (more than 1.1 million tons and more than 1300 kg per person, whereas in the country this figure is only 920 kg), for vegetables it is more than 3.6% (about half a million tons and more than 576 kg per person, whereas in general in Russia it is only about 93 kg), for fruit and berries it accounts more than 8% (producing more than 215 thousand tons and almost 250 kg per person, despite the fact that in the country it is just over 18 kg). All this is achieved not due to the size of the sown area, which accounts for 0.35% in the sown area of Russia, but due to the introduction of new technologies, among which artificial intelligence (AI) plays an important role, ensuring the growth of labour productivity, yield and food production. The industry is in the process of separating the sub-sectors (and segments) associated with the use of AI and the formation of a corresponding subsystem, which in the future may be separated into an independent industry. In this regard, a number of problems arise, first of all, overcoming the transfer of AI created in agriculture, secondly, the transition from the so-called point or localized use of AI to the system, through the expansion and deepening of the use of AI. Apparently, in both cases we are talking

about the transition to a new, more perfect form of AI. The above-mentioned issues are described in the paper.

Vehicle detection in aerial images

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Abstract. The vehicle detection in the aerial images is widely used in many applications. Comparing with the object detection in the ground view images, vehicle detection in the aerial images remains a challenging problem due to the small size of vehicles, monotone appearance and complex background. In this paper, we propose the solution of this issue using the convolutional neural networks. We further introduce the large-scale vehicle detection dataset with ground truth annotations for all the vehicles in the scene that considers the scene complexity due to the environmental conditions. We show the performance of the trained model with other popular neural work architectures.

The effect of irrigation regime on lucerne yield for hay in conditions of unstable wetting

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Abstract. The main objectives of irrigated agriculture are: obtaining the greatest amount of quality products and the preservation of soil fertility. In this case, irrigated crop rotation is one of the factors for the reproduction of soil fertility, favourable phytosanitary conditions in crops and soil protection from erosion. The potential number of lucerne mowing is determined by the thermal resources of the area, and the actual is closely related to the conditions of optimum soil moisture. In the first year 2–4 mowing of lucerne can already be obtained in various areas of the country, over the next two-three years – 4-7 mowing, or 6–10 tons of hay per hectare in the first year and 120–225 centres in the next. Considering the reduction areas of irrigated and drained lands, it becomes relevant to the competent use of the available reclaimed land. The article presents scientifically-based lucerne irrigation regimes that meet the requirements of a plant in water at the lowest cost per unit of production, provides estimated water consumption data and suggests an economical water consumption for obtaining lucerne yield. Considering the irrigation regime of lucerne, the irrigation rate is significant. Since lucerne is a crop with a deeply penetrating root system, watering should be carried out with moistening of the entire root zone. The required amount of water per irrigation depends on the depth of the root system and the water holding capacity of the soil. The study of whether it is possible to obtain the desired effect with smaller irrigation rates is dictated by the increased capabilities of irrigation technology and these issues are presented in the scientific article. The article gives conclusions about the effect of various irrigation regimes on the formation of lucerne yields for hay.

Analysis of the state grants' impact on the economic sustainability and efficiency of agricultural production

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Abstract. The estimation of the state support efficiency for agriculture in the Russian Federation is actively discussed in economic spheres. The grants received by farmers should be justified by an increase in the production and an increase in its profitability. It makes this research topic relevant. The article considers the degree of state grants influence on the stability of agricultural production and financial performance on the example of agricultural organizations of the Slavyansk region of Krasnodar Territory. The economic indicators of the agro industrial complex (AIC) of the region are considered. The main agricultural crops capacity, production and sales volumes, average prices for products, cost value and profitability of sales are analysed. The volume of grants received per hectare, the degree of costs compensation, the impact of grants on returns on investments and product profitability are considered using rice as an example. The analysis of the grants impact on the volume of net profit is given. It was proposed to determine the profitability of capital using the net profit reduced by the volume of grants in the calculations to improve the objectivity of the analysis and estimation of the efficiency of agricultural producers.

Improving the technology of obtaining clonal root stocks of stone fruit crops

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Abstract. The aim of the research was to study the effect of the cuttings rooting period on the yield of high-quality rootstocks of stone fruit crops. In accordance with the developed methodology of research, modern rootstocks of stone fruit crops on the Crimean selection station Eureka 99 and Kuban 86 for plum, apricot, peach, and also VSL-2 for cherry and sweet cherry were studied. The paper presents the results of three-year experiments on the study effect of the rooting period hardwood cutting for standard stone seed root stocks. The data of mathematical processing the obtained results indicate the rooting period has a significant impact on the survival of hardwood cuttings. During the experiment, the average for the studied rootstocks during the autumn period of rooting, the survival rate of the cuttings was significantly higher than for the spring by 2.8%. According to the obtained data, on average, in terms of rooting for the stock Eureka 99, the highest survival rate of cuttings in experience was observed, significantly exceeding the figure of the other rootstocks by 21,1-25,4%. Output rates of standard rootstocks were adequate for the number of rooted cuttings. The results given in the article indicate that rootstocks Eureka 99 and VSL-2 have the highest yield of rootstocks per hectare observed during the spring planting season, exceeding the autumn planting dates by 109 and 217 thousand pieces respectively. The Kuban 86 rootstock has a reverse pattern. The article presents the results of sorting the obtained rootstocks by quality degrees. According to the data obtained, the highest yield of the first grade seedlings in the experiment was observed on almost all variants during the autumn term of rooting.

Modern condition and development of the specialized enterprises – rape producers

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Abstract. The article deals with modern condition and development of specialized enterprises in Ukraine, which are engaged in the cultivation of rapeseed. On the basis of the analysis carried out, factors influencing the production and sale of these products were identified. The influence of specialization on the performance indicators of agricultural enterprises is considered. The article attracts attention to the problems of growing industrial crops and their influence on the soil in Ukraine. The development of specialized enterprises - producers of rapeseed in Ukraine requires the intensification of crop production, development and optimization of the relationship of farms with the processing industry of the agro-industrial complex, improvement of the price mechanism of formation of the market of raw materials.

Quality improvement and shelf life extension of functional bakery products with the use of stevia

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Abstract. With the use of stevia water extract, the production technology and range of functional bakery products have been developed. The analysis of the laboratory - baked pan and hearth bread of the reference sample and samples with the addition of different amounts of stevia water extraction was carried out. It is found that the preparation of bakery products according to the developed formulas contributed to the shelf life extension of bread. The positive effect of stevia extract on keeping bread fresh has been revealed. Conducted tests have shown the applicability of developed bakery products in diet composition for people with insulin dependence and overweight.

The substance and content of environmental supervisory activities in the Russian Federation

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Abstract. This paper attempts to consider some aspects of the state institute for supervision in the field of environmental activities in Russia. The existing gaps and conflicts in the system for ensuring the proper implementation of environmental law are factors for the need for the state to apply the institutional and legal mechanisms, the analysis of which was presented in this study. One of the most important institutions of environmental protection is the environmental supervision. The existing legislation of the Russian Federation regulates the order and the system of executive authorities, as well as the legal status of environmental entities. However, in practical activities of the environmental legal relations entities, problems arise in the enforcement of environmental law. The article describes the main aspects of the formation, development and operation of environmental supervisory activities in the Russian Federation, presents the interpretation of the basic tools of the environmental protection supervision system in the Russian Federation, and also some problems of law enforcement in this area are identified, and possible solutions are suggested. The purpose of the study is to identify areas of improvement of state environmental protection as the most important tool for managing environmental quality and environmental safety in Russia.

Ecological and geographical analysis of Rosaceae Juss. family of Khakassia flora

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Abstract. The Rosaceae family of the Khakassia region flora includes 102 species and 26 genera. The data of the ecological and geographical analysis show the heterogeneity of the family that has developed with the noticeable influence of the altitudinal zonality. Half of the family species are mountain species (Arcto-Alpine, Alpine, Montana, light conifer-forest, dark conifer-forest and nemoral groups), almost half of them are forest ones (27 species). Species of the light conifer-forest group dominate (17 species). A certain contribution is made by the steppe, forest-steppe, plurizonal, Montana groups. The Arcto-Alpine and Alpine groups constitute together 12 species, anthropochory group consists of 4 species.

Productivity and quality of onion products during the storage depending on mineral nutrition conditions

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Abstract. Onions are eaten fresh throughout the year, so the safety of its products is an important task for production. The quality and safety of products in addition to hereditary characteristics of the variety, are affected by the growing conditions and storage technology, an important role is played by the conditions of the crop mineral nutrition. Studies were carried out in the zone of unstable humidification of the Stavropol Territory in 2016, the storage of products (2016-2017) was carried out in a storage with controlled temperature and ventilation. As a result of researches it is proved that the biggest effect on saving the crop was observed in the application of the estimated rate of the fertilizer N120P170K140 which allowed to reduce the general losses of production of onions in the course of storage in comparison with the control one by 6.5-8.7 %. The use of the calculated rate of fertilizers contributed to the production of the largest amount of dry matter, sugars and vitamin C in the production of onion, and the biochemical parameters of bulbs during storage for all types of the experience have changed.

Development of evaluation model effectiveness of modern technologies in crop production

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Abstract. Effectiveness assessment of modern technologies and machines introduction is one of the most important economic objectives in agricultural production. The purpose of this paper is to develop a formalized effectiveness evaluation system of introduction of modern technologies and machines in crop production. This system is based on the use of modern software for creation of crop production process flow diagrams, business planning, and optimization of machines and technologies parameters. It is proposed to formulate the process of economic effectiveness evaluation of new technologies in crop production as a permanent operating three-stage indiscrete cyclic model for a particular industry, facility, district or region. In the first stage of

calculations income and expenses staggered over a period of time and obtained through the new technologies or more modern tools are defined, using detailed process flow diagrams, fodder balance and other estimation forms. During the second stage project success criteria are determined by calculation of stability analysis and evaluation of feasibility and effectiveness of new technologies. Finally, in the third stage it is necessary to solve a task of introduced technologies parameters adaptation and optimization. The effectiveness evaluation system of introduction of modern technologies and machines in crop production, proposed in this paper, allows for quicker decision making regarding reasonability of replacing machines and technologies with new ones.

Increasing economic efficiency of flour production from grain of the main cereal crops by extrusion method

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Abstract. The paper deals with the issues of improving the economic efficiency of grain processing enterprises through the introduction of the developed technologies of extrusion and flour production from extruded grains of the main cereal crops. The comparison of the output norms in the processing of grain from the main cereal crops on the existing and developed technologies was carried out. The calculations of the flour production efficiency showed that the processing of wheat will increase the volume of marketable products by 10.0 %, barley – by 14.8 %, oat – by 22.3 %, in this regard, the profitability of production of new high-yield types of flour will increase: wheat by 15 %, barley – by 29.3 %, oat – by 45.6%. Crops have a higher economic effect in the production of extruded flour due to the low cost of raw materials and a decrease in technological waste.

Analysis of consumer preferences of the residents of Kemerovo towards sports food products

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Abstract. Currently, the food market is replenished with new types of specialized food products intended for feeding certain categories of the population, including athletes. In the context of the dynamic development of sports, issues relating to the scientific substantiation and development of functional foods that meet the increasing needs of modern man are of particular relevance. This article noted the relevance of the topic, reviewed the range of sports nutrition products, presented an analysis of marketing information data obtained from the study, identified factors affecting the choice of this category of products by the target audience, which is necessary to form a rational range of sports nutrition products in the consumer market. Kemerovo.

Improving the competitiveness of agricultural products as a basis for solving import replacement issues

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Abstract. The paper deals with the problem of increasing the competitiveness of agricultural products. In this regard, the priority is to determine the competitiveness indicators with its classification by groups and evaluation criteria. The analysis is expanded by the method of determining the level of grain competitiveness, which is tested in the districts of the Krasnoyarsk region and is based on a comparison of indicators of the investigated district with the leading districts with the largest share of production in the total regional market. It is proposed to create a logistical infrastructure, which is the formation of the wholesale distribution centre in order to improve the competitiveness of agricultural products.

Design of specialized workshops to produce homogenized vegetable pastes and marinades for agriculture

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Abstract. Recently, in Krasnoyarsk, there has been an increased demand for local plant products, in particular, for vegetable pastes and marinades. An important aspect is the fact that the products should be as useful as possible, have high taste qualities and be from local producers. This article proposes the idea of opening a shop for the production of homogenized pastes and marinades from local vegetables with the addition of squeezed cowberries and cranberries with enhanced microbiological resistance for implementation in the food industry.

Mining production negative impacts on the environment in Baikal natural territory

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Abstract. Mining production impact factors on the state of the natural environment are diverse and complex. However, environmental and social consequences are even more complex. They represent a great danger, since they can cause irreversible processes. Therefore, taking into account the factors and consequences of the impact of this large resource-exploiting area of material production is extremely important for predicting the effects of technogenesis associated with the development of the subsoil, for taking measures to prevent the growing influence on the state of natural complexes both in the areas of natural-technical geosystems and at the level of the entire region.

Buckwheat productivity depending on agrotechnological techniques of growing in the Krasnoyarsk forest-steppe

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Abstract. The article describes the application results of various previous crops and pre-sowing using of nitrogen fertilizers for the planned yield for zoned buckwheat varieties in the forest-steppe of the Krasnoyarsk territory. On the basis of the conducted research it is established that statistically significant differences on average productivity of buckwheat were found between studied previous crops, the index of influence was 83.4 %. The maximum average yield increase was observed when buckwheat was sown after potatoes (41.6 c/ha), the minimum (16.4 c/ha) – after previous grain. The greatest reaction to the introduction of ammonium nitrate had Dasha variety, whose average yield for all three previous crops was 38.1 c/ha, and its highest yield was recorded after fertilized potatoes - 50.7 c/ha.

Use of vegetable raw materials in production of vegetable - berry purees with the set organoleptic, technological properties and nutrition value

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Abstract. An important component of the population's nutrition is vegetable raw material, including root vegetables. High-quality, standard raw materials are used for fresh sale in retail trade and at catering establishments; they are also laid for winter storage. However, there is a sufficient amount of substandard raw materials - in size, shape, deformation, and violation of integrity. Moreover, such raw materials have a high nutritional value. This paper presents the rationale for the recipe composition of blended types of purees using roots and wild berries. With the help of mathematical modelling, the optimum ratios of the components are determined, at which there is a high correlation between the organoleptic characteristics, technological properties and the content of biologically active substances. The results of the work make it possible to use substandard vegetable raw materials and wild berry stocks rationally. They allow wide use of new types of purees, including its use as semi-finished products for enhancing the nutritional value in the confectionery industry.

Trends and prospects of soil heating under conditions of protected ground

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Abstract. Such vital processes in vegetable plants, like absorption of carbon dioxide (photosynthesis), water intake, absorption of nutrients from the soil, respiration, evaporation of water (transpiration), nutrients transfer from roots to leaves and fruits, as well as macronutrients transfer from leaves to roots, depend on the temperature regime. The research of technical and economic parameters of popular de-vices for heating of greenhouses allowed to define quite a number of operational disadvantages. A device for air heating of the soil in protected ground conditions, designed to increase yield and reduce the energy intensity of vegetable growing in the protected ground, is developed by the fellow workers of the FSBEI of Higher Education Pskov State University. The device consists of assembled segments, combined in a system, and a special fan heater with a low temperature range. The proposed device allows to ensure an intensive development of the root system of vegetable crops; to hasten the planting time of seeds or seedlings, and, consequently, to increase a fruiting period; to prevent death of plants associated with frost and diseases, caused by temperature changes; and to reduce the cost of heating of the protected ground.

Modern aspects of using secondary plant-based raw materials in food production

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Abstract. The paper substantiates the efficiency of using non-traditional plant materials in *food and culinary recipes with high nutritional value*. The purpose is to find new technological solutions for using secondary raw materials in the technology of functional food production. The chemical composition of lingonberry (Vaccínium vítis-idaéa) and cranberry (Oxycóccus) press *residues* obtained after juice extraction was investigated. The sanitary-hygienic indicators of lingonberry and cranberry press *residues* were determined. Based on this research, we developed the method for the production of powders and pastes from secondary berry resources - lingonberry and cranberry press *residues*. The research involved quantitative assessments in order to define if the manufacturing process for the production of powders and pastes satisfies *non-wastefulness*. The optimal storage parameters for lingonberry and cranberry powders and pastes, ensuring maximum safety of biologically active substances - antioxidants: ascorbic acid, P-active substances were determined. Tests revealed that lingonberry and cranberry powders can be referred to the group of baking improvers, while lingonberry and cranberry paste can be used as thickening and gelling agents.

The yield structure elements variation of spring wheat variety "Novosibirskaya 31" at various farming levels

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Abstract. The article describes the results of various pesticides using and pre-sowing application of nitrogen fertilizers for the planned yield for the zoned variety of soft spring wheat «Novosibirskaya 31» in the forest-steppe of the Krasnoyarsk territory. It was found that the number of plants surviving for harvesting and productive tillering had the best reaction to the using of fertilizers and pesticides from the elements of the crop structure in spring wheat. The maximum average yield increase was observed when wheat was sown on the fertilized background using a full range of pesticides, the minimum – on the fallow.

Study of the digestibility of camel meat proteins by enzymes of the gastrointestinal tract

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Abstract. In this paper the technological properties of camel meat and the effect of enzymes of gastrointestinal tracton digestibility of camel meat proteins were studied. The rate of protein digestion in the gastrointestinal tract by proteolytic enzymes is one of the main indicators

determining the biological value of food products. The results of determining the digestibility of proteins by digestive enzymes in vitro make it possible to predict the degree of protein utilization by human body. The amount of losses and the duration of heat treatment like boiling and roasting were studied to determine the technological properties of camel meat. The results of the conducted studies of the chemical composition, physicochemical and technological properties show that camel meat in its composition, quality, culinary virtues is close to beef, which makes it possible to use it for the production of a wide range of meat products, and to apply the technological regimes used beef processing.

Modeling the optimal decision-making strategy of an organization using mathematical methods

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Abstract. The paper builds and studies a stochastic decision-making model under the influence of both negative and positive factors in a competitive environment. There is a finite set of company states, which is estimated by the value of the firm's capitalization per unit of time. Depending on the decision taken, the company goes into one or another state. In each state, the set of valid strategies depends on this state. The purpose of the simulation is to find the optimal strategy that maximizes the expected capitalization of the company from the transition process to various states, having a finite number of stages.

Dynamic modeling of process support by the influence of various factors on the activities of firms in a competitive environment

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Abstract. The paper builds and explores a dynamic model of a company's development under the influence of both negative and positive factors in a competitive environment. It is assumed that the head of the company is interested in obtaining the maximum profit from his company in a finite period of time and, acting on the basis of his interests, wants to find the optimal strategy. The task of finding the optimal policy for maximum profit is considered. Labor resources are considered as positive factors in the competitive environment.

The use of prebiotics in broiler poultry as an alternative to antibacterial drugs

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Abstract. Breeding animals without the use of antibacterial drugs is a relevant branch of modern science, because the entry of national agricultural products into the foreign market provides for the antibacterial drugs absence in raw materials of animal origin. Therefore, in order to improve livability and productivity of animals, it is necessary to constantly monitor the resistance of their bodies, use antibacterial drugs more carefully and eliminate unnecessary or ineffective drugs completely. Thus, an important task facing the veterinary service of the Russian Federation is the complete elimination or reduction of the antibiotics use in animal breeding and the use of drugs that can replace antibacterial ones. We first studied the effect of heteropolysaccharides "raspol" and "gemiv" on broiler bodies. It is established that the used drugs allow eliminating the antibacterial drugs from the broiler ration. In the period of antibacterial drugs exclusion from the broiler preventive treatment scheme these prebiotics cause an increase in poultry gain, increase its livability and natural resistance, while the use of antibiotics in broiler control group negatively affects the body. Recommendations for the use of prebiotics raspol and gemiv in broilers, as an alternative to antibacterial drugs, are provided.

The analytical model of the agro-industrial local complex system

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Abstract. In order to effectively manage the agro-industrial complex of municipalities, it is necessary to use high-quality management models. The principle approaches of management in logistics can provide the functions of public administration at the regional level. The use of the principles of logistics systems functioning and modeling in the assessment of agro-industrial complex management in municipalities will allow to see the problematic elements of the system that characterize the state of the municipality economy and social sphere. The object of the research is the process of functioning of the agro-industrial complex system in the municipality. The model of functioning of the agro-industrial complex system in the municipality taking into account the principles of logistics is offered in the article. The main purpose of the study is to coordinate the activities of the municipality in a competitive market environment, aimed at the effective management of material, information, financial and human resources in the agro-industrial complex. The article also presents the analysis of the main indicators of the agro-industrial complex in the Rybinsky district municipality: indicators of crop production, indicators of livestock production and financial results. To assess the effectiveness of the proposed model, the integral assessment of the links of flows based on the effectiveness indicators of the agro-industrial complex in the Rybinsky district municipality was used. The proposed analytical model has an average effectiveness and is characterized by the rise in the rate of growth of the agro-industrial complex system in the Rybinsky district municipality. At the same time, the influence of the state in the form of subsidies, allows to timely supply the model of the agro-industrial complex system in the municipality with the necessary resources.

Economic potential of the agro-industrial complex of the provincial region

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Abstract. The aim of the article is to analyze the economic potential of agro-industrial complex of the provincial region for the case of the Mari El Republic of Russia. A resource approach with the inclusion of a resultant component was used in the study of economic potential in the framework of system analysis. The strengths of the economic potential of the agro-industrial complex of the Mari El Republic are the low cost of labor, the availability of specialized educational institutions and personnel, high productivity and growth of livestock production. The positive dynamics of livestock production was achieved at the expense of state support of the agriculture modernization. The weaknesses of economic potential of the regional agro-industrial complex are the technological backwardness of local agricultural producers, a large share of non-cultivated land, low crop yields, and low level of land chemization. The outflow of population from rural areas and the deficit of the regional budget restrict the development of the sector. The increase in agricultural production is

mainly due to the livestock industry. The production of cattle meat and milk are promising to growth paths.

Development of histological methods for detection of carrageenan in yoghurt

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Abstract. Currently, in the market of fermented milk products there are various types of adulteration, which, as known, result in the low nutritional and biological product value and can be potentially dangerous to human health. Yoghurt is often exposed to adulteration; it is in great demand at consumers. Our work objective was the development of histological methods for the detection of carrageenan in yoghurt. As a result of the studies conducted, a histological method was developed for the first time, which can help to detect to high precision the unacceptable additive carrageenan in yoghurt. That way, the developed method allows to detect the adulteration of yoghurt.

The state of dairy cattle breeding and clustering of municipal entities of the Krasnoyarsk Territory by the level of industry development

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Abstract. The concept of sustainable agriculture is one of the directions of the state's national security strategy, which is determined by economic, social, environmental and political factors. Sustainable development of the region directly affects the sustainable development of the state, and sustainable development of the region; in its turn it directly depends on the sustainable development of individual industries, among which dairy cattle breeding is the leading one. The total milk production in Russia as a whole in farms of all categories reached a record high of 31.5 million tons

(+2.5% in the country and +2.6% in the Krasnoyarsk Territory). However, the annual milk consumption per capita in 2017 in the Russian Federation was 233 kg, in the Krasnoyarsk Territory it was a little less than this Russian indicator (231 kg, which is 71% lower than 325 kg which is the standard recommended by the Ministry of Health of the Russian Federation), which indicates a low level of milk self-sufficiency. The level of the country's milk production development is determined by the production state in its regions, which in turn depends on their territorial location, climatic conditions, natural-historical features of the territories, etc. Since a large number of enterprises is involved in milk production in the region, production should be considered in the context of municipal districts, which makes it possible to identify the most promising clusters from the standpoint of the production potential formation of the dairy cattle breeding industry in the Krasnoyarsk Territory.

Improvement of meat storage technology as a factor in increasing the efficiency of the development of the agro-industrial complex

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Abstract. The formula for a membrane solution with antioxidant and antimicrobial spectrum has been developed. 4% of agar agar, and 2% of glycerol were used as the main ingredients of the membrane solution, 1% of food additive arabinogalactan (E 409) was used as an antioxidant, and 0.02% of antibiotic nisin was used as an antimicrobial agent. These ingredients were diluted with distilled water to 100%. Addition to the basic formula of the membrane arabinogalactan makes it possible to increase strength and elongation. The biodegradability of the membrane when placed in a 0.5% solution of hydrochloric acid, containing all the enzymes of gastric juice was 25.4 minutes. It was found that samples of chilled meat packed in the developed membrane after 10 days of refrigerated storage corresponded to fresh organoleptic, physicochemical and microbiological indicators. Acid and peroxide numbers of fat samples were within normal limits. As a result, it was revealed that the packaging of chilled meat in the developed membranes helps prevent microbial and oxidative damage to the product, which allows positioning it for implementation in the agro-industrial complex.

Production of vitaminized food products as a new development vector for the agro-industrial complex

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Abstract. The paper presents the development of the formulation for a non-carbonated soft drink "With raspberry and cranberry flavour" enriched with microencapsulated vitamin premix. Beverages samples of the first group (control) were produced with the usual non-encapsulated vitamin premix 963/7; in the formulation of beverages of the second test group the microencapsulated vitamin premix maltodextrin was used. Encapsulation was carried out in a pseudo-boiling layer. The study made it possible to conclude that the microencapsulation of the vitamin premix had a positive effect on the persistence of vitamins in a drink. The amount of vitamin PP, vitamin B6, pantothenic acid, folic acid and vitamin C in the test drink samples was higher than in the control sample by 33, 50, 50 and 95 %. On the basis of the conducted studies, the warranty period and storage mode were identified: 4 months at a temperature ranging from 0°C to + 25°C and a relative humidity of not more than 75%. After opening, open packaging should be stored at a temperature ranging from 0°C to +5°C for no more than 1 day.

Immunohistochemical diagnostics of porcine reproductive and respiratory syndrome

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Abstract. For the diagnostics of porcine reproductive and respiratory syndrome the method of immunohistochemical identification of the virus antigen inorgans and tissues was applied, which provides the reliability of the diagnosis of the disease and confirm the tropism of the virus to cells and tissues of pigs organs. The research was conducted based on own monoclonal antibodies to the virus nucleocapsid protein on experimentally infected pigs, and also on animals during the outbreaks of the disease in pig farms. The results of the immunohistochemical study during experimental infection of pigs with the PRRS virus indicate that the main pathological changes are localized in the lungs and bronchial lymph nodes, followed by accumulation of the virus in the alveolar macrophages and bronchial lymph nodes. The changes detected in other parenchymal organs are not associated with the accumulation of virus in them.

The use of Brassica napus L. in soft drink production

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Abstract. One of the forms of agribusiness development is the use of local raw materials. Swede is an unconventional raw material resource that has a number of valuable nutrients. The paper shows the possibility of using swede, growing in the Novosibirsk region, in the production of purees and soft drinks for the first time. In solving the tasks assigned, generally accepted research methods were used. As a basis, it is proposed to produce root vegetable purees, which consist of the following main stages: preparation of ingredients (washing, inspection, blanching, cleaning, washing, grinding), processing in an apparatus under the influence of an acoustic field, packing, cooling, storage. Based on organoleptic studies, a soft drink formulation has been developed, consisting of rutabaga, 20% sugar syrup, low esterified pectin and citric acid. Studies of the quality characteristics allowed us to establish the shelf life of the drink within 9 months from the date of production. Regulated requirements for organoleptic and physico-chemical parameters, food and energy values have been established for the developed products.

New technologies for the storage of agricultural products

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Abstract. The paper presents a study of microencapsulated ascorbic acid stability on an experimental apparatus with a spouting layer in enriched sausages processed by ultrahigh pressure (600 MPa for 3 minutes using experimental hydrostat). A maltodextrin dispersion in a fluidized bed was used as a protective layer for C vitamin. As a result of research, it was established that the processing of boiled sausages by ultrahigh pressure did not adversely affect the stability of C vitamin in the product. The amount of ascorbic acid in the test samples decreased slightly after 7 days of storage. The research describes the ways of increasing the vitality of vitamins during manufacturing processes, especially during heat treatment. Creating a system of microencapsulation, which acts as an “insulating material” for vitamins, is one of the most possible ways that can be widely used in the agro-industrial complex.

The assessment of the bioecological method use for spring barley cultivation in the Krasnoyarsk territory forest-steppe zone

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Abstract. The article presents the results of the field experiment aimed at determining the effective modes of microwave heating and their impact on sowing quality, field germination, infection reduction, spread and development of diseases during the growing season, quality and yield of products. In the process of results interpretation, the data on the barley yield were obtained which showed that the increase, relative to the control option, can be obtained at all power levels from 180 to 900 W and exposure equal to 30 seconds. But the most effective is the option at P = 540 W and τ = from 30 to 60 s which gave the greatest biological effect, relying on the statistical processing. As a result, the method of microwave heating in the field conditions has a positive effect on the formation of the yield structure main elements, the significant reduction in infection and the increased grain germination.

Functional drinks based on grape juice and fruit and berry raw materials

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Abstract: In article are provided the results of research on studying of structure and properties of products of conversion of fruits of feijoa and blackberries and their use as a raw source of physiologically active agents for preparation of beverages of a functional purpose on the basis of grape juice.

The use of “Azofit” microbiological fertilizier to increase the productivity of the soil-plant system

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Abstract. In field experiment in conditions of the Krasnoyarsk forest-steppe, the influence of the microbiological fertilizer Azofit on the properties of chernozem and the productivity of rapeseed variety Nadezhny 92, cultivated for oilseeds, was estimated. It was shown that the treatment of rapeseed using the fertilizer with subsequent foliar treatments of vegetative plants or the use of the preparation only for vegetative plants formed a normal composition and good structure of the 0-20 cm soil layer. The use of the preparation contributed to an increase in the concentration of hard hydrolysable, easy hydrolysable and ammonium nitrogen in the soil. The maximum productivity of spring rapeseeds was formed on the variant using Azofit as a protectant in its pure form with subsequent foliar treatments of the crops (2.6 t/ha).

Process approach in integrated quality and safety management system for poultry products

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Abstract. This article discusses the issues of the quality management system (QMS), which focuses on the process approach with the rationale for its benefits. The basic documents, legislative acts and the theory of quality management, which is a platform for developing an integrated QMS model, have been studied. The format of such a model with regard to poultry production is presented, which is an information map of the entire chain of processes operating in an economic entity of the industry in their interdependence. The expediency of developing a process approach within an integrated QMS in parallel with the traceability system, which will be of a prolonged nature for the future, has been substantiated.

The development of the environmentally safe method for disinfection and biostimulation of spring wheat seeds using electro-magnetic field of super-high frequency

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Abstract. The article presents the laboratory experiment results aimed at determining the effective modes of electro-magnetic field of super-high frequency (EMFSHF) and their impact on the laboratory germination of spring wheat seeds, reducing the infection by the most harmful microorganisms. In the conditions of high seeds contamination in the Krasnoyarsk territory, the developed technology of microwave disinfection of spring wheat seeds is relevant due to its efficiency and environmental friendliness. The analysis of the results shows that the effective mode of the microwave field in which the infection of wheat grain with phyto-pathogenic microflora in the established thresholds of harmfulness, along with the simultaneous preservation of sowing qualities, is the variant with $P_{sp} = 650$ W/dm^3 and $\tau = 90 – 60$ seconds.

Energy return and production competitiveness of ekstrudat from grain mix and vegetable additive

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Abstract. Carrying out researches on extrusion of grain crops with inclusion of vegetable components and assessment of their energy value and competitiveness is an important task. Due to this quality indicator of the ekstrudat on the basis of wheat, barley, oats with inclusion of pulp of green grasses have been defined, the assessment of energy return and energy efficiency ratio has been carried out. The energy value of grain crops increased after extruding by 8.33 – 10.86%. The pulp of green grasses was mixed with seed of wheat or barley or oats in number of 10, 15 and 20% of the mass of mix. After mechanical dehydration of a grass mix the energy value of pulp was 10.68 MDzh/kg. At joint extruding of grain crops with pulp from a grass mix the power value of the ekstrudat decreased and was 0.12-0.21 MDzh/kg. Reduction of power value of the ekstrudat leads to decrease in power return by 0.12-0.21 MDzh/kg. At the same time the energy efficiency ratio is increased by 5.44-6.4%. Increase in power efficiency ratio is connected with reduction of energy input on grain crushing. Extrudat on the basis of wheat mix and 20% of pulp corresponded to the greatest value of energy return and energy efficiency ratio. The equations of linear regression have been received for the mathematical description of change of energy return and energy efficiency ratio. Use of pulp as a part of mix before extruding allows to receive a ready-made product with lower cost price in connection with reduction of grain mass as a part of the ekstrudat.

Production and processing of oilseed crops – a strategic agro-industrial complex development vector of the Krasnoyarsk territory

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Abstract. The article presents the research results on the world and domestic market of oilseed crops and products of their processing, reveals regional peculiarities of the Krasnoyarsk territory agro-industrial complex, on the basis of which the strategic guidelines for the industry development in terms of increasing non-oil and gas export potential of the region and the implementation of the food import substitution course are formed. Particular attention is given to the analysis of enterprises engaged in the cultivation of grain, industrial and other crops for compliance with their production capacity in relation to rapeseed and market opportunities for export activities. The integrated industry standard and the regional brand in the category “processed products of oilseed crops” serve as the main strategic vectors of the industry development and will expand the possibilities of diversification of enterprises activities when entering foreign markets. They will serve as a serious methodological basis for the formation of the institute of regional programs to support local products aimed at stimulating demand for domestic food products and improving their quality.

The philosophy of promoting innovation in poultry

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Abstract. Nowadays, there are considerable problems at the poultry industry that impede the development of the industry. In order to increase the competitiveness of business entities, a competent innovation policy is required that would facilitate the withdrawal of enterprises on a new level. However, only a small number of new technologies are being introduced into production. To increase the level of innovation promotion, enterprises need a clear understanding of why certain projects are needed, how effective they are and what results they can achieve. Help is at a new vision and philosophy of innovation for the business entities management.

Models of assessment of economic viability (insolvency) of organizations as a tool for their adaptation in poultry

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Abstract. Poultry farming is one of the most developed branches of agriculture, as evidenced by the positive dynamics of the main economic indicators, as well as the growth of innovative potential. However, over time, it became obvious that the economic entities of the industry are differentiated in terms of efficiency into solvent and insolvent. This division is measured on the basis of financial condition and the ability to consistently repay its obligations. Previously, the problems of a financial capacity assessment were not of interest to financial analysts. In this regard, a study of the basic models of economic viability (insolvency) was conducted for further use in the industry.

Economics of spring wheat production in the Middle Volga

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Abstract. In order to identify the economic and energetic efficiency of the applied agricultural technologies of spring soft wheat by productivity in the conditions of the Middle Volga region, the influence of the main tillage methods was studied: plowing at 20-22 cm, loosening at 10-12 cm and without autumn mechanical processing, on yield, protein content and gluten fractions in wheat grain obtained without fertilizer and on the background of fertilizer application when sowing in $N_{60}P_{60}K_{6}$ dose. On average, over the years of research, the yield of spring wheat for plowing and loosening the soil with the use of fertilizers was higher compared with the variant without autumn mechanical tillage. The content of protein in the grain with the application of fertilizers increased by 5.2-5.8% in comparison with the uncomfortable background. The protein content was maximum for plowing - 13.26%, medium - when loosening - 12.66%, and what was higher by 6 and 2%, respectively, with the option without autumn mechanical tillage. At the same time, the amount of gluten fractions was also the highest in plowing - 8.70% and loosening - 8.01%. Calculations of economic and energy efficiency showed that with loosening of the soil and without its autumn mechanical processing, profitability was the highest, 79 and 75% respectively against the background without fertilizer and 70% with fertilizer. The most energy-efficient option has been without autumn mechanical tillage with the use of fertilizers. The highest energy effect of spring wheat cultivation is confirmed by the lowest coefficient of protein intensity, equal to 5.96.

Digitization of the agro-industrial complex of Russia as a factor of increasing the investment attractiveness of innovative start-ups

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Abstract. Modern realities of the Russian economy create new challenges in the development of the agro-industrial complex. The instability of the financial and economic environment leads to a slowdown in the growth rate of the industry. The data of the Russian federal state statistics service on the dynamics of agricultural development show successful attempts of the state authorities to digitize the agro-industrial sector through the development of state programs and creation of an agricultural ecosystem. The comparative characteristic of small business and start-ups is given. Key difficulties in the development and implementation of start-ups in the agricultural sector of the economy are identified.

Development of logistics infrastructure in Yenisey Siberia

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Abstract. Regional logistics system and its infrastructure acts as a factor of increasing the competitiveness of the region. The purpose of the "Yenisei Siberia" regional logistics infrastructure development is to promote the harmonious structuring of commodity and related flows of the three regions – Krasnoyarsk territory, the republics of Khakassia and Tuva. A prerequisite for the creation of an effective logistics infrastructure is a realistic scenario for the development of the economy for a long period or a system of scenario conditions that allow modeling its most likely trajectory. This is due to the fact that infrastructure projects have a long investment cycle. The article analyzes the level of development of the logistics infrastructure of small cities in the Krasnoyarsk Territory, the Republic of Khakassia and the Republic of Tyva. The relevance of infrastructure development as an integrated factor in socio-economic development is explained.

The forecast of demographic situation in Russia up to 2033

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Abstract. The brief description of the demographic model and modeling technique elaborated and used by the authors for investigating the trends of demographic development in Russia are given. The demographic model and the modelling technique are based on auto regression and regression analysis of time series for demographic indicators, simulation modelling and confidence intervals for model values of demographic indicators with taking into account a priori information and constraints on the model parameters and modelling process. Based on confidence intervals three scenarios of Russia's demographic development were developed: Low, Medium and High. On the time period 2013-2033 being investigated the demographic model to be constructed allows for the scenario variants to calculate one-year age structures for men and women, one-year age fertility, mortality and net migration rates and all necessary for analysis integral demographic indicators. The results of the multivariate analysis of the demographic processes in Russia in 2013-2033-time period to be carried out are described.

Application of the method of measuring the bioelectric potential to assess the suitability of raw milk for butter production

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Abstract. The issues of formation and development of the agri-food market and butter market, in particular, have a multi-faceted character. The growing globalization of the dairy market, as well as the increasing demands placed on milk producers, have led to the fact that those who want to win in the competition for the end user must ensure high quality milk throughout the production chain. Under the quality of milk raw materials for the production of butter one should understand first of

all fat content and its fatty acid composition. However, the qualitative and quantitative indicators of raw milk in Russia today cannot ensure a high level of competitiveness of domestic agricultural producers on the world market. The productivity of cows in Russia is much lower than in Europe and the USA. As a result, an important place should be occupied by the issues of improving the quality of raw milk and its compliance with a set of indicators regulated by governing documentation. A certain role in regulating the quality of milk intended for the production of butter, can be played by superficially localized biologically active centres on the body of cows, which can be used to predict the technological characteristics of the produced milk by measuring the level of bioelectric potential and, therefore, to ensure the quality of the finished product already at the stage of forming batches of milk raw materials.

Assessment of the seed safety indicators from oilseed cruciferous crops in the organization of complex processing technology

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Abstract. For the organization of complex processing technology of oilseed cruciferous crops in the Siberian region varieties of spring rapeseed (Brassica napus), spring ginger (Camelina sativa) and white mustard (Sinapis alba) were investigated. The short characteristics of rapeseed, ginger and mustard varieties promising for cultivation in agro-climatic conditions of the Krasnoyarsk region are given. Safety indicators were evaluated, concentrations of toxic elements, mycotoxins, benzopyrene of pesticides, radionuclides in grain were determined. It is established that the studied varieties of cruciferous meet the safety requirements in accordance with the Technical regulations of the Customs Union TR CU 015/2011 for all analyzed indicators.

The relevance of salmonellosis risk control in the population of turkeys of the Russian Federation

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Abstract. Outbreaks of Salmonella infections caused by poultry products have been quite common in recent years. With current trends in the development of turkey farming in the Russian Federation,

it is necessary to pay attention to the products of this industry imported into the country. In the US 60% of chickens and 23% of turkeys are infected. In particular, in the United States in 2011, Salmonella heidelberg infection spread, affecting more than 150 people in 34 states. As the laboratory tests showed, it was caused by the infected turkey minced meat. In November 2011, 179 cases of the disease were reported, caused by the same salmonella serovar, but already due to products made from the liver of kosher chickens. Many cases were severe and required hospitalization.

The competitiveness of the enterprise as a factor of its market superiority

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Abstract. Currently, many issues related to ensuring the enterprise competitiveness, the formation of its market superiority, improving the efficiency of production and development of the pork market, the necessity for its regulation, taking into account the conditions of import substitution, remain far from being resolved. This fact predetermined the research relevance to improve the competitiveness of the pig complex LLC APC “Chistogorsky” (Limited Liability Company Agricultural Production Complex “Chistogorsky”). State policy aimed at economic security, places the global development of pig complexes in all regions of the Russian Federation into the list of priorities. The goal is quite obvious – domestic chilled pork should displace imported chilled and frozen meat. The movement in this direction will provide a large national producer with comfortable conditions for development, and the end user with inexpensive and high-quality products.

The assessment of the economic agents’ competitive interactions in the regulation of food market development

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Abstract. The article is devoted to assessing the impact of competitive interactions of economic agents on the regulation of the development of food markets. Consideration of the problems of the formation and food market development in terms of competitive relations provides a theoretical and methodological basis for improving the interaction mechanisms between economic agents in order to achieve the desired quality of the population life and sustainable development of the territory, and its goals can be interpreted not only from the point of balancing view the use of natural resources, scientific and technological development, personal development in order to strengthen the capacity to satisfy human needs in terms of preventing threats to future development.

Optimization of arable land structure in land survey design

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Abstract. The paper defines methods for the quantitative assessment of arable land structure by productivity, soil-protective ability and humus recovery balance. The dependence of quantitative indicators of arable land structure on the ratio of annual and perennial crops was established. The method of assessing the structure of arable land allows us to determine the optimal structure.

Air pollution problems of a Russian Federation region and ways of their solution

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Abstract. The paper deals with the problem of air pollution in one of the biggest regions of the Russian Federation which is Krasnoyarsk Territory. It is noted that the atmospheric air in the cities of the region is very polluted. The paper proposes measures to be taken to maintain an appropriate state of the environment.

Import substitution of breeding product as a direction of increasing the economic efficiency of poultry enterprises

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Abstract. The most important condition for increasing the economic viability of the economic entities of the industry is the presence of a competitive domestic breeding base. Analytics showed that at the present time there has been a significant weakening of it, which clearly demonstrates such tendencies as a reduction in the number of breeding farms and, above all, unitary breeding poultry farms, as well as a high dependence on the import of breeding material. The latter circumstance has led to an increase in the cost of both breeding and marketable products, therefore, a decrease in profit margins and the level of profitability. At the same time, an increase in the concentration of the original genetic material among individual manufacturers led to a restriction in the number of crosses used, a decrease in competition in the market for breeding products, and the choice of quality breeding material. The study of the economic viability of poultry enterprises from the perspective of the state of the domestic breeding base, taking into account the development trends of breeding companies in the world, has enabled to identify the fundamental directions for solving the problem under discussion. These include the formation of a competitive domestic breeding base; reduced imports of pedigree products; availability of methodological tools for assessing the genetic potential of poultry; increased investment support from the state and private entrepreneurs; ensuring the availability of credit resources; the introduction of innovative developments that contribute to breeding progress aimed at creating a competitive domestic poultry.

Development prospects of the Krasnoyarsk region agroindustrial complex in the export conditions

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Abstract. It is not currently possible to address matters of economic life in isolation from the issues of globalization and international economic integration. These processes do not just direct, they determine the vector and intensity of the national economy development, act as its accelerator. In this context, effective foreign economic activity is becoming one of the most priority factors in the growth of the Russian economy, and the country's involvement in the integration processes and economic relations is determined at a deeper level - the level of direct participation of the country's regions in foreign economic activity.

Methodological foundations of the reference normalized model of an agricultural holding financial stability

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Abstract. Agro-industrial complex is one of the most important sectors of the economy, which solves the problem of food security enhancing in Russia. The processes of holding formation in the agro-industrial complex are important for the concentration of capital and attracting investment in the realization of projects, increasing the export potential of agro-industrial enterprises. Creation and sustainable development of an agricultural holding requires the use of special corporate governance tools to improve the efficiency of planning and controlling financial flows of business units. In the article the principles of planning and controlling financial and economic processes of an agricultural holding are defined, the analysis of creation methods of the reference normalized model is carried out. As a result of the research, the authors proposed methodological foundations for the formation of the reference normalized model of financial stability of an agricultural holding.

System approach to the creation of Siberian brands on the example of adaptogenic drinks from local plant materials

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Abstract. The subject of the article is to justify the prospects of using a systematic approach to creating a regional brand. The productivity of this approach is due to the fact that the process of designing a regional brand product as a system is characterized by the presence of a specific set of system-generating, system-forming and system-dependent factors. Their analysis is presented in this article. Features of the application of a systematic approach to the management of the range and quality of innovative products is shown by the authors in relation to the life cycle of products based on vegetable food raw materials with biologically significant active principles.

Development of a differential diagnostic nutrient medium for the express diagnosis of animal dermatophytosis

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Abstract. The aim of the study was to develop a differential diagnostic nutrient medium for the rapid diagnosis of animal dermatophytosis. Abroad, for these purposes, environments such as Dermatophyte Test Medium (DTM) are successfully used, but in Russia such diagnostics has not been developed. As a result of our research, we selected the optimal composition of the nutrient medium, including growth and selective supplements. DTM-Expert, a developed domestic environment for growth, indicator and selective properties, was not inferior to foreign analogues, while it was much cheaper and more ergonomic in use. The widespread introduction of the developed DTM-Expert environment will significantly simplify the diagnosis of dermatophytosis and increase its effectiveness. Also, DTM-Expert can be used to monitor the latent micronization in animals that have no clinical signs of dermatophytosis.

Personnel training as a factor in the formation of the export potential of the agro-industrial complex of the region

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Abstract. The export potential of a region can be characterized as the possibility of producing the necessary quantity of goods for the purpose of export sales, corresponding in their quality and competitiveness to the demands of an external market relative to a region. But potential is not only and not just the amount of resources, but also the possibility of developing the system in a given direction. The agro-industrial complex today plays a particularly important social role, not only solving the issues of food supply of the Krasnoyarsk Territory, but also providing basic employment and incomes of the population of agricultural areas and maintaining the system of settlement of the region.

Food security of the Arctic zone regions in the Russian Federation: formation of methodological principles and performance indicators

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Abstract. The paper is devoted to the formation of a system of indicators for monitoring threats to food security in the regions of the Arctic zone of the Russian Federation (AZRF). The theoretical basis for the study included the results of the analysis of the accumulated foreign experience and current Russian practice on food safety assessment at the federal and regional levels. Focusing on the studied approaches, taking into account the identified advantages and disadvantages, the authors have compiled a list of methodological principles, on the basis of which a comprehensive system of indicators and indicators for assessing food security in the Arctic regions has been proposed. The results of the study can be used by regional and federal government to monitor risks and threats in the food sector of the Arctic territories, as well as to adjust existing regulatory and strategic documents and improve the mechanisms for ensuring food security in the Russian Arctic.

Peculiarities of natural and economic conditions influencing food security of the region population

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Abstract. The author of the paper made an attempt to analyse from the scientific point of view certain objective aspects that directly affect the provision of the population of Krasnoyarsk Territory with complete and sufficient food products. The relevance of studying the characteristics of both natural and economic conditions in relation to the food supply system of the region is not only theoretical, but also of practical importance. This issue is confirmed by the fact that without an objective analysis, a significant number of problems of economic and managerial relations in the food sector can arise. The publication examines how the natural and economic conditions affect the definition of the volume, structure, location and specialization of agricultural production in the region under study.

Necrotic enteritis of birds

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Abstract. Poultry clostridia are a serious problem for the domestic poultry industry, which is stated in a number of works by foreign and Russian scientists. In modern conditions, the epizootic situation of clostridia is becoming increasingly tense - the number of outbreaks of necrotic enteritis caused by clostridia increases significantly in a number of poultry farms in Russia, but knowledge of clostridium poultry infection is rather limited. This phenomenon has a tendency to aggravation also due to the fact that many enterprises according to the order of the Government of the Russian Federation No 2045-p of September 25, 2017 "On the strategy for preventing the spread of antimicrobial resistance in the Russian Federation for the period up to 2030" are already preparing to reduce use of antibiotics administered through feed and water. In this case, the producers of the poultry industry, striving to solve one social problem, receive a number of new production and economic problems that require fundamental scientific and applied research to solve them. The solution to this issue may be an alternative approach to the control of poultry clostridia, based on vaccine prevention, the issues of which are currently not studied. Additionally, it is worth noting that the group of poultry diseases caused by microorganisms of the Clostridiaceae family (clostridium) has not only epizootic significance, but also epidemiological one, since it is dangerous for people due to the toxic infection through processed products. In view of the above, the relevance of scientific research on the topic of clostridia of agricultural poultry species is considered obvious.

The cultivation efficiency of new hybrids of spring rape in the conditions of the Krasnoyarsk Region

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Abstract. The article deals with the effectiveness of the cultivation of new hybrids of spring rape by Rapool company selection in the conditions of the Krasnoyarsk forest-steppe. In modern agriculture the role of different kinds is increasing, the attention is paid to such indicators as a high level of adaptability, resistance to diseases, the stability of oilseed production, and the improvement in the fatty-acid composition of marketable seeds. Six new spring rape hybrids of the Rapool company selection were studied, the biological and actual crop yields were assessed, and the effects of crop structure elements on yields were determined. The assessment of the biological crop yield of the main alimony of the crop structure shows that it varies by hybrids and varies greatly from 8.8 t / ha for the Currie KL hybrid to 13.8 tons for the Miracle hybrid. The correlation analysis of the obtained data showed a significantly high correlation of yield with a mass of 1000 grains (correlation coefficient +0.86) and a high negative correlation of yield with the number of seeds in the pod and the number of fruits per plant (-0.89). The highest seed yield of 6.25 t / ha in 2018 formed a Cultus hybrid. A high economic effect was shown by the applied technology of complex protection of spring rape: the increase in production profitability of the Cultus KL hybrid was 31%, and that of the Curry KL - 14% compared with the control variant without the use of protective equipment and growth-promoting products.

Economic mechanisms for improving the efficiency of the territorial distribution of production points and temporary storage facilities

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Abstract. This article discusses the algorithms for finding the optimal solution of problems related to the location of temporary storage of goods, warehouses, firms for processing raw materials and shops selling the final product in the transport network. An algorithm is also proposed for finding a compromise solution to the problem of maximizing profits for each agent.

Russian export of products of maral breeding and velvet antler industry

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Abstract. The possibility of maral breeding production export and velvet antler industry is considered in the article. Development of maral breeding and antler industry in Russian regions is important for ensuring compliance of objective requirements of society for production of maral breeding and velvet antler industry and problems of social and economic development of the regions

that are rearing deer. In article modern conditions of development of production potential of maral breeding and antler industry of the region decide on orientation to export and possibilities of use of the innovative technologies promoting improvement of quality of production according to requirements of the foreign market are revealed. The article defines the main strategic directions of development maral breeding in the regions of Siberia, focusing on deep processing of raw materials, high productivity of marals, improving the quality of deer punts, compliance with veterinary and sanitary requirements, promotion pant products to foreign and domestic markets. The development of integration processes in maral breeding and velvet antler industry in Altai Republic and Krasnoyarsk region allow to reduce the cost of production and sale of final products, rational usage of economic and natural resources, strengthen competitive positions and control the market situation.

Study of structural shifts in food consumption in the Russian Federation for the period 2013-2017

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Abstract. The paper presents the results of the study of the structural dynamics of food consumption by the population of Russia for the period from 2013 to 2017 per capita. The study is important to identify current trends in consumer behaviour in the context of food embargo and economic recession. The research methodology is presented by statistical analysis of coefficients and indexes of structural changes with a constant and variable base of comparison. The authors determined that starting in 2014, there are significant changes in the structure of consumed food products, which affect the structure of the retail turnover of food products with a time lag of two years. It has also been established that a 20% difference in the level of real disposable income creates a structural shift in the consumption of basic foodstuffs by the population in the range of 3-5%.

The mathematical modeling of mobile zinc and cobalt level in soil

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Abstract. According to the research results, the coefficients of applied zinc and cobalt fertilizers activity are calculated. It is established that each kilogram of zinc and cobalt applied into the soil layer of 0-30 cm increases the level of mobile zinc by 0.012 and 0.013 mg/kg of soil, mobile form of cobalt by 0.028 and 0.025 mg/kg of soil.

Empathy, emotional intelligence and decision-making among managers of agro-industrial complex. The role of tolerance for uncertainty in decision-making

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Abstract. The article is devoted to the study of the peculiarities in decision-making by the managers of the agro-industrial complex enterprises. Managing agrarian enterprises is connected with the necessity of considering multiple factors and risks. Therefore, the decision-making under uncertainty and risk is often stressful. Recently, the study of the role of the emotional intelligence and tolerance for uncertainty in decision-making has become relevant and indispensable. The authors conducted the research using four techniques in two groups – managers and students of universities studying on programs involving the future management of people. The positive correlation between emotional intelligence measured by the MSCEIT test and the subjects' age was established. A higher ability to emotional self-control according to the EmIn questionnaire and emotional intelligence according to the MSCEIT test among managers were revealed. Iowa Gambling Test showed significant differences in the preference for the winning decks both by gender (higher for men) and in groups – the students showed a lower degree of self-control, but a greater propensity for risk. People who seek certainty and clarity perceive their loss very unambiguously and try to avoid the risk of such an outcome in the future. Thus, the ability to understand and regulate emotions is important in the choice of solutions; therefore, emotional intelligence plays an important role in decision-making.

Market potential of breeding and commercial products in poultry farming

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Abstract. The article deals with the theoretical aspects of the market potential for the production of breeding and commercial poultry farming products. The different points of view on this issue are analyzed and the characteristic of the conceptual terms of enterprise and products competitiveness is given. Integrating the research results, the concept of the market potential of poultry products is proposed. At the same time, a classification of market potential by its types and subspecies (industry, enterprise, products) is developed. The combination of these theoretical developments allowed designing the models of market potential for the main, related products, products of deep processing and by-products that have an applied nature.

The main environmental problems of mankind and possible solutions

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Abstract. The global environmental problems of mankind are analyzed in the article The analysis of major factors and consequences of an adverse effect of human activity on the environment is carried out. Some possible measures which could reduce the consequences of adverse anthropogenic effect of person on the environment are offered.

Ecological engineering as an effective method of ensuring company ecological safety

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Abstract. The article aims to consider the concept of “environmental engineering" in the context of environmental activities in the Russian Federation. Authors of this article set as an example the work of the company OJSC Udmurtneft, which activity is connected with the development of such a segment as environmental engineering. As a result of the analysis, authors prove that to quickly prevent the negative impacts of industrial enterprises on the environment in this area, it is necessary to carry out permanent environmental controlling.

The implementation capabilities of the brand commercial network on the regional market of pasta

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Abstract. At the present time, there is an irregular demand for locally produced pasta products from consumers on the studied regional market. Besides, nowadays we can see the increased competition between food producers on the domestic market. One of the signs of greater competition is the emergence of new product brands and the release of modified products under their current names with similar quality parameters. For this reason, primarily manufacturing companies must build an effective system of network marketing through corporate trade to attract consumers to their products.

Corporate social responsibility as a factor of increasing the investment attraction of agrarian-industrial business

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Abstract. The research considers the role of corporate social responsibility in the functioning of agrarian-industrial holdings. The research objective is to reveal the potential of corporate social

responsibility as a factor of attracting investments to agricultural companies. The author applied the methods of analysis and synthesis. The conceptual basis of the research is the pyramid of corporate social responsibility by A. Carroll and the theory of focused social responsibility by M. Porter. The empirical base includes social accounting of companies and information on financial indicators from corporate web-sites and annual reports of the leading Russian agricultural enterprises. The article presents the specific features of applying the strategies of corporate social responsibility and its key directions most demanded in Russia. The conclusion is made that there is direct correlation between socially responsible behavior and positive perception of a company by investors.

The effect of age on milk productivity and reproductive qualities of dairy cows

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Abstract. The article presents data on the age dynamics of changes in the level of dairy productivity of cows. As a result of the research, the increase in milk yield and the increase amount of milk fat and protein with age of animals was established. The age dependence of qualitative indicators of milk production wasn't revealed. It was noted that the level of milk productivity of cows in all age periods was higher than the requirements of the first class standard of black-motley breed. An average positive correlation was found between age and milk yield. It was revealed that the productivity of cows is largely determined by their linear affiliation. When analyzing the age-related changes in the reproductive capacity of cows was revealed that the duration of the service period decreases with the age of the animals. When analyzing the age-related changes in the reproductive capacity of cows was revealed that the duration of the service-period decreases with the age of the animals. The duration period between the calves of the average for the cows was optimal, while its reduction with age was observed. It's noted that as the age of cows increases, the number of inseminations for fertilization increases.

Training of specialists for implementation of the agriculture digitization programme

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Abstract. The paper discusses the prospects of the economy and agriculture digitalization, the problems of training qualified IT-specialists in the field of computer technology for the implementation of this task. Also, briefly discussed the main aspects of the training of such specialists, as well as the technology of their training, which forms an interest in the engineering profession.

Comparative analysis of dairy cows' productivity depending on their origin and perspectives of further stock breeding in the herd

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Abstract. Analysis of the dairy productivity of cows of various origins was made in the APC Kolkhoz Prigorodny. In this farm they breed cattle of black-motley breed. All the cattle stock in the farm are purebred and high-quality, the dairy efficiency of cows is at a fairly high level. In the herd there are cows of five genealogical lines: Vis Back Ideal, R. Sovereign, Mont-week Chieftain, S.T. Rocket, Pubst Governer. As research has shown, cows of the Pubst Governer line were the leaders by milk yield, and the cows of the S.T. Rocket line had the most fat-milk. The cows of the lines Vis Back Ideal and Mont-week Chieftain possessed the highest content of protein mass fraction. As a result of the research it was found out that among the considered population cows were lactated by daughters of 33 bulls. All bulls, whose bioproducts were used in the farm were purebred, had an elite-record class. Proceeding from the possibilities of the farm economy, a tribal nucleus in the dairy herd was identified, and a selection boundary of characteristics was established. Further measures of selection and breeding work with the herd have been developed.

State regulation systems of agricultural insurance

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Abstract. The classification of entrepreneurial risks in the agricultural sector was reviewed and summarized. The current state of the agricultural insurance system, implemented with state support in the Russian Federation was studied. The paper considers the practice of agricultural insurance of foreign countries. The main reasons restraining the development of insurance in the agricultural sector and directions for improving the agricultural insurance system with state support in the Russian Federation were identified: the improvement of the agricultural insurance conditions established by law with state support; increasing financial stability and creating the necessary conditions for attracting the majority of agricultural producers to participate in the insurance system; expanding the line of insurance products; improving the procedures for concluding contracts and settling losses; and promotion of insurance as a risk management tool.

Evaluation of innovation potential in Russian clusters

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Abstract. A system for evaluation the level of development of cluster innovation potential in Russia is presented in this article. The formation of a complex system of interacting elements of an innovation environment providing innovation development of a socio-economic system in the interests of the society and the individual is seen as an innovation environment cluster. The main prerequisites for emergence of an innovation environment is availability of social connections and networks for exchange of ideas and information. The article identifies the need for creating a cluster advisory body with the function of coordinating activities of the innovation cluster. To ensure the effective functioning of an innovation cluster an information infrastructure is necessary. Management formation and development of innovation potential through application of tools designed for cluster development the cluster management company' work creates a particular mode of doing business, favorable institutional conditions and aims to achieve synergies. To evaluate the level of formation of a cluster innovation potential basic indicators are needed.

Assessment of reproduction of agricultural products

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Abstract. To expand the reproduction in the agricultural industry (a priority task of Russia), to achieve the goal of import substitution and food security, it is necessary to ensure continuous renewal and replenishment of resources. To assess the type of reproduction in agricultural organizations, average annual growth indicators taking into account resource (labour, land, capital) and economic conditions (profitability, liquidity, financial stability, turnover) were used. According to the method used for assessing the type of reproduction, organizations can be categorized into three clusters. Development problems within each cluster were determined to evaluate conditions of reproduction taking into account cluster characteristics. Agricultural organizations using the method of expanded reproduction have modern agricultural equipment, high-yielding crop varieties and highly productive animal breeds. Organizations of the second and third clusters have limited resources (labour, land, basic and working capital) and low profits.

Mathematical model for identifying the leading geopolitical actor by the principal component analysis

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Abstract. In this paper, an approach is developed that allows one to solve an applied problem of identifying hidden factors of geopolitical influence. It uses the principal component analysis. The solution of the problem is based on the principal components and the method of informative selection of the components of the response of the linear regression model. A numerical example is given on the basis of data on the cost of armament of a number of leading countries.

Improving the heat treatment process of the underutilized fish raw materials of the Northern Basin

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Abstract. The extent of dehydration of raw fish being blanched depends on the method and the mode of blanching and determines the area of their application. Stingray stellate meat is a valuable raw material for the fish foods production, since its protein contains all essential amino acids not synthesized in the human body. The main obstacle to the intensive industrial use of stingray stellate meat is the necessity to remove urea. The removal of uric acid is only possible in its thermal decomposition at temperatures above 60 ^{0}C. Mixed blanching (water-steam) can significantly expand the range of the loss of the raw material mass from 11 to 30 % compared to blanching with steam or water when removing the urea. The developed mathematical models for determining the basic parameters of the process of mixed blanching of stingray stellate are adequate and can be used for the predictive calculations. The developed modes of mixed blanching of stingray stellate are experimentally confirmed and can be recommended for the industrial use.

The foresight technologies as a tool for strategic planning of sustainable rural development

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Abstract. The article substantiates the need for the use of foresight technologies in the Russian practice of planning and forecasting sustainable development of rural municipalities. It shows the foresight methodology, which is used as a system tool for the formation and implementation of the development strategy of rural territories. The algorithm of strategic planning of social and economic development of rural territory of the region based on foresight technologies and the mechanism for its implementation at the municipal level are considered. It is shown that the nature of the municipal foresight is determined, on the one hand, by the need of taking into account the interests of key entities of regional development and, on the other hand, due to the obligatory interconnection of strategic priorities for the development of rural territories in long term. According to the results of the foresight study, the main directions of the introduction of digital technologies in rural areas and in the rural region are identified. The necessity of using foresight technologies for the development of a roadmap and the strategy for the development of rural territories of the Republic of Bashkortostan.

Key factors in the development of the poultry industry in the Russian Federation

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Abstract. Poultry farming is actively developed in most countries of the world, as it is the basis for the livelihood of many people regardless of income level. It is a rapidly growing, low-cost industry that does not require much labor. Over the period from 1990 to 2017, the total number of birds in the Russian Federation decreased by 15%. At the same time, the laying capacity of laying hens in large-scale formations increased by almost 32%. If in the 90 years of the 20th century poultry production in Russia began to decline due to the high growth of imports from abroad, from 2000 the market of chicken and egg meat began to grow. In the course of the study, we found that the disparity of prices for energy resources and the cost of agricultural products, and the reduction in the number of able-bodied rural population, are the main deterrents for the development of the poultry industry. The main goal of the development of the poultry industry in the Russian Federation is the creation of an efficient, competitive and optimal in its structure poultry products and raw materials for the processing industry, which will increase the level of self-sufficiency of the main types of poultry products and raw materials, as well as develop exports outside the country. Achieving this goal provides for the development of the poultry industry on an innovative basis based on the preservation of reproduction and improvement of land and other natural resources used in agro-industrial production, increasing the competitiveness of poultry products and raw materials produced.

The issues of territorial branding of agricultural products in modern conditions

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Abstract. The development of agribusiness in Russia requires the quality improvement of agricultural products and the market instruments improvement for the purpose of sales growth in all sectors of agricultural products in domestic and overseas markets, providing the efficiency increase of agricultural companies' activity, the sustainable development and the economic safety of territories in the framework of national projects. The increased attention to the technologies of commodity and corporate branding as tools aimed at improving the competitiveness of agricultural products and producers in modern conditions makes the necessity to use territorial branding relevant. Territorial branding creates a synergistic effect both in ensuring the products quality and the market support for agricultural products. The development of territorial brands of agricultural products is constrained by the insufficient scientific and methodological support, in particular, the brand structure definition. The adaptation of territorial brand models to agribusiness carried out by the authors will help to solve one of the scientific problems and to use it in the practice of territorial branding.

Crowdfunding as the way of projects financing in agribusiness

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Abstract. Entrepreneurs in the sphere of agriculture often meet difficulty of receiving financial resources from traditional sources for financing of innovative and investment projects. The article considers use of crowd funding as alternative way of funds raising for projects connected with agriculture and rural areas development. Authors substantiated need of the factors accounting reflecting the social and economic level of regions development in which territory implementation of the project is provided. On the basis of the projects research presented on two the most popular Russian crowdfunding platforms it was found out that such factors as the income amount of the population and availability of the information and communication net Internet in the region in which it is planned to implement the project have the greatest impact on success of agricultural projects. Besides, the research established that such factors as the index of agricultural products manufacture and investment into fixed capital per capita in the region of the project implementation have no significant effect on the success of funds raising.

State support development of agricultural consumer cooperation in the Krasnoyarsk Territory

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Abstract. In the article we considered the main directions of the state support of the cooperative relations. In total there are five main directions allocated, such as: legislative actions of support, actions of financial support, the organizational and information and consulting actions, actions

directed to training, preparation and retraining of personnel and actions for the organization of sales channels and markets of products, and target indicators of implementation efficiency of actions package for agricultural cooperation development in the Krasnoyarsk Territory are also given for 2018 – 2021. The sociological research analysis conducted within the social and labor sphere monitoring of the rural areas is provided in article. Heads of administration of municipal districts, and rural communities, heads of agricultural cooperatives and heads of farms were included into the expert board. Experts estimated the development nature of the economic and social relations in the sphere of consumer cooperation, the reasons hindering agricultural consumer cooperation development, cost and social efficiency of various forms of economic management in the Krasnoyarsk Territory, ranged actions for ensuring sustainable dynamic development of consumer cooperation in the Krasnoyarsk Territory. Experts estimated the development nature of the economic and social relations in the sphere of consumer cooperation, the reasons hindering agricultural consumer cooperation development, various forms cost and social efficiency of economic management in the Krasnoyarsk Territory, ranged actions for ensuring sustainable dynamic development of consumer cooperation in the Krasnoyarsk Territory. For the cooperative relations development in rural areas it is necessary to strengthen the state support. Creating favorable conditions for development of agricultural consumer cooperatives in the region is a task of the state.

The prospect of the development of the poultry industry

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Abstract. Over the past five years, great changes have been made in the development of poultry farming in the Republic of Mari El in primarily meat direction. In many district municipalities of the North-Eastern part of the Republic, modern complexes for broiler poultry cultivation with the use of modern, intensive technology have been built, which greatly facilitates the work of workers. All this contributes to the increase in the gross production of poultry meat. This industry is characterized by a rapid rate of reproduction of livestock, high productivity, lowest cost of production compared to other livestock industries. However, there was a question of the production of hatching eggs at the local level, because it is expensive to buy them on the side, the period of their storage is short, and most importantly, from the development of the economy, it is not profitable. There is a question, what methods and means it is possible to solve the arisen problem in our conditions. The scientific article reflects new approaches to attract investment resources for the development of poultry industry using innovative technologies. The proposed scientific recommendations will contribute to the production and significant reduction in the cost of hatching eggs at the first stage and ultimately to the overall reduction in the cost of finished products – poultry meat. The investments made by the calculations shall be repaid within three years. Thus, they will create a new production base that is not inferior to the existing Western analogues in the production and sale of hatching eggs, both in the Republic of Mari El and abroad, which will contribute to cheaper final products and significantly improve the financial condition of the poultry farm.

The use of main methods of entering the agro-industrial enterprise to the foreign market

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Abstract. The article describes the actual topic of entering the agro-industrial enterprise to the foreign market and maintaining sustainable activities in these economic conditions. The modern world market is the cruelest in terms of competition for the buyers' interest and in order to occupy its own niche, to find and retain its buyers long and hard work is required. The article discusses the current conditions and problems affecting the entry of the enterprise into the world market. In order to achieve this goal, the stages were developed, which include strategies for organizing the foreign economic activity of agrarian enterprises. One of the options is licensed activity, as an opportunity to access foreign markets with minimal risks. Special attention is paid to the difficulties of using a particular strategic plan. The article considers internal production problems arising from organizations as they enter the maritime market. Also, in order to choose an appropriate strategy, it is important to understand whether managers and the enterprise as a whole are ready for increased responsibility and risks. All these aspects are described in the comparison of these strategies, and a detailed description of each of them is given, highlighting the advantages and disadvantages.

Governmental support for the agriculture development on the example of the Irkutsk Region

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Abstract. The article deals with the governmental support for the agro-industrial complex development on the example of the Irkutsk region. Here are analyzed the formation and the implementation of the Governmental program of the Irkutsk region "Development of agriculture and regulation of the markets of agricultural products, raw materials and food" for 2014-2020.

The role of human capital in the development of agribusiness

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Abstract. At the present stage of forming the sustainable rural areas development, the priority is to increase the level of human capital. Despite the dynamic development of agro-industrial complex, the advancement of rural areas is uneven, some of the territories lose their development, the population ageing processes are accelerating, and the outflow of young people is increasing. Attraction and retention of human capital in rural areas will allow to solve the priority tasks on acceleration of agriculture modernization as well as the development of entrepreneurial initiatives.

Analysis of the agroindustrial enterprise competitive strategy tools

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Abstract. The article presents an analysis of the agrarian enterprise competitive strategy. Considered ways to reduce costs. One of the most important tasks of enterprises is being solved - reducing costs. Several options have been identified for implementing this strategy, as well as difficulties in achieving this goal, and ways have been found to solve them. In addition, the main types of losses that occur in modern enterprises are highlighted and the essence of these losses is determined. The author gives a definition of cost and reveals the value of this indicator in the enterprise management system, determines the goals of cost reduction, and highlights the factors and methods of reducing the cost of production in the enterprise. He gives advice on how to start saving, how to reduce the cost of production and how to produce better products, while reducing the number of defects. Today, innovation has become a crucial tool for competing in global markets. To improve the skills in the field of innovation, it is necessary to ensure consistently high results by constantly introducing innovations and get high returns on them. The article reveals the peculiarity of introducing total innovations, their influence for organizations and the most important tools for introducing innovations, and considers five "puzzle pieces".

Methods of developing a competitive strategy of the agricultural enterprise

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Abstract. This article examines the features of the use of various strategies, as the basis for creating a competitive advantage of an agribusiness with stable positions both for entry and for keeping a high level during various financial changes in a market economy. Developed or selected strategy should be based on a comprehensive analysis of the business with strengths and weaknesses. The distinction between the strengths and weaknesses of a business, and accordingly the grouping of its features into advantages and disadvantages, allows them to be more accurately taken into account when choosing a strategy that provides competitive advantages. The reasons for the poor viability of various business aspects are the lack of development and the validity of strategies that reduce both the competitiveness and profitability of various enterprises. The given structure of strategies and their correct modernization in business will make it possible to enhance the stability of the presence of an enterprise afloat of financial success. Competitive advantages of a business are the advantages manifested in the position of the firm in the market, which is more advantageous in relation to competitors and is achieved using methods and tools of strategic planning that take into account the characteristics of small business.

Essence and classification of the agribusiness organizations competitive strategies

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Abstract. This article describes the main types of agro-industrial organizations competitive strategies. Competitive strategists now are the most important component, it is impossible to imagine modern market relations without it. No organization can achieve superiority over its competitors. To get closer to this goal, it is necessary to correctly set priorities and develop a special strategy, show the strengths of the organization's activities, increase its intensity of activity and strengthen its competitive position in the market. A special place has the competitive advantage achieved by the organization, which is characterized by a special advantageous position among competitors in the competitive struggle and an individual approach to attracting consumers. The key to the successful functioning of any organization is built on these characteristics.

The analysis of methods for developing the marketing strategies in agribusiness

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Abstract. The article deals with the development of marketing strategies. There is set out the methods for developing a marketing strategy for the agrarian enterprise. The formation of a competitive developmental strategy has been considered, as well as formal and informal marketing strategies have been identified: BCG matrix, Ansoff matrix, Porter matrix, and development of author's methods. The matrix of the Boston Consultative Group allows to identify the most promising and, on the contrary, the "weakest" products or divisions of the enterprise, which are divided into 4 types: stars, cash cows, difficult children, dogs. Ansoff Matrix systematizes the available information about the market and the company's products, helps to choose the right direction of business development, taking into account the available resources and capabilities of the enterprise. In addition, the article describes the structure and construction of the Ansoff matrix, which consists of four marketing strategies: market penetration strategy; market development strategy or expansion strategy; product development strategy, product development strategy or product expansion; diversification strategy.

Internet demand marketing analysis for Black sea resorts' touristy services

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Abstract. Internet usage percentage based on the latest statistics was 71% of the total population in 2018. That allows considering the Internet users' behaviour to be relevant to the whole citizens' behaviour accordingly to the large regularity. Therefore, the potential customers' preferences marketing research technologies and methods application for the Internet is of current interest. This article discusses Internet demand marketing analysis for Black Sea resorts' touristy services and correlation formulas that allow analyzing the tourist's attendance in the region.

Application of fuzzy logic for an enterprise production activity management

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Abstract. For knowledge representation and solving problems of qualitative nature, an applied calculus of fuzzy predicates of the first order has been developed. This theory and methods were used to create an expert system for scientific research in the field of molecular spectroscopy, as well as for a number of other subject areas. One of these areas is the planning and management of the enterprise production activities. A system of fuzzy predicates was developed to formalize basic knowledge of production and commercial activities related to solving the problems of managing production orders. The applied theoretical methods and practical approaches to solving problems of a qualitative nature are considered in the paper.

Development of an automated system histology security of food production

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Abstract. The histological method of research based on nanotechnology, allows to study cells and tissues, the effect of herbal supplements on the quality of meat products. Histology is performed to study the tissues of various organs and systems. Histological examination helps with high accuracy to determine the presence of pathologically altered cells and damage to the structure of tissues in products. The difference of this research method from others, for example, examinations, laboratory tests, is an increased accuracy of obtaining results. Currently, studies are conducted manually, and therefore, there is a need to automate the process of histological analysis. Based on the method of histological analysis, a technological map of the stages of histological research has been developed. Developed a functional diagram and logical equations of the equipment. The software and hardware of the automated histological analysis system is implemented on the Omron controller.

Basic principles of online service development for functional zoning and definition of urban space development scenarios

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Abstract. The management of municipalities is becoming more and more difficult every year: the complexity of urban infrastructure is increasing, road traffic is growing, and new communications are emerging. In the context of the development of modern Russian cities, the task of transforming inefficiently used public areas comes to the fore. The most promising approach - participatory design - sets the vector for the development of a comfortable urban environment in the Russian Federation. The actual material accumulated at its use allows revealing regularities of occurrence of these or those scenarios of use of public spaces. In the article the example of creation of information system for a choice of suitable scenarios of development of public urban space on the basis of use of a principle of co-projecting is considered. The basic methods of raster maps processing, principles of work with the spatial data for automation of process of city planning on the basis of the forecast of city development are stated. The complex of mathematical models built on the basis of neural networks and analysis of large data sets, which allows with a given probability to forecast the development of urban space on the basis of the data of geoinformation systems and the wishes of users, is described.

Evaluation of product quality nonconformity risk found at production

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Abstract: This article deals with the possibilities of risk evaluation of product quality nonconformity found at production. In first parts of article main steps needed for risk analyses are defined, including created by the author's mathematic models for risk evaluation and scoring system for characteristics, weighted based on expert consultation. In the following part developed methodic is approbated at production of household appliances on example of washing machines production. Risk of increase of technical call rate and warranty costs are evaluated. General risk level based on probability of risk occurrence, severity of risk consequences is also calculated. In the last part, using the knowledge from the previous parts document for evaluation of risks of quality nonconformity found during production process is created.

Non-contact methods of cattle conformation assessment using mobile measuring systems

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Abstract. Examination of body conformation traits and measuring of cattle exterior parameters play a significant role in improvement of animal's breeding abilities and enhancement of selection efficiency. Non-contact remote measuring through the use of digital technologies means considerable progress towards mitigation of animal's critical reaction to stress and substantial time reduction in contrast to manual measurements in contact with animals. This article presents a new approach to exterior assessment and provides an analysis of non-contact methods of measuring basic parameters of animals' body conformation. The values of conformation parameters have been obtained by photo image processing of animals and with depth sensor. Basic body measurements (height at withers, height at rump, chest depth, chest width, rump width, rump length, body length, metacarpus girth) were taken in the production environment. They were determined with the accuracy up to 1 mm and an error about 2 %. Experimental findings show that these techniques may be considered as an innovative method of non-contact measuring of cattle conformation traits.

Entropy approach to the evaluation of the integration processes in agro-industrial complex

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Abstract. The possibilities of assessing the integration processes in agro-industrial complex are considered. Preference is given to the study of the influence of network research structures for obtaining, processing and transformation of information. The necessity of development of system recommendations taking into account theoretical achievements and analytical studies based on network analysis and the concept of entropy is indicated. The main directions in the study of integration processes based on the construction and analysis of network structures are briefly considered. The main attention is paid to the entropy approach of evaluation of integration processes. Interpretations of the measure of information uncertainty (entropy) are proposed in order to perform network analysis. Among the preferred models to determine the amount of entropy, the following are proposed: K. Shannon's measure of uncertainty; cross-entropy and Kullback-Leibler divergence.

Technological level of high power wheel tractors

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Abstract. The aim of the work is a comparative assessment of the technological level of high-power wheeled tractors in the natural-industrial conditions of the Eastern agrozone of the Siberian Federal District. As the main criterion for adaptation to natural production conditions, when forming models and algorithms for assessing the technological level of Russian-made production tractors of different configuration, we used a generalized net performance indicator corresponding to the minimum reduced costs for different classes of rut and groups of tillage operations with specific characteristics of specific traction resistance of working machines and the nominal values of technological speed. According to the simulation results, rational traction modes were defined, limited by 7-15% skidding of propulsions and the corresponding change ranges and axle distribution of wheeled 4K4b tractors of different configurations. For the prevailing class of rut length more than 1000 m, the required tractor power, taking into account the employment in operations of different groups, was 260 kW on single wheels and 250 kW doubled with an operating weight of 14.64-17.60 t and 15.70-18.38 t respectively. With an average for the agrozone, the rut length class of 600–1000 m, the optimum values of the mass-energy parameters of the tractor are at the level of 0.80–0.81 from those indicated. According to the criterion of the technological level in the natural production conditions of agrozones with a rut length of more than 1000 m, the Kirovets tractors of models K-740P, K-742C

and K-742P with an operating capacity of 284-298 kW on single wheels and tractor RSM-2375 (240 kW) on dual are mostly efficient ($K_э \geq 0{,}950$). Doubling the tractor wheels increases productivity by 5-6% and fuel efficiency of the aggregates up to 14% with a two-fold decrease in pressure on the soil.

System development of the clinical data analysis of patients with diabetes for assistance in creating therapy and estimating efficiency of its application

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Abstract. The article analyzes data on the methods of treating patients with diabetes, as well as the possibility of obtaining additional information based on the processing of case histories by neural network methods, which is later used to build a decision-making assistance system for medical specialists. This information system can be used to assess the risks arising in the treatment of patients, allows you to more accurately set the diagnosis, prescribe treatment and monitoring dynamics of the effectiveness measures taken in relation to the patient. Presents solutions related tasks to data collection, processing and normalization both in the form of human analysis and with the help of machine learning systems. Affected by the heterogeneity of medical data. An analysis is made of existing systems with the same desired result in decision making for the medical sector. The approaches to the practical implementation with the observance of the norms and rules for handling personal information are considered. Accurately described the desired target result in achieving the solution of the task that satisfies a number of requirements of specialists using a similar system on their existing clinical data. The most important part of the system is the implementation of an adaptive method that allows specialists to influence the operation of the system by using the data and information at their disposal that is specific to a given region and social standard of living. Further possibilities for the application and development of technology in the future by adding additional methods to the already created system, affecting the efficiency of its work, as well as the possibility of creation new methods.

Analysis and forecasting of the availability of sufficient personnel complexities of the digital economy mechanisms in the agrarian sector of the Stavropol territory

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Abstract. The need to transfer agricultural production to the digital economy is obvious. One of the main factors constraining the mechanisms for introducing digital technologies into agricultural production is the insufficient availability of specialists with the necessary qualifications in the IT sphere in the area of processes and production. The main, in our opinion, criteria that allow us to predict the demand for labour resources with the necessary qualifications have been considered; typical problems of training in the framework of the current education system, associated with insufficient from the point of view of the digital economy, elaboration and specification of Educational Standards and qualification requirements for graduates who were educated by the time of transition to digital production mechanisms have been identified. The possible difficulties of the state of the labour market associated with the reduction of jobs as a result of the intensification and automation of a number of industries using the digital economy and buffer measures of pension legislation have been noted. Options for mitigating the effects of the problems presented by creating a specialized educational structure based on short-term, highly specialized courses, allowing in a short time, depending on the existing skill level of the worker, to bring his knowledge, skills, abilities and competencies in line with the level required for successful work in the framework of digital economy mechanisms have been offered.

The prospects of microcontroller application in the agriculture digitalization

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Abstract. This paper discusses the problems of agriculture digitization, shows the reasons for its appearance. One of the ways to solve these problems is proposed on the basis of the modern Arduino microcontroller platform implementation. A brief review of its capabilities for building distributed systems for collecting and processing information has been carried out. The task of training qualified IT specialists in the field of microcontroller technology is highlighted. Briefly reviewed the main aspects in the education and training of such specialists, as well as the technology of their training.

Features of GIS technology in the Republic of Sakha (Yakutia)

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Abstract. The article analyzes the features of the use of GIS-technologies in various fields in the Republic of Sakha (Yakutia). The authors definitely argue that GIS-technologies are effective tools for activities in certain areas of activity.

The study of the characteristics of photovoltaic power stations and the identification of rational operating modes by changing the inclination and the spectral composition of the irradiation

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Abstract. The global trends in the development of photovoltaic power stations (PPS) and their application are actively fighting for a place in the sun. On January 20, 2009, Vladimir Putin (at that time the chairman of the government) signed a decree approving the main directions of state policy in the development of renewable energy sources (RES) until 2024, and on May 13, 2019, by decree no. 216 “On the approval of the energy security of the Russian Federation” signed the Doctrine of the energy security of the Russian Federation. In this regard, the need to find the optimal operating modes of PPS has become acute, which is an environmentally friendly way to generate electricity. New designs and methods of using systems are being developed to study and determine the optimal operating modes of PPS. The work justified the design parameters and experimentally investigated the characteristics and operating modes of PPS, determined the effect of the spectral composition of radiation on the amount of generated energy. The study was conducted using graph-analytical processing of the results of practical PPS tests characteristics by simulating outlook surfaces using the biharmonic interpolation method in the Curve Fitting Toolbox application of the MATLAB program.

Methods of separation of stable oil-water emulsions into phases and their application at production sites

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Abstract. In this paper, the problem of accumulation and disposal of oil sludge, which includes a stable water-oil emulsion, is touched upon, existing processing methods are studied from the point of view of dividing it into separate components. The classification of physical separation methods, including gravitational sedimentation, separation using centrifugal forces, extraction is given; chemical and combined. It is proposed to use the technology of processing the intermediate layer with a chemical reagent such as SNPCH-4802 with an aromatic solvent. This physico-chemical method for processing tank sludge is to add demulsifier reagents to the emulsion, followed by stirring, heating and separation from water and dirt.

Application of geoinformational systems for veterinary geology

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Abstract. Every organism is constantly exposed to biotic and abiotic environmental factors. Geological objects (soil, minerals, water, etc.) and factors play a great role in the development of a huge number of animal diseases. The diseases are endemics, for instance endemic osteodystrophy, enzootic ataxia in sheep, boric enteritis in sheep, white muscle disease and deficiency in microelements). As a result, Veterinary Geology as a new branch of veterinary medicine is being formed. Veterinary Geology studies the influence of natural and anthropogenic geological objects and processes on animal health and quality of animal products and use of minerals for treatment of animal’s diseases of different etiology. Study of the epizootic situation and the role of geological objects and processes in the animal health allow to develop successful preventive and control measures. The overview presents the areas of application, directions and prospects for the development of veterinary geology in modern conditions. The importance of application of geoinformational systems (GIS) as an optimal tool for assessing, analyzing and managing risks in this branch of knowledge is shown.

Blockchain technology and smart contracts in the agro-industrial complex of Russia

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Abstract. Progressive technologies associated primarily with the use of the latest information systems are developing very quickly and are being introduced in the modern world. Recently, such phenomena as cryptocurrency and the smart contract, functioning thanks to the blockchain technology, have become very popular. The application of this technology is used in many areas: information technology, law, state, and municipal administration, etc. This article discusses the mechanisms of functioning and features of the latest Internet technologies in the context of the agro-industrial complex of Russia. Their practical significance for optimizing the relationship between the seller and the buyer has been investigated. The advantages of the blockchain for all market participants when using technology in the supply of agri-food products are justified. The research shows the possible difficulties and shortcomings of the existing content system, gives recommendations on the use of the blockchain and its evaluation for domestic producers of agricultural products. The authors propose a mechanism for using the blockchain technology in agriculture, which will change the existing practice of trade and settlement transactions between counterparties of the agricultural market.

Modern information technologies for inventory of objects of ameliorative network of St. Petersburg

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Abstract. A functional diagram of the inventory of land reclamation networks in St. Petersburg is proposed. Its main element is geo-information systems of visualization of geo-data, filled in on the basis of cartographic materials, topographic tablets, the results of satellite imagery and aerial photography, the results of field surveys of open and closed land reclamation systems. The advantage of the proposed approach is to reduce the laboriousness of work on the inventory of ameliorative network, the definition of its functional purpose and technical condition. The results of the inventory are presented in a single geo-information complex, which allows online access to any cartographic and attribute data.

Expert system as a means for optimizing cattle diets

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Abstract. Existing expert systems for optimizing cattle diets were studied, the ISO 9126 quality model was chosen to formulate requirements and evaluate existing systems. A mathematical model for optimizing animal feed rations was developed based on the linear programming problem, which is to minimize the objective function for the ration cost with the restrictions on the indicators of overall nutritional value. The prototype of the application being developed is based on a functional model developed using the IDEF0 methodology, which defines the main functions of the system: processing user requests and providing the necessary information on animal feed and standards; creation of rations for animals according to set parameters; recalculation of a diet taking into account the changes made by the user; analysis of the diet and providing recommendations for its optimization. Methods for developing user interaction algorithms are described. To create an interface, design methods were chosen - “User-oriented design” and “Human-oriented design”. When implementing the objectives of the current research, the problem of optimizing the diet of animals will be solved.

Automated system for processing diagnostic parameters of asynchronous motors for poultry house ventilation systems

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Abstract. The most common electric motor to drive working machines is an asynchronous one with a short-circuited rotor. It has a fairly large resource, provided proper operation. When analysing faults, it was found that the most common cause of failure is increased wear of bearings. The diagnostic parameter of this fault is an increase in the eccentricity of the rotor, to identify which we have developed a diagnostic method that allows us to evaluate the technical condition of the engine using an indirect indicator, the rotor speed. To make a diagnosis, it is necessary to process the data on the dynamics of change in the rotor speed of the engine and predict its operation for the forthcoming period. To simplify data processing, a program has been developed that is an automated system for analysing diagnostic parameters and can significantly reduce the laboriousness and time of diagnosis, eliminating the influence of the human factor. The developed programme was used to analyse the operation of asynchronous engines in poultry house ventilation systems, to predict their failure, as well as to plan maintenance and repair.

New biocomplex for nutrient-metabolic support of bone tissue

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Abstract. In the conditions of digitalization of agriculture and food industry, a prescription composition and innovative technology of a specialized product formulated as a biologically active additive have been developed to normalize metabolic processes in case of damage to the musculoskeletal system. Specialized product obtained by innovative tableting technology, which provides high consumer properties and preservation of prescription components. Innovative technological solutions allow us to divide prescription ingredients taking into account their chemical and pharmacological incompatibility, to deliver them to different parts of the gastrointestinal tract consistently at a given speed. It should be noted that glucosamine sulfate, which is part of the vitamin-mineral complex, is combined with macro and microelements: calcium hydroxyapatite, magnesium oxide, zinc oxide, D3 vitamin, manganese sulfate, which are characterized by unidirectional functional properties with respect to the correction and normalization of metabolic processes during damage motor apparatus. The effectiveness of the vitamin-mineral complex is confirmed by clinical trials by including it in the complex treatment of children with fractures of the long tubular bones, one capsule twice a day (children 3-7 years old) and one capsule three times a day (8-14 years). It was concluded that the appointment of a vitamin-mineral complex had a beneficial effect on the metabolism of bone remodelling, the rehabilitation period and, in general, the quality of life of sick children. New developments in the field of formulations and technologies were tested in terms of production at the enterprises of the Art Life company (Tomsk), certified according to the requirements of international standards 9001.22000 and GMP rules, ensuring competitiveness and stability of quality characteristics.

Some aspects of the essence and legal regulation of agriculture digitalization as one of the priorities of modern state policy of agriculture development

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Abstract. The article examines the nature and problems of such a direction of modern state policy of the Russian Federation as digitization of agriculture in the context of the general course on digitization of the Russian economy and understanding of the regulation of agricultural development as part of modern state policy of Russia. Attention is drawn to the need for an integrated approach to the formation of the very concept of a policy on digitization of agriculture and to the mechanism for its implementation. The importance and significance of scientific support and human potential for the effective solution of the tasks assigned to the process of digitization of agriculture are noted.

Geospatial database for digitalization of agriculture of the Krasnoyarsk territory

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Abstract. The experience of implementation of GIS and web technologies for regional agriculture of the Krasnoyarsk territory is considered. The experimental agricultural enterprise "Minino", located near the city of Krasnoyarsk, was chosen as a pilot project. For this agricultural enterprise, the comprehensive digital model using geographic information systems, remote sensing and web mapping data processing techniques and software is created. A geospatial database, which contains relevant and archival information about agricultural fields, varieties, crops, soil, particle size distribution, soil-forming rocks, terrain features, has been developed. A series of technological digital maps and cartograms have been created in which information on crop rotations and cultivated crops is concentrated. Archives of available multispectral satellite data of high spatial resolution on the considered territory are analyzed. As a result, a multi-layer electronic map of the agricultural enterprise was created, which contains all available information and can be used for modeling and forecasting crop yields, agricultural planning. The developed methods and software and technological solutions can become a methodological basis for a new generation of information and analytical systems and technologies to support management decisions in the agricultural sector.

Estimation of the spatial distribution of spring barley yield using ground-based and satellite spectrophotometric data

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Abstract. The article presents a method for estimating the spatial distribution of spring barley yield, based on the use of optical ground and satellite spectral data (PlanetScope data with a spatial resolution of 3 meters). This approach is highly relevant for the development of precision agriculture technologies. Yield mapping is carried out on the basis of data on the spatial distribution of the actual yield and the spatial distribution of the spectral optical characteristics. The method’s characteristic feature is the use of the integral values of vegetation indices (NDVI, MSAVI2, ClGreen) at various stages of crop development. The method was tested on the basis of stationary field experience, where

traditional agriculture (deep plowing) is compared with resource-saving technologies (subsurface and surface plowing, and direct seeding with zero tillage).

Efficiency of barley foliar feeding under conditions of leached chernozem fertility heterogeneity

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Abstract. The article presents the results of studies conducted on the effectiveness of barley foliar feeding under field experiment conditions. The studies were carried out in a field stationary experiment in a grain-vapor-tilled crop rotation system with the following rotation: green-manured fallow - spring wheat - barley - maize - spring wheat. The object of the research was leached chernozem. Rotation cropping was sown on two degrees of ground fertilization – without fertilizer and with fertilizer. Urea (carbamide) was added as barley foliar feeding. Spring wheat that was sown on rape plant green-manured fallow served as the forecrop to the barley. Soil fertility heterogeneity was determined by examining barley crops during the tillering period (biomass scanning). Unmanned aerial vehicles manufactured by Krasaeroskan were used for this purpose. The results of NDVI index determination in the field experiment formed the basis for determining the mineral nitrogen fertilizer doses. Such doses were refined by tissue diagnostics. It was established that foliar feeding with mineral nitrogen fertilizers (urea) contributed to an increase in barley productivity.

Modeling of absorption process using neural networks

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Abstract. An artificial neural multi-layer network has been developed for predicting the mass transfer coefficients in the liquid and gas phases for the gas absorption (CO2) from the air using an absorbent - water. For the development of neural network the unobservable parameters of the packed absorber were calculated. The obtained results can be used to model an extensive class of chemical engineering processes with the possibility of formalizing the calculation procedures.

Polynomial regression as a tool for prediction quality of bread baked of wheat flour mixed with flour of cereal extrudates

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Abstract. Multiple regression models and Multivariate polynomial regression models were used for estimating the relationships between bread quality and chemical composition of wheat flour added with flour of six types of cereal extrudates (wheat extrudate, wheat extrudate added with Fe, covered barley extrudate, naked barley extrudate, covered oat extrudate and naked oat extrudate) in proportion 5, 10, 15, 20 and 25%. Multivariate polynomial regression models were found to be highly effective tool for prediction titratable acidity and porosity and less effective for prediction humidity of bread. Deviation of predicted values of titratable acidity from observed values did not exceed 4.0% of actual value and deviation of predicted values of porosity from observed values did not exceed 0.55% of actual values. The accuracy of models did not depend on the type of extrudate and on the proportion of extrudate in flour. In contrast with polynomial models, the multiple regression models were low effective. Using polynomial regression models two VBA applications for prediction and modeling of titratable acidity and porosity of bread baked from random blends of wheat flour and flour of cereal extrudates were developed.

Numerical simulation of supercavitation in the constrained flow

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Abstract. Mathematical modeling of the liquids movement, accompanied by the phenomenon of cavitation, is developing intensively, but the super-cavitational flow regime has a number of features compared to the localization of the cavity on the streamlined body. The article presents a general approach to the mathematical modeling of the supercavitational flow, describes the used mathematical model. The geometry selected for modeling, the initial parameters and the physical constants characterizing the process are given. Using ANSYS CFX, the flow around a cone installed in a round tube at different flow velocities was calculated. The analysis of the obtained results was carried out, and directions for further research were outlined.

Monitoring and certification of agricultural land by creating a bank of information resources for the rational use of steppe landscapes of the Western Ciscaucasia

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Abstract. The improvement of economic efficiency and reproduction of soil fertility require today a comprehensive study, qualitative characteristics, quantitative and cost assessment of the land. A certain imbalance exists today in the use of land and the preservation of soil fertility. Certification contributes to the rapid development and adoption of management decisions, as well as operational monitoring of agricultural landscapes. The subject of the research is the main integral indicators of soil fertility and degradation processes of agroecological monitoring in the system of land evaluation procedures within the steppe landscapes of the Western Ciscaucasia. The authors have identified the need for a number of measures: to analyze the structure of the lands of administrative districts, which are part of the IV accumulative plain landscape of the Chelbas and Beisug rivers basins with plowed steppes in 2017, to monitor the main integrated indicators of soil fertility of agricultural land steppe landscapes of the Western Ciscaucasia, to substantiate the approval of form "Passport of quality of soils of Krasnodar territory» by legislation.

Modeling of information processing in the Internet of Things at agricultural enterprises

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Abstract. The paper discusses the features of solving problems related to the modeling of information in the Internet of things in the organizations of the agricultural sector. It is noted that by improving the efficiency of information processing increases competitiveness, reduced costs. It is shown how the reduction of indicators of monitoring evaluation in the Internet of things in terms of importance for the optimization of resource efficiency of agricultural companies. The features of using a combination of several methods for processing and modeling of reduced monitoring information in the Internet of things system are given. The block diagram of the implementation of a combination of methods for processing reduced monitoring information in the Internet of things system is given.

Methods for assessing the impact of the energy fields of experimental prototypes of contactless charging of implants' power supply sources on biological objects

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Abstract. Currently existing bioimplants need to be periodically removed from a body to replace a source of energy supply and then reinstall them in a body. It is to a certain degree a threat to the health of the patient and degrades the quality of his life. Developed by the authors contactless charger for transcutaneous energy supply of implantable modules automatically adjusts the power of the electromagnetic field. When implementing the methodology for assessing the impact of the energy fields of experimental prototype of implant power supplies' contactless charging on biological objects, it was decided to link the transmitting and receiving modules to negative feedback loop, which allows stabilizing the power supplied to the transmitting circuit by the D class amplifier. This solution minimizes the heating of the receiving module, both in the area of the receiving circuit, and in the area of the stabilizer of the charging current of the battery. Thus, in addition to smaller dimensions, the new solution allows optimizing the energy characteristics of the device as a whole.

Scheme of optimal ensembles of clustering algorithms with a combined use of the Greedy Heuristics Method and a matched binary partitioning matrix

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Abstract. We propose a procedure for building optimal ensembles of automatic grouping (clustering) algorithms with a combined use of the genetic algorithm of the Greedy Heuristics Method and a matched binary partitioning matrix for practical problems. It is shown that our procedure allows us to increase the accuracy of separation of a mixed batch of industrial products into homogeneous batches.

Application of IoT technologies for automation of management in agriculture

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Abstract. This paper describes actual problem of modernization and process automation of agro-industrial complex. Agriculture, farms, private agricultural complexes are more and more supported at the state level over the past years in Russian Federation. This is due to the new import substitution policy in food production. The main purpose of modernization of process control methods in agriculture is to increase the efficiency of manual control and decision-making by the operator. Also, modernization is expressed in reducing the duration of the processes, increasing accuracy and minimizing of energy consumption. The objective of this study is to create an effective monitoring model to optimal decision-making of management of processes in agriculture. In this work authors present a model of control of measuring components using the Internet of things technology. This model allows to get an estimate of the values from the measuring sensors with the deviations of environmental conditions. The algorithm of control of measuring components and processing of indications of sensors is considered in detail.

Test methods for integrated experimental prototypes of wireless charging of implants’ power supply sources and implantable biotelemetric system

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Abstract. This article discusses the well-known inductive wireless power transfer for implantable devices. These devices are intended for use in the area of medicine, pharmacology and human physiology. Implantable small-sized devices are introduced into the body surgically and autonomously monitor and control the functional state of individual organs and systems. However, the currently existing implantable devices must be periodically removed from the body of the object of observation to replace the source of energy, and then reinstall into the body. Developed by the authors wireless charger for transcutaneous energy supply of implantable modules automatically adjusts the power of the electromagnetic field. It gives the possibility to use either non-rechargeable power sources or batteries charged via wireless power transmission. The integration scheme of experimental prototypes of wireless charging device and implantable biotelemetric system is considered. The methodology of three consistent tests of integrated charging device and implantable biotelemetric system is discussed. The tests’ results verified the compliance of the specified parameters with the requirements of the technical specification.

Transport and logistics cluster designing in the agribusiness complex: business barriers

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Abstract. The current state of the agricultural products market in Russia is determined by a growth trend, which is explained by the presence of sanctions on its imports in the recent years. The development of the consumer market in the agricultural products production and sale requires new approaches to the organization of supply and marketing processes. In this regard, the issues of integration of transport and agricultural companies by purchasing, producing and distributing agricultural raw materials and finished products become relevant. As one of the strategies for the integration of transport, logistics and agricultural companies, there is a cluster designing, which may further reduce the cost of delivery of material resources.

Electric circuit of brushless motor electric drive of technological objects of agriculture

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Abstract. In the article schemes of power circuits of a feed of synchronous reluctance machines are considered. The features of the choice of the most rational scheme by the criterion of improved weight and size parameters are shown. It is shown that the specific parameters of electric drives have values that exceed similar synchronous electric drives by approximately 20%. Improvement of specific parameters in the agriculture electric drive can be achieved not only due to the complexity of the electric machine construction, but also due to the choice of optimal schemes of power circuits. So, in agriculture electric drives with individual sources with rectangular current form, the values of overloads corresponding to electric drives with complex (compound) rotor design.

Synthesis of energy-efficient agriculture electric drives control system

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Abstract. In this paper the capabilities of the agriculture electric drive with rectangular shape of the phase current were analyzed, the level of pulsations of the electromagnetic torque in synchronous reluctance electric drives was found, the synthesis of the electric drive control system was considered, the characteristics of the electric drive under different control laws were compared. It is found that the use of high-speed current circuits (cutoff frequency => 200 rad/s) can significantly suppress the level of pulsations of the electromagnetic torque. It is shown that the use of flexible positive current feedback in switching phase currents can be considered as an additional opportunity to improve the performance of the current control circuit, as well as in conjunction with the previous method for suppressing torque pulsations in both static and dynamic modes.

Design of fast response electric drive of agricultural objects

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Abstract. The main stages of synthesis of high-speed agricultural AC electric drives are considered in the article. As the main criterion, the mass ratio of the rotating parts of the motor to the nominal torque can be applied. It is rational to solve the following problems in the article: synthesis and justification of the stages in the methodology for the development of high-speed electric drives; assessment of the possibilities of each of the design stages; comparison of the developed electric drives' characteristics according to the original method with existing objects. Proposed the concept of synthesis drives that implement a limit on the operation speed and handling ability, which from the position of a systematic approach contains a number of stages: synthesis of generalized mathematical models of the object, taking into account a detailed description of the system implementing the limit operating modes; assessment of possibilities of the control object; parametric optimization of electrotechnical complex with the position of the marginal characteristics; selection of simplified mathematical models of the electric drive; synthesis of structures and control systems that realize the limit operating modes; search phase trajectories of motion of the system "Electric drive - working body" implementing extreme modes of operation. The proposed algorithm is a series of interrelated stages, where in each stage can be done the clarification on the results of second stage, for example, detailing the requirements of the technological process at the last stage of the search for phase trajectories provides for a return to the parametric optimization of the agricultural objects electric drive.

Design of electric drives with the improved mass-dimensional indicators for agricultural facilities

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Abstract. The article systematizes information on the structure of regulation of non-contact agricultural electric drives with improved mass-size parameters. Regulatory structures with independent control two-zone speed control and sequential excitation are proposed. It is shown that the best indicators are achieved in the scheme of sequential excitation and they reach values of 20-25%. Attention is drawn to the fact that structures with independent excitation are most relevant for dynamic mechanisms that realize the trajectory of motion with the maximum speed. Schemes of sequential excitation are most relevant for mechanisms with a large range of load variations on the motor shaft, for example, agricultural facilities. Schemes with two-zone speed control are most relevant for mechanisms that, with a large increase in speed, significantly reduce the load on the motor shaft.

Energy saving electric drives of boilers fans of agricultural objects

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Abstract. The article reviles possibilities of a regulated electric drive for increasing the energy efficiency of agricultural mechanisms and pumps. The transition to regulated AC drive can significantly reduce operating costs, both reducing power consumption, and increasing reliability of electric motor, in whose windings currents close to nominal values are passed through sections of starting and braking modes. It has been established that agricultural regulated electric drive of blowing mechanisms consumes energy that is (50-70%) lower than with throttle control and (20-30%) lower than controlled directing devices. The shown effect can be significantly refined if one takes into account that reliability of system parameters in transition regulated AC electric drive increases. The agricultural electric drive, which operates at rated starting currents, according data in, has an increased resource approximately (30-40%).

Energy-efficient pumping installations at agricultural production facilities

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Abstract. The article presents the method of the feasibility study of various methods of regulation on pumping installations of agricultural objects. It was found that the best results are observed in electric drives with frequency converters and valve cascade: here the total losses Q_{min} mode are only about 10% of the base value, which is explained by minimal losses in pipelines. There is no need to use valves at all. It is shown that with parametric control of the speed of an asynchronous electric drive with a phase-rotor, the loss in hydraulic elements (pump and network) has the same value as with frequency control (about 10% of the base value), but slip losses increase by 12%

Analysis of operating modes of electric drives in agriculture

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Abstract. An algorithm for analyzing the operating modes of an agriculture electric machine as a control object based on its generalized mathematical model using the Fourier transform of non-sinusoidal signals of phase currents and conductance along the air gap of an electric machine is proposed, which is applicable to any electric machine with magnetic non-symmetry of rotor and which allows to obtain and investigate the spectral composition of such electric drive's coordinates as induction and electromagnetic torque. According to such an algorithm, it is recommended to perform the calculation under the following assumptions: the machine is not saturated, the magnetic conductivity of steel is equal to infinity, there are no scattering fluxes. When going beyond these limitations, the calculation must be refined by a numerical finite element method using Maxwell's equations. An example of an agriculture electric drive with a synchronous reluctance machine of independent excitation coordinates calculations is given according to the proposed algorithm in comparison with a numerical calculation by the finite element method.

Increase in reliability of frequency converters of agricultural objects

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Abstract. The article presents ways to improve reliability of agricultural semiconductor frequency converters. It is shown that an increase in reliability of semiconductor converters can be achieved increasing the power reserve. At the same time, if the economic indicator is chosen as an optimization criterion, the coefficient of failure-free operation reaches no more than 0.8. In the event that resulting coefficient of failure-free operation is allowed according to operating conditions, selected criterion can be successfully applied at design stage of semiconductor converters.

Improving the accuracy of electric mechanisms for the manufacture of blanks of agricultural objects

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Abstract. The principles of increasing the precision characteristics of an agricultural electric drive are presented in this article. There are achieved by analyzing the requirements for the electric drive by the operating body. The scientific work has a relationship between the parameters of the quality of rolling the blanks for agricultural facilities and the precision parameters of the electric drive in terms of overshoot parameters and absolute positioning accuracy. It is shown that this dependence is non-linear in the position electric drive and depends more on the size of the overshoot and a significantly smaller ratio from absolute accuracy. The permissible overshoot value depends on the absolute accuracy and has range from 5 to 10%. The largest value of the overshoot is achieved with absolute positioning accuracy with an error not exceeding 2%. The obtained values of the control parameters can be successfully applied in the design of the position agricultural electric drive. So, if you provide sufficient positioning accuracy with an error not exceeding 2%, which is achieved by the use of position sensors with a resolution of at least 10 000 pulses per revolution, the modeling electric drive in the position loop can be adjusted with an allowable overshoot of 10%, and therefore, increased system performance while maintaining quality control indicators.

Highly reliable power sources for objects of agriculture and automation of the stages of their adjustment

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Abstract. The technique of experimental research of static, dynamic and thermal characteristics of elements of automation systems based on the use of traditional equipment and special algorithms of information processing is developed. The reliability of information determination is increased by the use of the method of synchronous signal detection in determining the frequency characteristics of the studied elements of automation. An experimental study of the input and output signals of the amplifier module for two modes of operation was carried out, which confirmed the prospects for using an adaptive power supply for the output stages of the amplifier module when working with non-stationary loads. The method of setting up two modes of operation of the elements of the control system for agricultural facilities with non-stationary power sources, including the choice of parameters for the elements of the system, the experimental determination of its parameters and the choice of parameters for corrective relationships, has been proposed.

The study of oxide films on the surface of a piston of aluminum alloy after micro-arc oxidation

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Abstract. One of the promising methods of surface hardening of piston aluminum alloys – micro-arc oxidation-is considered in the paper. This type of coating, formed under the influence of micro discharge in the electrolyte solution, is fundamentally different from the base metal. A qualitative analysis of the piston alloy on the energy dispersion x-ray fluorescence spectrometer was carried out for a more accurate assignment of the oxidation parameters, which allowed the most accurate determination of the chemical composition of the alloy. Micro-arc oxidation of the pistons was carried out at the experimental laboratory facility, which allowed to regulate the total density of the ion current II and the quantitative ratio of cathode and anode currents IK/IA in a wide range, which favorably affected the quality of the oxide layers. The mechanism of formation of crystalline inclusions and high-temperature structures depending on the ion current density in time is also described. The conditions of formation of oxide films on the surface of piston alloys based on the physical-geometric Keller model are described and their characteristic features are revealed. The technique of investigation of microstructures of thin films is considered, its characteristic features are described. The obtained microstructures of piston aluminum alloys after micro-arc oxidation are presented. Mechanisms of formation of oxide layers are considered taking into account the influence of alloying elements of piston aluminum alloys. Microphotographs of individual porous cells obtained with the help of an electronic scanning microscope are also shown and analyzed. The basic properties that should have a piston of aluminum alloys: heat resistance, corrosion resistance and abrasive wear. Methods of their research are described. The complex analysis of the received results is carried out. The conclusion about the prospects of these oxide coatings is made.

Compression testing of soils by utilizing method of constant rate of loading

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Abstract. The work outlines one of the most frequently encountered methods of soil compression testing - the method of constant rate of loading (CRL). Compression tests, in fact, are laboratory tests to determine the deformation characteristics of soils. There are a large number of methods that differ in the approach to the study of soils, the duration of the test, etc. The most reliable results, which are close to those obtained in practice, are provided by the so-called method of constant rate of loading as was mentioned before. However, it also has its drawbacks - the time that is spent on researching the properties of the soil. It usually takes about two weeks. In order to optimize this method, a software product was created that relies on the developed mathematical apparatus and allows you to significantly speed up the data processing process and build a forecast regarding soil characteristics.

Problems of the digital economy development in the transport industry

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Abstract. In the conditions of the modern world and its constant changes, it is just necessary to correspond and develop together with it. Progress does not stand still and without digital technology it is already difficult to imagine almost any of the spheres of everyday life. The article deals with the topic of digitalization and development of the Russian agroindustrial economy in this area, as well as problematic aspects of the transition to the described area of life. The role of digital technologies in the agro-industrial complex, the level of use of special software and Internet technologies in the transport sector has been investigated. The prospects for the development of the digital economy in the field of railway transport and transportation are considered. The article describes the problems of the industry in the areas of B2B and B2C, as well as current solutions through the use of digitalization. Despite the fact that the transition to a digital economy is the most optimal, appropriate and modern solution, there are a number of problems that appear to be barriers to the digitalization of rail transport. One of these problems can be called the lack of properly trained personnel who are able to work in the conditions of the technologies being introduced. Considered the necessary for the introduction in the described industry trends and digital platforms.

Features of the development of an international competitive agrarian enterprise complex

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Abstract. The article presents the features of the development of an international competitive agrarian enterprise complex. The concept of competition is revealed, the main role of which is the spontaneous regulator of social production. The importance of competition in the international market is revealed. Agrarian enterprises, developing a competitive strategy, strive to compete profitably and for a long time in their industry. The article considers the main competitiveness ratings and defines the place of Russia in them. The moments of a competitive strategy are defined: firstly, it is the structure of the industry in which the firm operates, and secondly, it is the position that the firm occupies within the industry. Additionally, the competitive advantages of enterprises are identified that are directly related to the formation of national income. At the same time, with competition in any industry, competition occurs by a type of activity, which is divided into categories. The article also reveals the reasons for obtaining a competitive advantage over other manufacturers due to innovations and factors that determine the duration of retention of this advantage. The article considers various international strategies that are used to form competitive advantages in international markets.

The software systems for managing dissimilar unmanned aerial vehicle groupings and its quality

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Abstract: Development and creation of software systems for managing groupings of unmanned aerial vehicles today is a promising and rapidly developing area of the modern software industry of high-tech aerospace instrumentation. To date, a single well-established and scientifically-based understanding of the canonical architectonics of such software systems has not been developed. The paper shows that in software systems for managing unmanned aerial vehicle groupings, as in real-time software and information systems, a different information processing organization scheme is required, different in the implemented sequence of analysis procedures for input but unsystematic digital data. A conglomerate of knowledge-intensive software technologies for processing data and

knowledge, integrated into specific implementations of software systems for managing unmanned aircraft groupings, is unstable and difficult to combine, which is the main threat to ensuring the high quality of such software systems.

Adaptogenic effects of essential oils: prognosis in vitro and results in vivo

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Abstract. The results of a two-week in vivo experiment confirmed the adequacy of the in vitro prognosis about the possibility of oxidative balance correction. The prooxidant effects of cedar, orange and lavender essential oils (by inhalations) on the free radical production by blood phagocytes were investigated using a chemiluminescent (CL) test. The results obtained in vivo are in good agreement with those obtained in vitro models. Consequently, with the help of express CL analysis, it is possible to prognose the direction and intensity of changes in the free radical balance of the internal environment of the body under the influence of essential oils. Two conditions are necessary for such a forecast. The first, preliminary definition of the functional status of the blood phagocytes using express CL-analysis is required for an individual person. Secondly, information is required about the antioxidant or prooxidant potential of essential oils, which the person has chosen when he oriented on organoleptic parameters or objective recommendations. Individual selection of essential oils as biologically active metabolic regulators will avoid the risk of unwanted side effects in aromatherapy. Using this approach, manufacturers and distributors and consumers receive a preliminary assessment of the antioxidant and prooxidant activity of essential oils.

Estimation of extraction efficiency of salidroside from Rhodiola rosea using deep eutectic solvents

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Abstract. This article is devoted to the new possibilities of extraction of biologically active substances (BAS) from Rhodiola rosea L. This plant contains such BAS as salidroside, rhodiosin,

rosavin, rosarin, rosin, which are glycosides of cinnamon alcohol and tyrosol. Pharmacological effects Rhodiola rosea include adaptogenic and stress- protective, cardioprotective, antioxidant effect, stimulating the central nervous system, anti-fatigue, antidepressive, anxiolytic, endocrine activity normalizing and life-span increasing effects. One of the promising methods for extracting biologically active substances is extraction using deep eutectic solvents. The aim of this work is to assess the applicability of three deep eutectic solvents for the extraction of biologically active substances, in particular, salidroside, from Rhodiola rosea. In this work the maceration method is used to obtain extracts and the HPLC method is used for the semi-quantitative analysis of the salidroside content. It has been established that the most suitable extractant for salidroside extraction is a mixture of choline chloride + malonic acid + methanol. Extractants containing choline chloride and urea, in contrast, do not extract salidroside from Rhodiola rosea.

Production of chitin from dead Hermetia Illucens

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Abstract. Searching for new ecologically and economically efficient sources of chitin is of great interest in the field of biotechnology. Nowadays, the topic is growing fast, and many scientists, researchers, primarily the representatives of the Russian Chitin Society, study and search for new sources of chitin not only from large crustaceans, molluscs, and crabs, but also from insects and small crustaceans. Domesticated and liable to breeding representatives of invertebrate animals, particularly large American Black Soldier Fly (*Hermetia illucens* L.) can be new and promising raw material source. The Fly is a promising object of research because it contains a chitinous external skeleton. During the studies at the Biology, Ecology and Biotechnology Department of NARFU named after M. V. Lomonosov, there were determined a sufficiently high percentage chitin yield from dead flies equal to 21.3% (1281.2 g per year per 1 m^3 of a cage), almost complete absence of residual protein (C = 0.98 μg/ml) and high adsorption ability (X = 156.6 mg/g) of the extracted polysaccharide. Studied qualitative characteristics enable to consider the product as environmentally and economically cost-effective sorbent with the possibility of application in many areas of biotechnology, environmental and industrial fields of production.

The method of obtaining the original material for the selection of yellow clover under the conditions of the Stavropol Territory

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Abstract. The paper presents the studies on the original material of yellow clover fodder legumes of VIR (VIR plant genetic resources gene bank) for the fodder mass productivity with low coumarin content. The results of the best varieties of clover are given in terms of green mass and hay yield. A selection material was obtained for getting new varieties for the conditions of the Stavropol Territory.

Hemato-biochemical status of laboratory mice with a GM corn based diet

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Abstract. GM analogues have about 30 plant species, and main share from GM crops belong to soybean and corn. According to the literature data, the introduction of GM fodder in the diet of laboratory mice and rats was accompanied by negative consequences for the health of experimental animals and their offspring. Corn is a component of animal feed and popular product among people, especially sweet canned corn. The lack of experimental data regarding effects of canned sweet GM corn on an organism was the drive behind our research subject. The objective of the research was a comparative analysis of hematological and biochemical parameters of laboratory mice with a conserved GM corn based diet and without it. Clinical blood analysis indicated the development of hyperchromic anemia, leukocytosis due to an increase in the fraction of medium blood cells and thrombocytosis in experimental group mice. Biochemical studies of these mice blood revealed signs of renal and liver pathology, myocardial damage and hyperproteinemia. A comparative analysis of the hemato-biochemical status of laboratory mice indicated the development of signs of anemia, intoxication and allergy in the group of mice with a conserved GM corn based diet as compared to intact mice of the control groups.

Extraction of cinnamic alcohol from Rhodiola rosea using deep eutectic solvents

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Abstract. The aim of this study is to assess the possibility of using deep eutectic solvents (DES) for the extraction of components of essential oils and biologically active substances from the rhizomes of Rhodiola rosea. Cinnamic alcohol was obtained obtained in aqueous, methanol, ethanol and DES extracts by maceration. Content of the alcohol in extracts was assessed. For preparation of DES, choline chloride was used as an hydrogen bonds acceptor, and malonic acid and glycerol were used as hydrogen bonds donors. Analysis was performed by gas chromatography-mass spectrometry using a GCMS-QP2010 instrument (SHIMADZU) with NIST 27.147 databases. It has been established that the mixture of choline chloride + glycerin + water extracts more than 2 times more cinnamic alcohol than ethanol, and more than 5 times more than methanol.

Regular changes in hematological and biochemical indicators and immunogenetic certification of yak blood introduced in new conditions

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Abstract. Yaks are unpretentious and extremely hardy. They have a well-developed sense of smell, thick hair which helps them endure harsh climatic conditions. They can live in high mountains and hilly steppes. The aim of the article is to assess adaptive properties of yaks based on morphological and biochemical studies of blood samples and immunogenetic certification by blood groups. Cattle breeding is successfully developing in the Transbaikal Krai. However, yak breeding is a new activity. In 2015, 53 breeding yaks were purchased in the Oka district of the Republic of Buryatia and exported to the Transbaikal Krai. The experimental studies on blood of transported animals identified the high content of leukocytes and the high level of hemoglobin. The lymphocyte, monocyte and red blood cell indicators were within the norm. The calcium content decreased by 0.17 mmol/l. The ratio of calcium to phosphorus was 1: 1.8. The protein content was 72.35 g/l, alkaline reserve – 51.8 v%. The indicators were within the norm. While determining the frequency of individual blood antigens, it was found that the most frequent groups were as follows: J'-52%, X2

- 50%, Z - 49%, D '- 48%, A2 - 47%, V - 32% , G2 - 28%, F - 26%, E - 23%, O2 - 22%, P - 20%. In new conditions, the Oka yaks have high adaptive properties and productive qualities.

Aberdeen Angus cattle breed in Russia: prevention of the genetic defects and evaluation of the risk of their spread by transferring from parents to offspring

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Abstract. The article highlighted the problem of genetic defect of Aberdeen Angus cattle. Previous investigation showed the presence in Russian population of Aberdeen Angus cattle of animals carrying in their genotypes the mutant alleles associated with Arthrogriposis multiplex, Developmental Duplication and Osteopetrosis. In some populations, the frequencies of the animals-genetic defects carriers were sufficiently high. The aim of the study was to evaluate the risk of spread of the mutant alleles causing the genetic disorders by their transfer from parents to offspring under absence of control over the genetic defects in the farm, breeding Aberdeen Angus cattle. The analysis has shown increasing of the frequency of animals-Arthrogriposis multiplex carriers about on 10.3% in the population of heifers comparing with population of their mothers and the raising of the mutant allele frequency in six times in F2 generation.

The effect of extraction of labile organic fractions on surface properties of pyrochars

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Abstract. The changes in the properties of pyrochars and the possibility of their use as soil meliorants were evaluated. Pyrochars obtained from linden residues at fixed pyrolysis temperatures of 250°C, 450°C and 650°C and under isothermal conditions in the temperature range from 450°C to 650°C have been studied. Their labile fractions of organic matter extracted with $Na_4P_2O_7$-NaOH solution and hot water was investigated by UV-VIS spectrometry and after extraction cation exchange capacity of pyrochars was characterized. For the qualitative characteristics of the selected fractions, ratio of the absorption of a colored solution of organic matter at $\lambda = 254$ nm to the content of organic carbon was calculated. It was concluded, that the pool of water-soluble and alkaline-soluble organic matter of pyrochars is a mixture of organic compounds of uncertain qualitative composition, whose properties are determined by the pyrolysis temperature. Extraction of this water-soluble and alkaline-soluble organic matter leads to a change in cation exchange capacity of pyrochars.

Population homeostasis and habitats of the sable of the southern Cisbaikalia

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Abstract. The importance of hunting design for the rational use of hunting resources is highlighted. As part of hunting, the role of hunting taxation is defined. Using the example of an exceptionally economically important commercial species, the possibilities of a landscape-interpretation approach for mapping the habitats of game animals are shown. The work makes their inventory on the basis of the landscape-species concept of hunting taxation. According to the habitat conditions, optimal and suboptimal habitats are identified, as well as lands unusual for sable. Criteria for the selection of optimal conditions served as the possibility of providing natural complexes of year-round habitat of sable. The interpretation criteria as suboptimal are the worst habitat conditions of the sable and their use is mainly seasonal. Unusual lands are the areas where the species does not inhabit. In general, the work performed shows the use of ecology (biogeocenology) and modern landscape science in hunting management, including for identifying and displaying natural complexes that are extremely important for homeostasis of the sable population. The region has been identified for the special importance of indigenous Siberian pine (Pinus sibirica du Tour) and the importance of this species for sable is shown. Optimal habitats are characterized by sable population density. The current state of the sable population, taking into account the current commercial use, can be characterized by its homeostasis.

Correlation of technological indicators of grain and milled rice quality of new varieties depending on climate condition

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Abstract. Rice is the staple food of many nations of the world, as it gives the greatest amount of grain per unit area. The most important task in developing a new high-yielding variety is to increase the technological indicators of grain and milled rice quality, or at least to keep them at the optimal level (standard-check variety). Rice for food purposes is used in the form of cereals, as an admixture to bread or confectionery, in the production of flakes, puffy grains. This is due to the demand for high-quality rice with excellent taste and culinary qualities in a dynamic market.
This article presents the results of three-year studies on the formation of technological indicators of grain and milled rice quality with different heat supply during the growing season. It is established that the accumulation of heat in 2016-2018. exceeded the average long-term data (783 °C) - 1054, 1089 and 1238 °C, respectively. Under these conditions, the varieties VNIIR 10244, VNIIR 10276 and VNIIR 10279 with a mass of 1000 grains - 29.3; 30.5 and 30.4 g, respectively were selected, significantly exceeding the standard (27.8 g). Vitreousness in all varieties was at a high level - 89.7-97.7%. Filming over the years of research varied on average from 17.7 to 21.4%. The fracture of the presented varieties was 4.7-32.3%. The varieties VNIIR 10275, VNIIR 10278 and VNIIR 10828 showed the maximum resistance to grain cracking - 9.7; 9.3 and 4.7%. Total milling yield in almost all genotypes was at the level of variety Flagman (st), with the exception of VNIIR 10278 (72.7%), which significantly exceeded the standard. By head rice content the variety VNIIR 10282 turned out to be significantly higher than the standard, and the rest within the LSD $_{05}$. The correlation of technological indicators of grain and milled rice quality with the heat supply of the growing season were revealed. It was established that the varieties VNIIR 10279 and VNIIR 10282 by head rice content weakly correlate with heat supply. There are also varieties (VNIIR 10275, VNIIR 10276, VNIIR 10277 and VNIIR 10282) with a weak connection of a mass of 1000 grains and the sum of effective temperatures (0.60; 0.18; 0.27 and 0.36, respectively). This fact suggests a weak variability of these traits in new rice varieties with heat accumulation, which determines their genetic nature and the possibility of forming a high-quality yield.

Intermediate crops as one of the factors of optimizing the application of fertilizers and increasing soil fertility

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Abstract. Saturation of crop rotation with intermediate crops compresses the time of agricultural works: harvesting the forecrop grown, preparing the soil, applying fertilizer, sowing the next crop. Regulation of water availability of plants makes all factors of productivity manageable. Wheat on green fodder responds positively to the extended sowing time and allows collecting feed or mass for the production of grass meal in the same sequence in the autumn and spring. Continuous use of arable land in intensive irrigated crop rotation provides a high total yield of green mass mixture and row crops grown after the bean-wheat mixture on ordinary irrigated chernozem and objectively provided by any combination scheme obtaining adequate total yield for some deviations concerning the early harvest or late sowing. Spring crops in intensive crop rotation with irrigation in the south of Russia are used as insurance crops in case of winter crops. In intensive crop rotations, they play a more important role of stubble crops. Zero tillage for crop after irrigation is not inferior in efficiency to plowing. The use of mineral fertilizers in the system of two crop field is an integral agricultural method, contributing to an increase in the yield of all crops.

Evaluation of the phagocytizing blood cells functional activity of cattle (Bous Taurus)

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Abstract. Reactions of free radicals' formation are integral parts of many metabolic processes in the body, but in a number of states under the influence of external and internal factors there occurs intensification of these reactions accompanied by excessive generation of phagocytizing blood cells activity (PBCA), therefore the study of the antioxidant activity of biological fluids is of clinical (diagnostic, predictive) value. The component analysis of the blood chemiluminescent kinetics of Bous Taurus of different age and sex groups was carried out. The functional activity of venous unfractionated blood cells taken from the jugular vein was evaluated by the Tono-Oke method using the "Chemiluminometer CL-3604" hardware-software complex. The analysis of the chemiluminescent kinetics of PBCA generation and the state of the organism was evaluated by the method of Magrisso M.Y. A component analysis of the blood chemiluminescent kinetics of animals of different sex, age and physiological state revealed a number of specific characteristics and pointed out the relationship between some parameters that can complete the picture of the antioxidant potential possibilities.

Physiological and biochemical aspects of the functioning of Arg-X proteolytic system in the cell nuclei of plants

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Abstract. Plants are structural and biochemical systems in which at each moment of ontogenesis are established inherent only to this plant, the ratio of growth, biorhythmic and morphogenetic processes. The conjugacy of circadian rhythm and the activity of chromatin-modifying enzymes is becoming increasingly important. In this aspect, histones play an important role, since they are able to fine-tune transcriptional programs through a series of accurately organized post-translational modifications that combinatorially regulate chromatin function. It is proved that almost all histones are proteolytically modified. It was shown that differences in the exhibition of activity Arg-X proteolysis between spring and winter seedlings are observed mainly in the fractions of core histones at the level of chromatin tightly bound. The preferential localization of Arg-X protease activity was

found in the histone (H3 + H4) block as spring and winter varieties. In addition, activity Arg-X proteolysis at the level of nuclear matrix correlated with the growth characteristics of spring and winter seedlings in coleoptiles and roots growing by cell stretching. Results can be viewed as an illustration of a multi-layered regulatory proteinase network involved in proteolytic processing of nuclear proteins, taking part in circadian spatial and temporal structural changes of chromatin states.

The modification of murashige and skoog media for efficient cultivation of gizella-5 and vsl-2 rootstocks in vitro

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Abstract. This paper reports the effect of modified nutrient media on biotechnologically growing rootstock plants (Gizella – 5 and VSL – 2) at the stages of introduction and grafting. Murashige and Skoog medium was modified by adding 25 mg/l Chelate-Fe and 500 mg/l of $Ca(NO)_3$ to the basic nutrient at the stage of introduction of the plant. At the grafting stage 0.1 mg of 6-Benzylaminopurine (6-BAP) was added to Murashige and Skoog, where the effect of regeneration was 2 times higher than in experimental control. The results obtained prove that modified Murashige and Skoog medium is to be the best nutrient media for root-plant introduction and regeneration processes in Vitro followed by Chelate-Fe, $Ca(NO)_3$ and 6-BAP respectively.

Effect of Enrofloxacin for treatment of bovine anaplasmosis and canine babesiosis

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Abstract. The target of the survey is to study the efficacy of Enrofloxacin 5% and its lower doses used for the therapy of bovine anaplasmosis and efficacy of Enrofloxacin 2,5 and 5% used for treatment of canine babesiosis. Enrofloxacin 5% has a pronounced therapeutic effect in treatment of anaplasmosis in cattle used at a dose of 1cm3 per 20 and 30 kg of body weight while using the

preparation at a dose of 1cm3 per 40 and 50 kg of body weight the therapeutic effect was practically not observed. At the same time Enrofloxacin has no therapeutic efficacy against canine babesiosis.

Kinetics of formation of reactive oxygen species by blood cells when exposed to ultra-low doses of ionizing radiation

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Abstract. The article contains the results of hematological, immunological and chemiluminescent analysis of the functional activity of peripheral blood cells of five-year-old lactating cows from the central regions of the Krasnoyarsk Territory (Siberia, Russia) with different radiation status, at which the radiation doses of animals were 0.02, 0.17 and 0.21 mSv per year. It was established that small doses of radiation at 0.17 mSv per year and 0.21 mSv per year affect hematological parameters, increase the phagocytic activity of blood leukocytes and change the kinetics of the formation of active oxygen forms by blood cells, which is manifested as an increase in the time of formation of the maximum kinetics of spontaneous and activated secondary radicals, reduction of the total production of secondary radicals in the antigenic activation of blood cells in vitro and an increase in the volume of spontaneously produced primary radicals.

The glyphosate influence on cytogenetic and biochemical aspects of wheat (Triticum aestivum L) seedlings development

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Abstract. The influence of glyphosate on the germination and development of bread wheat (Triticum aestivum) was researched. The chronical influence during all the time of growth was estimated, together with the consequences of the contact with glyphosate of the already formed seedlings. A dose-dependent decrease in the growth rate of seedlings in the presence of glyphosate was found, and even in normally developing seedlings damage to the root tips was observed. In particular, in seedlings, the integrity of the root cap was disrupted, degenerative changes of the rhizodermis and root hairs were detected. It has been shown that a decrease in the root growth rate during chronic exposure is largely due to the suppression of mitoses. In addition, high glyphosate concentrations had a general toxic effect, stopping the development of seedlings yet at the stage of primary roots growth through enlarging the cells. It was found that the antioxidant system of seedlings prevented the development of oxidative stress at the concentration of herbicide 50 μM, in particular, due to the activation of peroxidase. Placing seedlings grown on distilled water in 100 μM glyphosate solution induced lipid peroxidation. Chronic effects of herbicide in this concentration inhibited lipid metabolism in general.

Mathematical modeling of the magnetic field of red blood cells in narrow capillaries

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Abstract. The red blood cell (RBC) moves in a narrow capillary and asymmetric of its shape lead to tank-treading motion of the membrane. Electric charges on the RBC membrane generate a magnetic field in the surrounding space. A mathematical model imitating the motion of RBC through capillaries with a diameter less than 8 μm is developed in order to estimate the distribution of plasma pressure, plasma velocity and magnetic field strength in the vicinity of RBC. It is assumed that plasma flow between erythrocytes in the capillary satisfies the Poiseuille law, and in the gap between the capillary wall and the RBC membrane satisfies the Reynolds system of equations for the lubricating layer. Calculations made on a computer allow us to estimate the shape of the RBC, the speed of rotation of the RBC membrane, the plasma pressure, the plasma velocity and the magnetic field strength in the vicinity of the RBC. It is shown that the distribution of the magnetic field strength in the vicinity of the erythrocyte is non-uniform and depends on the capillary diameter, RBC speed, RBC charge, volume and surface area of RBC.

Universal biotechnological medium for sperm dilution during poultry artificial insemination

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Abstract. The aim of the research was to develop a universal biotechnological environment for diluting sperm during artificial insemination of birds. The creation of the medium was carried out in 4 stages. The first stage is the selection of environmental components of their influence on the survival of sperm cells in vitro. During the second one, the combination of components and their effect on sperm of different species of birds was studied. Subsequently, the effect of the complex of combinations of ingredients on the preservation of sperm motility was determined upon dilution of the ejaculates of roosters, turkeys, cesars, drakes, husaks during in vitro storage. Ejaculates of males of the studied species in quality close to the average species value were used. During the experiments, the ratio of chemical components was determined, which ensured the optimal value of the concentration of hydrogen ions when the medium was diluted in distilled water. The permissible pH of the medium has been established; it must be neutral or slightly alkaline. The pH was adjusted by injecting sodium acetate. The created medium is stored in a dry state for up to 2 months at a temperature of + 6–8 ° C in hermetically sealed containers. Sperm diluted with this medium contributes to maintaining the high fertilizing ability of rooster sperm for up to 24 hours, for turkeys and cesaries for 7 hours, for waterfowl for 3-4 hours.

Concentration of cattle blood by moisture freezing

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Abstract. Prospects for the use and processing of cattle blood for food and pharmaceutical purposes were described in the article. The process of blood cyclic concentration by the method of moisture freezing was investigated. A crystallizer with a flowing liquid film was used in the experiments. Research showed that increasing of the refrigerant boiling point in the crystallizer evaporator causes a decrease in the specific amount of frozen from the blood ice. Increase in the amount of frozen ice contributes to an increase in the liquid flow rate that irrigates the crystallizer evaporator. Increase of the initial solids content causes a decrease in the frozen ice value. A decrease in the refrigerant boiling point in the crystallizer evaporator causes an increase in the solids content of the solution obtained by frozen ice melting. An increase in the blood flow irrigating the crystallizer evaporator causes a decrease in the solids content in the solution obtained by frozen ice melting. It characterizes the amount of loss of target substances that are removed with frozen ice. An increase in the initial content of dry substances in the blood causes an increase in the content of soluble substances in the

frozen ice solution. Spectral analysis of the chemical composition of the concentrated blood showed its high quality, while preserving almost all proteins, bilirubin and lecithin.

Formation of the physical state and carbon stocks in organic matter of agrochernozem under the influence of resource-saving technologies

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Abstract. In the field experiment in the conditions of the Krasnoyarsk forest-steppe, the influence of resource-saving technologies on the physical state of agrochernozem and the carbon reserves of organic substance is studied. It is shown that the productive moisture reserves are satisfactory, in the subsoil layer there is a tendency to increase the moisture reserves by 2-5 mm on the minimum and zero background compared with plowing. Moldboard plowing and minimal tillage by fluffy consistency determined the greatest degree of differentiation of the humus horizon. Resource-saving technologies of main tillage contributed to an increase in bulk density by 0.05-0.08 g /cc while retaining the optimal parameters. The method of the main tillage determined the stocks of the above-ground mortmass. The stock of plant residues on the soil surface at the minimal background increased 1.4 times, at zero - 2.1 times compared with plowing. Stocks of phytomass, roots and underground mortmass were not identified by crop cultivation. The stock rations of carbon in mobile humus of agrochernozem increased 1.4-1.5 times against the background of resource-saving technologies due to newly formed humic acids and water-soluble organic matter.

Heavy metal level in the ecosystem components of small rivers in the Amur-Zeya Plain agricultural landscape

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Abstract. The article considers the results of the heavy metals determination in the components of ecosystems of small rivers (water, sediments, macrophytes) of the Amur-Zeya Plain agricultural landscape. In the waters of small rivers, a high level of iron, zinc and copper is due to the natural factor. The lead and cadmium level in the waters of small rivers did not exceed the maximum permissible concentration (MPC). The level of heavy metals in bottom silt of small rivers

corresponded to background values. Excessive concentrations of cadmium, manganese, and lead are characteristic of aquatic moss and rooting hydrophytes. The results of studying the level of heavy metals in the components of aquatic ecosystems of the Amur-Zeya Plain are the basis for further study of the technogenic load on small rivers of the agricultural landscape.

Formation of hard ticks' biotopes on urban territories

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Abstract. On territory of many cities and towns in the Russian Federation, new stable biotopes of hard ticks have been formed up and being occurred constantly. these ticks eat animal and human blood and are agent transmitters of many transmissive tick-born infectious and invasion diseases. They are very stable towards adverse factors of nature environment. The article represents knowledge about risk-oriented monitoring and ixodid tick biotope formation on urban territories. Classification and characteristics of urban territories of contemporary city versus the conditions of ixodid ticks' biotopes formation and, hence, of focuses of tick diseases are given. For ixodid biotopes eradication in the cities, tick-spread maps should be arranged on the base of geoinformational systems, GIS, and pursue, on their basis, target treatment of greenery with acaricides. GIS can be considered as a research method that might be applied for risk management in retrospective and prognosticating.

The complex analysis of the "soil-plant" system stability to multicomponent herbicides

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Abstract. With the aid of the system analysis elements we identified type and subsystem "soil-plant" reaction orientation under the influence of the disturbing effect of herbicides. It is established that subsystem "soil" is distinguished by "accidental" type of management, smaller connectivity between elements and smaller rigidity in comparison with subsystem "plant".

Transmission of porcine circovirus genotype type 2 (PCV2) in Russia and genotype association (PCV2d) with porcine dermatitis and nephropathy syndrome (PDNS)

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Abstract. The study of the prevalence of PCV2 genotypes in pig farms of the Russian Federation is presented. It is shown that currently the genotype PCV2d is the most common, which is important in connection with the assumed probability of lack of the immune response to PCV-2d induced by PCV-2a-based vaccines. The main goal of this investigation was to conduct monitoring studies for DNA, immunoglobulins IgG and IgM classes to PCV2 by the polymerase chain reaction (PCR) and enzyme-linked immunosorbent assay (ELISA) assays, respectively, as well as identification of the PCV2 genotype by sequencing of pigs of different ages were carried out at one of the Russian industrial pig farms with PCVAD (Porcine circovirus associated disease) outbreaks that used PCV2a vaccination. The data of this field observation indicates that PCV2d – is a major genotype in Russia. Additionally, it was shown that PCV2d prevalence in the farm correlates with clinical manifestation of PCVAD.

Development of a test system for detecting bovine adenovirus DNA based on polymerase chain reaction

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Abstract. The paper presents the results of the development of polymerase chain reaction (PCR) test systems for detecting the DNA of bovine adenovirus. Due the large number of classified types of bovine adenoviruses included in two separate genera of *Mastadenovirus* and *Atadenovirus*, a nested PCR variant was chosen when creating a test system using a common external pair of primers and internal primers specific for the *Mastadenovirus* and *Atadenovirus* genera. In the study of field samples from calves with a characteristic clinical picture using the developed test system, the circulation of different strains of bovine adenovirus, which are representatives of these genera, was established. Selective studies showed the presence of 1, 3, 6, and 8 subtypes of bovine adenovirus among positive samples.

Changes in some properties of agro-gray soil fertility under the influence of biofertilizer

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Abstract. In the field experiment with the agro-gray soil of the Krasnoyarsk forest-steppe, the improvement of the agro-physical properties was established with the use of organic fertilizers, regardless of their type and application rate. Under the influence of bio-fertilizer and chicken manure introduced into the agro-gray soil, there is a tendency to increase the amount of humus and nitrate nitrogen, mobile phosphorus and the yield of wheat grain. The correlation between the yield of wheat grain and mobile forms of humus is estimated at the average level. Using the method of multiple regression, a model of wheat yield was calculated, according to which it depends on the content of mobile humus substances.

Determination of fibrin age in pathologically changed tissues in porcine reproductive and respiratory syndrome

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Abstract. The paper presents data supplementing the pathogenesis of porcine viral reproductive and respiratory syndrome. It was shown that the pathological changes taking place are characteristic both for animals infected under natural conditions and for experimental infection of piglets. Pathological data reflecting the development of pathology in the skin and in the internal organs of piglets indicate the development of systemic pathology affecting the hepato-linear, immune, respiratory and

vascular system. The use of specific staining for fibrin showed its effect on the development of pathology not only in the respiratory system, but also in immunocompetent tissues. Specific staining for fibrin in histological sections of lung and lymph node tissues made it possible to determine that “young” fibrin coagulates in the tissues for 6 hours and becomes yellow-orange; "Mature" fibrin stays longer in the body for up to 24 hours and is painted depending on the period in orange-red (6-12 hours), bright red (12-18 hours) and red-violet (18-24 hours), then turning into the “old” fibrin, which is painted in purple (more than 24 hours) and grey-blue (more than 48 hours).

Osteodensimetric indicators of dogs’ mandible during deciduous teeth change period

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Abstract. The data of bone mineralization range in dogs during the deciduous teeth change are presented in the article. Densitometry is a progressive and minimally invasive methods using in modern dentistry to determine bone mineral density. Five mongrel dogs at the age of 3 months were x-ray tested during the period of occlusion shifts per every 10 days for 3 months. It is found that a significant increase in bone density is registered in experimental animals during teething. It is established that the relative mineral density varies by 26.1% in the front teeth region, by 24.8% in canines’ region and by 38.6% in the region between the second and third premolars in dogs. The average increase of the lower jaw bone mineral density has averaged about 26% due to permanent occlusion forming processes and skeletal growth in dogs.

The effect of planting date on winter rye and triticale overwinter survival and yield in Eastern Siberia

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Abstract. A field experiment was conducted at an agro-ecological station (53 ° 33'58.75 "N and 102 ° 35'23.90" E) of the Siberian Institute of Plant Physiology and Biochemistry on gray forest medium loam soil. Winter rye (family 6) and winter triticale (No. 430-6002) were sown in 4 terms with a 10-day interval (10, 20, 30 August and 10 September) in three replications. The results of the two-year studies show that the winter crops included in the experiment had a higher (higher than 5 t/ha) and

more stable yield between the years with the planting dates held on August 20, 30 and September 10 for rye and August 30 and September 10 for triticale. Earlier sowing time contributed to intensive tillering, strong growth, which led to the plant death and lower yields.

The effect of biologized crop rotations on wheat yield in the forest-steppe of Tuva

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Abstract. The influence of various types of fallow on the fertility of the textural carbonate agrochernozem and wheat yield in the conditions of the forest-steppe zone of Tuva was studied. It is shown that in the forest-steppe natural-climatic zone of the region of sideril fallows, the green manure melt fallow has the highest efficiency. In the forest-steppe in dry years, one of the best predecessors is pure fallow, but the highest yield of spring wheat was obtained after pure fallow with the introduction of manure and green manure traverses. The economic efficiency of various types of fallows in the territory of the Tuva Republic has been determined.

The effect of the ratio of the medium volume and the number of organisms on the results of toxicological experiments

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Abstract. The dependence of the sensitivity of test organisms of different systematic groups and trophic levels (Escherichia coli bacteria, Chlorella vulgaris microalgae, Daphnia magna crustaceans, Lemna minor aquatic plants) to copper ions on the ratio of the volume of the medium and the number of test objects was studied. A significant decrease in EC_{50} indices was revealed with an increase in the volume of the test sample per one organism. The possibility of increasing the sensitivity of rapid bioassays on these organisms using the equipment and methodology developed in the Siberian Federal University is shown.

The estimation of growing season length of different soybean varieties and samples in the conditions of the forest-steppe zone of the Irkutsk region

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Abstract. The estimation of growing season length of soybean varieties and samples was carried out in the field conditions of the agro-ecological station of the Siberian Institute of Plant Physiology and Biochemistry. Depending on the growing season length, the soybean sample 15 is the earliest; the growing season is 98 days. The varieties Lira, Voronezhskaya 31, Veras are late ripening in these conditions; the vegetation period is 125 days. To develop the DNA markers to identify promising early samples, the varieties Lira, Voronezhskaya 31, Veras and sample No. 15 were selected which are the most contrasting and can be used for whole transcriptome analysis of the genetic mechanisms determining soybean ripeness in a long day.

The effect of nanoparticles of biogenic ferrihydrite on the development of *Lepidium sativum* L.

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Abstract. The basis of the study was the assumption that the nanoparticles of biogenic ferrihydrite exhibit biological activity in relation to plant organisms, which can be used in the cultivation of agricultural crops. The research studied the effect of nanoparticles of biogenic ferrihydrite on the development of seeds and seedlings of *Lepidium sativum*. Structural indicators were studied: masses of the aerial and root parts, linear dimensions of the above ground and root parts of seedlings. The activity of the photosynthetic apparatus was assessed by the relative index of the delayed fluorescence of chlorophyll seedlings of watercress. The germination energy and germination of seeds were investigated. The most pronounced effect of nanoparticles is registered in the increase in the total phytomass of seedlings and the length of the above ground part. A slight decrease in the photosynthetic activity of watercress sprouts was noted. The effect of nanoparticles of biogenic ferrihydrite on seed germination was not manifested.

Risk assessment for interspecies transmission of enzootic bovine leukemia

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Abstract. Conducted three series of infecting the rabbits with bovine leukemia virus (BLV) using milk and blood from cows having enzootic leukemia with different doses of infecting material and different mode of administration showed a high degree of repeatability of the experiment. The obtained results testify to the ability of BLV to successfully overcome the interspecific barrier when ingested by an alimentary pathway with milk, as well as by the direct injection of infected lymphocytes into the bloodstream.

Factor model of foreign students’ adaptation to the climate and geographic conditions of Volgograd region

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Abstract. The article deals with the body adaptation of foreign students from warm countries to the sharply continental climate of the Volgograd region. By adapting to the new climatic and geographical conditions of study and living, there are changes in the physiological function of the life-supporting systems. On the basis of a differentiated approach to the assessment of the adaptive state of functional systems, it is possible to identify groups with "poor adaptation of functional systems", with "stress of functional systems by adaptation" and with "satisfactory adaptation of functional systems". The factor structure of adaptation has been determined, including: the hormonal factor, the oxygen transport cascade factor, the vegetative supply factor, the respiratory homeostasis factor, the acid-base and gas composition factor. Imbalance and inadequacy in the activity of life-supporting systems, strengthening the central contour of cardiac activity regulation, changes in peripheral blood, hormonal status are criteria for an unfavorable course of adaptation processes in the body. Functional adaptation of the body of foreign students is influenced by the factors of a new climatic and geographic environment and educational activities features.

Genetic diversity of feline leukemia virus

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Abstract. Feline Leukemia Virus (FeLV) belongs to retrovirus family, causing various proliferative and immunosuppressive diseases in felines. There are two forms of FeLV: endogenous (enFeLV) and exogenous (exFeLV), the latter has 4 subgroups: A, B, C and T with different receptor specificity. The FeLV-A is the most abundant transmissive form. The FeLV-B emerged as a recombinant between provirus FeLV-A and endogenous virus of domestic cats. The FeLV-C appeared as a result of accumulation of mutations in the env FeLV-A gene. The chimeric FeLV-T virus was obtaind as recombination event between 61E and 61C viruses. This review also covers two new recently described subgroups - FeLV-D и TG35.

Assessment of soil microbiota in the area of the gas pipeline

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Abstract. The article presents the results of the evaluation of the soil microbiota in the area of the above-ground gas pipeline. The analyzed areas collected material of the rhizosphere (root soil, soil from the roots) and rhizoplan (root structures) of wormwood. Based on the microbiological study of soil microbiota, the cultural and morphological properties of microorganisms are determined. In a soil microbiota taken from the marginal area of the field under study, a microorganism of Azomonas genus is presumably identified. Microorganisms of Acinetobacter genus, Agrobacterium genus, and Bradyrhizobium genus are presumably identified in the soil, which is under the anthropogenic impact of the above-ground gas pipeline. These microorganisms provide the nutrients of the plant and as a consequence contribute to the natural restoration of the soil.

The use of bovine multipotent mesenchymal stem cells isolated from bone marrow and adipose tissue as sources to obtain muscle cells in vitro

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Abstract. The creation of muscle tissue with use of cell engineering technologies is currently being evaluated as one of the most promising areas in various fields of science. The aim of the work was to assess the in vitro potential of bovine multipotent mesenchymal stem cells (MMSCs) derived from bone marrow (BM) and adipose tissue (AT) to directed differentiation into muscle cells under the influence of various inducers. It was found that AT-MMSCs could differentiate into skeletal muscle cells (Sk-MCs) in response to inductive stimuli much more so than BM-MMSCs. When cultured for 28 days in the medium, supplemented with all-trans retinoic acid, bovine AT-MMSCs formed multinucleated myotubes and expressed markers of myogenesis MyoD1 and MyoG. The induction medium, including growth medium for myoblasts and horse serum, caused, in addition to myogenic differentiation, the appearance of adipocytes with lipid vesicles. The presence in the medium for differentiation of conditioned medium obtained from L6J1 rat myoblasts stimulated the directed differentiation of bovine AT-MMSCs into muscle cells, and the efficiency of its inducing action was higher. Thus, a sufficiently high potential of myogenic differentiation of bovine MMSCs has been demonstrated, these cells can be a potential source for large-scale production of Sk-MCs.

The antioxidant properties of fermented milk products enriched with resveratrol and syrups of hawthorn

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Abstract. The article presents data on the antioxidant properties of a fermented milk product with resveratrol and hawthorn syrup, obtained experimentally by amperometric method. The purpose of this study was to obtain yogurt enriched with encapsulated resveratrol and hawthorn syrup in various proportions. An increase in the antioxidant activity of a fermented milk product with resveratrol and hawthorn syrup, taken in an amount of 15%, has been proven. Based on organoleptic ratings, a 15% level was selected for further study. Optimized yoghurt was compared to controls for texture, consistency, taste, and smell. The results of the study show the possibility of enriching yogurt with encapsulated resveratrol and hawthorn syrup to enhance the functional properties of the finished product.

Comparative analysis of haematological parameters of guinea fowl of different breeds and populations

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Abstract. Comparative analysis of haematological parameters of some breeds and populations of Guinea fowl grown in the Russian Federation was carried out. The following breeds were studied: Volga white breed, the French breed BroilerGuineaFowl ESSOR MI. LF, the Zagorsk white-breasted breed. The following coloured populations were examined: gray-mottled, blue from the CJSC "Mariyskoye" of the Mari El Republic and gray-mottled from Sergiev Posad. Contents of haemoglobin g/l, erythrocytes 10^{12} l, leukocytes 10^{9} and thrombocytes thousand/mcl, as well as the nuclear Arneth's count (percentage ratio of different types of leukocytes) were determined in blood of Guinea fowls The pseudoeosinophil / lymphocyte ratio was calculated. Standard hematological methods were used. Statistical processing of the results was carried out with the help of a single-factor analysis of variance. It was established that the clinical picture of blood of the examined Guinea fowls is characterized by uniformity of type. An exception is toms and hens of the Essor breed that had higher and lower hemoglobin level correspondingly in relation to the same haematological parameter of other groups of the examined birds. The average values of the hemoglobin level in the studied breeds and the populations of Guinea fowl ranged from 85.0 ± 4.4 g / l to 128.0 ± 6.98 g / l. Blood of the studied groups of Guinea fowls did not differ significantly in relation to all other clinical haematological parameters. The nuclear Arneth's count of blood of Guinea fowls of all studied groups corresponds to the normal amount of mature birds of most species. First of all, it is characterized by the lymphocytic profile. The second position in the quantitative content of cells in the nuclear Arneth's count is taken by pseudoeosinophils. The structure of the nuclear Arneth's count of blood depends on the breed or population. The white blood cell count of the French Guinea fowls has some peculiarities. The obtained values of the clinical haematological parameters of the examined Guinea fowls make it possible to conclude that the studied groups of birds are relatively healthy.

The influence of "Therapeutic and preventive immunoglobulin" immunostimulant on the veterinary and sanitary assessment of meat and the histological features of the parenchymatous organs of cattle

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Abstract. The aim of the research is to study the effect of "Therapeutic and preventive immunoglobulin" immunostimulant on the veterinary and sanitary assessment of meat and the histological features of the parenchymatous organs of cattle. The study showed that pH of the meat in the experimental group was 5.32±0.03, in the control group – 5.43±0.02, the level of amine ammonia nitrogen – 1.19±0.02 and 1.21±0.01 mg in the experimental and control groups, respectively. The peroxidase reaction was positive both in the experimental and control groups, the reaction with copper sulfate was negative. The copper content was 34% more in the experimental group than in the control group (1.80±0.03 mg/kg). The concentration of zinc was 38.5±1.32 and 23.1±0.98 mg/kg in the experimental and control groups, respectively. The levels of iron were similar in the experimental and control groups. The cobalt content in the meat of calves in the experimental group was 24.6% higher than in the control group. The concentration of selenium and magnesium in the meat of calves in the experimental group was higher than in the control group. Such heavy metals as lead, cadmium, mercury and arsenic were not found in the meat of the calves in the experimental and control groups. According to the results of the histological study, the drug does not cause pathological changes in the structure of the liver, kidneys, myocardium, lymph nodes and spleen.

Assessment of influence of biostimulating medicines on the cow milk cheeseability

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Abstract. The article shows the research results of qualitative composition and technological characteristics of milk in case the food ration of cows is added by biostimulant belonging to the category of synthetic phytohormone "Irkutin". To hold the experiment 5 groups of first-calf heifers of black and motley breed, up to 10 heads in each have been created. The division was based on the principle of analogs. The selection of animals was made according to the following criteria: live mass, dairy efficiency level, month of calving and their physiological state. The 1st group (control group) as was bred on the main diet of the farm. "Irkutin" was introduced in different doses into the main diet of cow experiment groups II, III and IV. Medicine was given to animals in the morning, once every 3 days. "Irkutin" represents a biostimulant from the category of synthetic phytohormones (growth substance). As an analog, for comparison of impact of "Irkutin" on milk structure and milk properties, extract of eleuterococcus spiny, natural biostimulant. Eleuterococcus was introduced into the diet of group V of cows in a dose 40 ml per head. Research shows that the introduction of "Irkutin" and extract of spiny eleutherococcus into the ration influenced fat and protein content of milk given by fresh cows. It was proved that the best characteristics of cheeseability were shown by the animals of the fourth experimental group. It coagulated more quickly under the influence of rennet shaping dense and elastic clot.

Improving the rice irrigation practice in Priamurie

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Abstract. This article discusses the prospects for rice cultivation based on the current food balance data in the Far Eastern Federal District in Russia. Our studies have proven the patterns of the production process and yield of adapted rice cultivars depending on irrigation practices. It has been found that the rice irrigation practice based on surface flooding provides stable grain yield of 4.5-5.0 t/ha and proves the rational use of water resources in the southern part of Amurskaya oblast.

Changes in milk yield, fat and protein mass fractions in mares' milk within 24 hours

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Abstract. During the day protein mass fraction and fat mass fraction in mares' milk changes in different ways. The variability of fat content in mare's milk reaches 60% within 24 hours. Several experiments, including the milking of mares continuously during the day, were conducted to explain the nature of this phenomenon. Differences in the variability of fat and protein contents in the mares' milk during the day and various way of secretion of the milk components from udder's secretory cells were explained by the authors in this scientific article. The protein is secreted due to merocrine secretion, and fat secretion mainly occurs due to apocrine secretion. Reduction of fat content in the mares' milk is caused by the significant increase of milk yield in the early morning, when secretion of synthesized fat slows down. When milk yield is reduced, the secretion of stored fat is increased, which also increases the fat content in milk. It was found that in the morning milk yield of mares is higher than at night by 16.39 %. It was also found that during the day protein mass fraction is higher than it is at night by 5.24 %. The fat content in the mares' milk during the day is higher than it is at night by 12.24 %. The ratio of daily milk yield and fat content was amounted to 0.22, of daily milk yield and protein mass fraction was + 0.44, and of fat mass fraction and protein mass fraction was + 0.47.

Vermicompost effect on the trace elements distribution in the luvic chernozem of the Krasnoyarsk forest-steppe

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Abstract. In the field experiment (2016-2018) in the conditions of the Krasnoyarsk forest-steppe the number of trace elements mobile forms were determined and the effect of soil organic matter and increasing doses of vermicompost on their distribution in luvic chernozem was studied. It is established that the studied vermicompost does not pollute the soil, which allows its widespread use in agriculture. The correlation and regression analysis obtained linear regression equations that reflect the relationship of the chemical element and organic matter in the soil after using increasing doses of vermicompost adequately. Elements with positive correlation and high significance level include Mn, Cu, Co and Zn.

The influence of energoprotein concentrate on biochemical parameters of dairy cows' blood serum

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Abstract. The article presents the results on the study of the influence of activated protein concentrate BioGumMix on biochemical parameters of dairy cows. Research and production experiment was carried out on the milk farm of the Vakhitov Agricultural Productive Cooperative (APC) in Kukmor region. The experiment lasted for 73 days of which 10 days were a preparatory period and 63 days – registered. 24 dairy cows were chosen for the experiment. The research results indicate that biochemical blood parameters of dairy cows in the experimental group have standardised.

Antibacterial properties of intestinal microbiota of the Japanese sea cucumber Apostichopus japonicus

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Abstract. The ability of 134 bacterial strains isolated from the digestive system of the Japanese sea cucumber Apostichopus japonicus to inhibit the growth of Vibrio alginolyticus, V. parahaemolyticus, V. splendidus, Staphylococcus aureus, Yersinia pseudotuberculosis, Pseudomonas aeruginosa and Escherichia coli was studied. 17 strains (13%) had different level of antimicrobial activity against investigated test -cultures, 8 (6%) of them were bacteria of the genus Bacillus. The highest antimicrobial activity was demonstrated by the strains Bacillus sp. K32, Arthrobacter sp. A16, Kocuria sp. A34, Bacillus megaterium K13 and Pseudoalteromonas sp. K59. The results indicate a high potential of symbiotic microflora of Apostichopus japonicus to confront pathogenic microorganisms.

Influence of the seeding rate on the formation of anatomical features of the monoecious hemp stems of Diana breed

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Abstract. The article considers the research results on the influence of the seeding rate on formation of anatomical features of the monoecious helm stems of the Diana breed. According to the experiment scheme, the seeding rate is from 0.1 to 2.7 million pieces of germinating seeds per hectare. The size of each plot is 10 × 10 m (100 m2). The tier is 3-fold. Nature of the change in the thickness of the bast-fibered layer depending on the seeding rates was studied. The results of the research showed that the thickest bast-fibered layer (530.5-636.4 μm) is formed due to the seeding rates of 1.8–2.7 million pieces / ha. Thus, there is a reason to assume that the increased seed rates allow achieving the best yields indicators of the bast-fibered substances. It is noteworthy that each seeding rate is characterized by a certain amount of elementary fibers in the stems: stems from crops with the seeding rate of 0.1–0.6 million pieces / ha have the smallest number of primary and secondary fibers. The largest cells of primary and secondary fibers are found in the stems from crops with the seeding rate of 0.1–0.6 million pieces / ha, the smallest - due to the seeding rate of 1.8–2.7 million pieces / ha. Consequently, the size of both primary and secondary fibers decreases when the

seeding rate is increased. The data of the research conclusively prove that the size of the inner lumen of the elementary fibers decreases both lengthwise and edgewise when the seeding rate is increased. Stems that are grown on the plots with the seeding rate of 1.8 -2.7 million pieces / ha have a thick bast-fibered layer (530.5–636.4 µm) with the largest amount of primary and secondary fibers (6918 , 4-8302.6 cm) of a regular multi-faceted shape with a small internal lumen lengthwise and edgewise (2.9–4.2 µm and 2.2–2.7 µm).

The effects of barley straw extract on the microalgae growth

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Abstract. One of the most common environmental problems of recent decades is the eutrophication of surface water and the associated algal bloom. As one of the approaches to eliminate this phenomenon, the use of biological methods, in particular biological preparations from barley straw, is considered. In this work presents the results of laboratory modeling of the effect of 1 and 2% (v/v) of barley straw (Hordeum vulgare L.) extract on the development of unicellular algae (Chlorella vulgaris Beijerinck). The alhistatic effect was evaluated by the parameters of algae growth, which were measured using the spectrophotometric and fluorescent methods. The parameters were measured at 0, 7, 14 and 21 days. The addition of barley straw extract reduced algae growth, both with the addition of 1% and 2% concentration. A two-day toxicity test using Daphnia magna Straus showed no toxic effect of barley straw extract for both 1% and 2% concentration.

Cost-effective reducing the environmental impact of wheat production in Siberia

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Abstract. The effects of previous crop, fertilizers and pesticides on the wheat yield and the cost efficiency of wheat production in Siberia were studied in two-year field experiment. It was found that the yield mostly depends on the previous crop and pesticides, whereas the fertilizer demonstrated relatively slight effect in the year favourable for wheat growth and no effect in the year unfavourable for wheat growth. Cost-effectiveness analysis showed that the most effective way to reduce the environmental impact of wheat production in Siberia is the use of fallow in crop

rotation scheme. Usage of fallow without chemical fertilisers provides higher yield than variants with fertilisers and pesticides where wheat was used as a previous crop. Cost efficiency of variant with fallow was 20.8% what is comparable with cost efficiency of the most cost effective variants (fallow as a as a previous crop + pesticides with cost efficiency of 36.6% and wheat as a previous crop + fertilizers with cost efficiency of 30.4%).

Rationale for the choice of wear-resistant coatings in the hardening of tillage working bodies of forestry machines

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Abstract. The article deals with the interaction of soil-cutting elements of forestry machines with soil and trees and shrubs. It substantiates the statement that when choosing wear-resistant coatings when hardening tillage working bodies, it is necessary to take into account the composition and physico-mechanical properties of the soil. The method of choosing wear-resistant coatings depending on the hardness of abrasive particles of soil mass is considered. According to the results of experimental studies in the hardening of soil-cutting elements, it is recommended to use flame spraying of wear-resistant coatings from self-fluxing alloys.

Designing of local constructions for decontamination and leachate recirculation at municipal solid waste landfills

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Abstract. The article discusses the results of studies on the design of a system for managing the leachate at the municipal solid waste storage facility (MSW landfill) in 4 km southeast from Ketovo, Ketovsky district of the Kurgan region with the possibility of using the hydrobotanical method and recycling the leachate. The work was carried out within the framework of the research of the Perm State Agricultural Academy, Contract 15/13 and PNRPU Contract No. 2013/379, as well as the license agreement under the patent RF 2162059. The article describes the main stages of designing a system for handling the leachate at the designed MSW landfill. The dynamics of formation of leachate is shown and the forecast of changes in the amount of leachate for the period of the landfill

operation is presented. Seasonal changes in the amount of leachate under different conditions in the Kurgan region are shown. The calculations were performed in the "Ecolog" program, which allows to determine the performance of local structures for clearance and recycling of the leachate of MSW.

Ecological and economic efficiency assessment of forest-transport systems based on the principles of sustainable territorial development

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Abstract. In order to solve the urgent problem of the development of forest transport systems efficiently, it is necessary to develop strategic principles for their planning, taking into account the current realities of a market economy and the transition of the world community and Russia to the principles of sustainable development. Formation of transport systems in general and the new road network on the territory of forest lands in particular requires significant financial and material resources and therefore it is important to justify the cost effectiveness of their creation and development, taking into account the principles of sustainable development of the territories and the overall environmental and socio-economic effect of the implementation of state project. The paper substantiates the need to take into account environmental, social and economic factors when planning transport systems on the territory of forestland. The principles for assessing ecological and socio-economic efficiency are proposed. Quantitative efficiency criterion is developed taking into account the principles of consistency. The developed objective function of the optimization problem reflects the profitability of the timber transport system (including costs for all stages of its life cycle) for the entire planned period of interaction with the forest ecosystem, i.e. recoupment of the design, construction and operation of the forestry fund of the country's regions by achieving the maximum productivity of the forest ecosystem from their coexistence over the entire planning period.

Environmental engineering and management during mining in the Arctic: indigenous communities and business cooperation

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Abstract. The article discusses the issues of the interaction between indigenous peoples and business in environmental management in the context of the Arctic development. The author analyzes the current legislation on environment management related to the subsoil users and indigenous peoples, gives case-studies of such cooperation during mining. The implementation of corporate social responsibility during the interacting of indigenous peoples and business is considered in the paper, including investments in the development of social infrastructure, education, employment. It also discusses the main objectives of the development of the Arctic territories, which include improving the welfare of the population, solving social and economic problems. The author proves that research on the development of approaches and mechanisms for coordinating interests in traditional lands is relevant, since each stage of the investment project should include a set of tools and methods aimed at the negotiation process, the calculation of damage, monetary compensation, etc. Based on a study of statistical and legal data, the author justifies the need to develop mechanisms for cooperation and partnership between business and indigenous peoples to achieve the goals of sustainable development of the territory.

Biogeochemistry of honey chemical elements

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Abstract. The quality of honey is reduced due to the fact that various insecticides and residues of acaricides fall into it. This is due, on the one hand, to frequent violation of instructions on the use of drugs - time of use, dose, frequency of processing and intervals between them, on the other hand, it is necessary to take into account the state of bee colonies and their nests. Violation of these requirements may lead to the ingress of toxic substances into food honey, as well as changes in the normal functioning of the metabolism in the body of insects.

Evaluation of background content of priority contaminating substances in atmospheric air at the pre-design stage of construction of landfill solid waste disposal

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Abstract. The article is devoted to experimental studies to determine the approximate values of background concentrations of pollutants in the ambient air in the area of the proposed construction of solid waste landfill. By preliminary calculations of dispersion priority substances for which it is necessary to determine their background concentration were identified. A number of situ measurements of concentrations in atmospheric air were carried out for the selected substances. According to the results of measurements, the most probable laws of distribution of random variables are determined. Also the quota of air pollution by solid waste landfill on the basis of existing sanitary standards of air quality is determined.

Disinfecting of the leachate of solid waste landfills with the application of hydrobiological cleaning

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Abstract. Methodological and technical approaches to cleaning of the leachate of the municipal solid waste (MSW) on hydrobiological constructions are offered. The purpose of work was justification of cleaning of drains of MSW by means of community of plants (including natural vegetation of grounds and dumps of MSW). The major factors influencing design solutions of hydrobiological constructions for cleaning of drains of MSW are shown. It is shown that cleaning of drains of MSW requires cleaning in three-stage ponds. On a first stage the shallow ponds no more than 0.5 m in depth for a destruction of organic pollution by means of saprophytic bacteria, utilization of biogenic elements with use of a complex of microalgas and disinfectings of drains due to formation of food chains, and removals of pathogenic bacteria are provided. On a second stage ponds with planting of water vegetation are provided deep-water (not less than 0.5 m). For three-stage cleaning of drains after a second stage as a part of hydrobiological constructions biochannels are provided. The method of calculation of a response time of water at each step of cleaning and the area of a mirror of ponds is presented. Hydraulic loading proceeding from the area of landing of gidromakrofit and a daily consumption of the purified water is calculated. For decrease in an index of BOD before dumping of drains into the superficial reservoirs the special structure of biocanals is provided. Basic elements of biochannels known in biomeliorative practice are presented in article. The technique of definition of a hydraulic radius necessary for calculation of driving of water is given in channels.

Optimal weight and power parameters of crawler tractors to reduce pressure on the soil

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Abstract. Crawler and wheeled vehicles are used in a variety of soil and climatic conditions. In the Krasnoyarsk region crawler tractors have a number of advantages. They have a higher traction efficiency, low fuel consumption, and low pressure on the soil. Reducing the pressure on the soil helps to preserve its structure and fertility. This fact is relevant for the agro-industrial complex of Siberia. At present, the vehicle fleet of general-purpose crawler tractors is being reduced. This is due not only to economic reasons, but also the lack of justification for their operation. The paper shows the optimal weight and power parameters. The use of triangular crawler track increases traction efficiency by 3.0% and significantly expands the traction range of effective use of the tractor. For tractors of 4 and 5 classes, the optimal range of change in operating power is 140...175 kW, it corresponds to the optimal range of change in weight 8.5...9.5 tons. For tractors of 5 and 6 classes, optimal interval of changing the operating power is 155...210 kW, it corresponds to the interval of weight change 10,5...12,0 tons. Regulation of operating parameters is produced with a change in the coefficient of engine adaptability from 1.2 to 1.4.

Monitoring of drinking water quality from the distribution network of the regional centralized water supply

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Abstract. The territory of the Irkutsk region belongs to one of the most endowed with fresh water. Along with this, monitoring studies to provide residents with quality drinking water from the distribution network of centralized water supply revealed an excess of hygienic standards. The discrepancy is due to the excess content in drinking water of iron, manganese, nitrates, magnesium, increased rigidity, the presence of common and thermotolerant coliform bacteria. The main causes of poor quality of drinking water are identified, the sources of systematic pollution of water bodies are called. It was recommended to conduct activities that bring the quality of drinking water into line with the requirements of current legislation.

Environmental monitoring: personalized access approach to the remote sensing information resources

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Abstract. The article considers the necessity to apply a user profile operating with the earth remote sensing information used in the environmental monitoring. The stages of forming a user profile are presented; a dynamic profile model is given. It allows to take into account both long-term and short-term profiles. The main attention is paid to the following issues in describing the stages of user personalization: monitoring the user's activity; creating user profiles; evaluating the effectiveness of personification. The proposed approach has been successfully implemented for the environmental monitoring of the power plants.

The use of non-toxic technogenic and natural materials to ensure the stability of disturbed ecosystems

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Abstract. Experimental field tests of the developed technology of the disturbed lands restoration with use of preliminary neutralization of the soil polluted with slurry alkaline waters are carried out. Various technological solutions for the use of substrates made of non-toxic technogenic and natural materials were studied. It was found that the use of combined soil treatment with a neutralizer, followed by the introduction of overburden quarry sand and silt from the treatment facilities of 5-year storage as the main component of the soil substrate led to a decrease in pH to the normalized value and the restoration of agrochemical properties of the soil. The ecological and toxicological assessment of the soil taken from the recultivated experimental area confirmed the absence of toxicity of the investigated substrates and their application ensured the stability of the ecosystem in the area of the operating industrial enterprise.

Phytotoxicity of gaseous limit and aromatic hydrocarbons in relation to some agricultural plants

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Abstract. The authors of the article determine the phytoxicity of aromatic hydrocarbons in various concentrations in relation to some agricultural plants and the ability of these plants to accumulate hydrocarbons. This is done for the first time on the basis of field studies of plantings at different distances from the enterprise for the production of carbon black, which is a source of gaseous saturated and aromatic hydrocarbons, as well as after exposure of these mixtures to methane, phenol, benzene and toluene. The objects of study were Phaseolus vulgaris, Hordeum vulgare and soft spring wheat called "Memory of Aziev". Statistically significant changes in the pigment complex of plants, expressed in a decrease in the content of pigments and carotenoids, an increase in the ratio of *b* and *a* chlorophyll under the action of hydrocarbons were revealed. The activity of the polyphenol oxidase enzyme tended to initially increase, in response to pollution, and to a subsequent decrease under the action of higher concentrations and high toxicity of the gas. Plant peroxidase activity increased 1.5–7 times with an increase in the concentration of toxin in comparison with the control analogues. According to the degree of phytotoxicity, the studied gases are arranged in the following sequence: phenol > mixture of aromatic hydrocarbons > benzene > toluene > methane. Phaseolus vulgaris turned out to be the most sensitive to the action of hydrocarbons, and also capable of active absorption of hydrocarbons.

Monitoring the quality of drinking water of the regional decentralized water supply

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Abstract. Despite the fact that the Irkutsk region belongs to areas with a large supply of fresh water, the monitoring surveys carried out on the quality of drinking water from decentralized water supply have shown that the inhabitants of the region lack quality drinking water. This is especially true of the population in rural districts and small towns where water supply is mostly not centralized. Studies have revealed a significant excess of standards for sanitary-chemical and microbiological indicators due to the high content of iron, nitrates, magnesium, manganese and sulphates, increased rigidity, the presence of coliform bacteria. The main causes of non-compliance of drinking water with regulatory requirements are identified. Measures to be done to bring the quality of drinking water in line with existing requirements are recommended.

Antioxidant activity evaluation of aqueous extracts of chickpea and lentil seedlings

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Abstract. The aim of the study was to explore the antioxidant activity of aqueous extracts of leguminous crop seedlings - chickpea and lentils. For the study of antioxidant activity, an in vitro method of autooxidation of adrenaline in an alkaline medium was used. The process of adrenaline autooxidation was investigated as a model reaction of quinoid oxidation, proceeding through a series of intermediate stages with the formation of the final product of adrenochrome. The accumulation of the adrenaline autooxidation intermediate product - adrenalinquinone - in an aqueous-alkaline medium and in the presence of aqueous chickpea or lentil extracts was recorded using a UV 1700 spectrophotometer (Shimadzu) at a wavelength of 348 nm. It was revealed that aqueous extracts of legumes exhibit antioxidant activity. Inhibition of adrenaline autooxylation with a selected exposure time of 5 minutes in the presence of aqueous extracts of lentils was 25%, and of chickpea - 16%. The interrelation of the manifestation of the antioxidant activity of seedlings and the content of biologically active compounds with reducing properties (reducing sugars, flavonoids, vitamin C and tannins) was revealed.

Russian solar collectors for hot water supply of agricultural complexes and small private farms

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Abstract. This paper presents data on new designs of Russian solar collectors for hot water supply. Field tests of collector installations showed its high efficiency corresponding to the best foreign analogues. The main advantage of the collector is a low cost, which is achieved by using new methods of local processing. A new cost-effective production technology for a thin-walled heat-receiving panel allows you to produce channels of any shape. Based on the method of local deformation, the production technology of the panels made it possible to arrange their manufacture in Russia and reduce the weight of the panels and their cost by 30...45% compared with the best Japanese and German counterparts.

The forms and methods of garbage disposal in Petrozavodsk city

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Abstract. The article is devoted to the problem of utilization of solid household waste in a large city on the example of the city of Petrozavodsk (Russia). Authorized and unauthorized dumps of the city of Petrozavodsk are considered, the characteristics of enterprises specializing in garbage disposal at landfills are given. The role of Russian public organizations for the elimination of unauthorized dumps is analyzed, the open network resource “Interactive Landfill Card” is given as an example, where citizens can mark the place of illegal waste storage or illegal dumping themselves (this resource was created within the project -political organizations public movement All-Russian Popular Front (ONF). The current state of Russian lawmaking in the field of waste disposal is analyzed. An assessment of the state of separate garbage collection in Petrozavodsk is given, the most significant enterprises of this city dealing with recycling and recycling metallurgy, batteries and other special waste are given.

Agrophysical properties of black soils depending on types of economic use in the Krasnoyarsk forest-steppe

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Abstract. About 50% of the world’s distribution of the richest soils on the planet, black soil, is concentrated in Russia. On black soil, 75% of the gross output of grain crops and 50% of livestock production are manufactured. However, the current state of black soils causes concerns about the increasing degradation that threatens Russia's food security. Black soils are a subject to significant anthropogenic stress; first of all they are exposed to agricultural impact. The problem of degradation of arable black soils is largely due to the deterioration of agrophysical properties and the degree of degradation varies in different soil-climatic zones. The granulometric compositions, density of soil structure, general porosity and water permeability depend on the nature of the soil use. Throughout the entire range of the studied agrophysical soils properties, arable black soils are inferior to virgin analogues located in similar conditions of the landscape. Post-irrigative soils transformed into a set aside are inferior in their agrophysical properties to virgin analogue, but surpass arable soils in some indicators. The range of unfavourable properties of black soils acquired as a result of irrigation is quite wide and manifests itself at almost all levels of their structural organization. It should be noted that irrigation with ecologically safe irrigation norms of 300 m3 / ha does not impair the physical properties of the soil, in contrast to heavy irrigation norms, that determine the unidirectional and noticeable expression of the main indicators in the direction of their deterioration.

Ecological aspects of technogenic material application in road construction technologies

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Abstract. It is shown in the paper that various secondary technogenic products and industrial wastes are effectively used as cheap raw materials for the production of road construction material. The hardening kinetics of the nepheline-sand mixture compacted at different initial humidity was studied, which showed that when nepheline sludge used as a binder, a relatively uniform set of strength of the samples was observed for a long time. Analysis of the aqueous extract from nepheline sludge showed there are ions of Ca^{++}, K^{+}, Na^{+}, CO_3^{2-}, HCO_3^{-}, SO_4^{2-}, Cl^{-} in it. Using the method of biotesting confirmed the absence of toxic effects of the proposed technogenic materials for use in the strengthening soil of road pavement.

Products of sea-buckthorn berries processing in parapharmaceutical production

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Abstract. Labour activity of the person during scientific and technical progress is complicated with increasing ecology pollution caused by active use of various chemicals for agricultural purposes, industrial use of toxic metals and other substances, radioactive components of different origin. The purpose of our research is to find out new vegetative raw material being a source of food fibers (in the given concrete case) and possessing high food and biological value which could become a basis for creation new kinds of foodstuff for medical and prophylactic use in the diet of the population directly involved in harmful manufacture at the industrial enterprises and living in ecologically polluted areas. We offer to use the sea-buckthorn berries oil cake as such source of raw material - the dry waste product from sea-buckthorn oil production, which possesses high biological activity and meets all listed above requirements.

Spectral characteristics of water-soluble and alkaline-soluble organic substance of fallow light-gray forest soils

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Abstract. The content of organic matter (OM) and its individual fractions were studied in different ages (7 and 75-80 years-old) fallow soils. The qualitative composition of labile OM fractions was evaluated by the criteria of $SUVA_{254}$ and Sr, which were calculated from the absorption spectra in the UV range. It was shown that as deposits age, there is a significant increase in the content of total organic carbon (TOC) in soils and a change in the qualitative composition of its labile fractions. From the nature of changes in the degree of aromaticity and molecular masses of labile fractions with the age of deposits, a conclusion can be drawn that the factor of selective preservation of compounds resistant to degradation is relevant only to stabilize the water-soluble OM. The stability of alkaline-soluble OM fractions is most likely provided by the formation of organic and organic-mineral associations.

Technology of gluten-free pastries using sorghum flour

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Abstract. The purpose of this research is to create a new way of making gluten-free foods. Gluten-free cereals acreages in Russia were analyzed. It was revealed that gluten-free cereals have much less acreages than wheat one which is why gluten-free food production in Russia is so poorly developed. It is suggested to use sorghum flour as gluten-free non-traditional raw material. Physical-chemical properties of sorghum flour were determined. Gluten-free biscuit, custard and chocolate cream were obtained. Determination of obtained products organoleptic properties was conducted by potential gluten intolerant customers.

Modeling the operation process of the unit for processing row-spacings of fruit plantings

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Abstract. The reserves for expanding areas for fruit plantations in the mountainous regions of Russia are limited. One of the ways to solve this problem is to engage in agricultural circulation and, in particular, for fruit plantations, sloping lands. At present, for foothill and mountain areas, scientifically based technologies for growing gardens on slopes have been developed for zones. One of the problems faced by fruit producers is the lack of technology for the care of the row-spacings of fruit plantations. Mechanized technologies of plain gardening are ineffective in the specific conditions of mountain and foothill agriculture, where soil fertility is the main limiting factor. At the same time, there is an urgent need to accelerate the creation of a humus layer in the near-stem stripes, to improve the water and food regimes of fruit plantations on sloping lands. The analysis of the soil maintenance system in the gardens showed that the most rational is the sod-humus system, which involves mowing the vegetation, leaving it on the soil surface in the form of mulch. However, commercially available technical means have a relatively low rotational speed of a rotary working body, do not provide high-quality tillage. In this regard, the proposed design of the unit for processing row-spacings of fruit plantations. As a result of the theoretical studies, rational values of the main parameters and modes of operation of the proposed unit have been established.

Alternative raw materials for food industry

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Abstract. The paper is devoted to searching for alternative raw materials for the food industry. The purpose of this study is to develop a recipe and technology to prepare cheese curds coated with dried apricots. Conventional methods are used to study structural and mechanical parameters. The results obtained when investigating structural and mechanical indicators of fruit coating for cheese curds with the *software package* STATISTICA 6.0 are presented. The research involves regression and correlation analysis of experimental data. Based on the results we could determine the exact *amount* of each ingredient in the recipe for multicomponent fruit coating of cheese curds. A recipe and *the stages of manufacturing process* for the production of sweet cheese curds coated with dried fruit have been developed. The manufacturing process proposed for the production of cheese curds coated with dried fruit has a number of advantages in comparison with the traditional technologies for the production of glazed cheese curds. Replacing the chocolate glaze with dried apricots resulted in decreasing the cost of the cheese curds coated with dried apricots per 5 kg batch. Moreover, cheese curds with the fruit coating are a good source of *complete* proteins, fiber, vitamin C, and minerals.

Influence of different methods of soil treatment and fertilizer systems on the yield of winter barley in the central Ciscaucasia

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Abstract. The data of five-year studies on the effect of fertilizer systems and soil tillage methods on the agrochemical indicators of leached chernozem and the yield of winter barley on the Stavropol Upland are presented. It is established that the methods of tillage did not have a significant impact on the response of the soil solution and the content of exchangeable potassium in the 0-20 cm soil layer. The calculated fertilizer system significantly exceeded not only the control, but also the yield indicators of the recommended and biologized systems.

Dynamics of trichloroethylene adsorption on activated carbons

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Abstract. We studied trichloroethylene adsorption from aqueous solutions on activated carbons (SKD-515, ABG, and Purolat-Standart brands), which differ in composition, method of production, structure and surface chemical state. Performance time of the filter layer before the breakthrough decreased in SKD-515 > ABG > Purolat-Standart respectively, which was caused by their porous structure and the nature of functional oxygen-containing groups on carbon surface. The interaction of trichloroethylene with functional groups of carbon surface was also noted. We studied the layer height on efficiency of trichloroethylene adsorption on different activated carbons at a constant flow rate. The reduction of the solution flow rate through the filter contributed to the increase of the dynamic adsorption capacity, which indisputably proved pore diffusion resistance of mass transfer.

Ecological and agrochemical bases of the nitrogen regime of typical chernozem depending on agrotechnical methods

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Abstract. In the environment of the southwestern part of the Central Black Earth Region (Central Chernozem) of the Russian Federation, an increase in the content of alkali- hydrolyzable and nitrate nitrogen, as well as an increase in the soil nitrification capacity in typical chernozem, is mainly due to increasing doses of mineral fertilizers, manure aftereffects, the use of perennial grasses in crop rotation as precursors of winter wheat, and for the most part, plowing in the main tillage system. The most noticeable variation in the content of alkali-hydrolysable nitrogen in the soil is 20-50 cm in soil, and soil nitrification capacity in the 0-20 cm layer. Nitrate nitrogen is characterized by the most significant increase in its content in the soil layer 0-20 cm with a combination of mineral fertilizers and manure, especially by plowing. The tendency to increase the nitrate content in the underlying layers is due to the use of an overdose of mineral fertilizer for winter wheat - $N_{120}P_{120}K_{120}$ + N_{60} (saturation of 1 ha of the crop rotational area in the grass-growing crop rotation $N_{84}P_{124}K_{124}$ and in the grain-growing crop rotation $N_{120}P_{124}K_{124}$) and due to the aftereffects for the fourth year 40 and 80 t/ha of manure (saturation 8 and 16 t/ha). In the grain grass crop rotation, this is common in all studied soil layers — 0–20, 20–50 and 50–100 cm, and in grain cultivation crop rotation, only the 0–20 and 20–50 cm layers.

Evaluation of the cytogenotoxic activity of mercury by analyzing chromosomal aberrations in wheat root meristem cells

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Abstract. The work evaluates the cytogenotoxic effect of mercury by performing a primary screening on a plant object. The authors determined the qualitative and quantitative characteristics of a cytogenotoxic effect depending on the exposure time and the dose of mercury nitrate (Hg $(NO_3)_2$) in anaphase and telophase of mitosis on wheat apical meristem cells of the Memory of Aziev variety. In the process of primary screening to assess the cytogenotoxic effect of the test substance, the nature and diversity of chromosomal abnormalities in the wheat meristem cells of the presented variety were studied. The frequency of occurrence of various types of chromosomal aberrations was analyzed. The complex shows the effect of mercury salts on viability indices and chromosomal instability of wheat. The cumulative pathology curves for different exposures of (Hg $(NO_3)_2$) are presented. A significant increase in the number of pathologies was shown in accordance with the increase in mercury concentration in anaphase of mitosis. A similar pattern was observed in the change in the total number of chromosome aberrations in accordance with the increase in the soaking time of seed material. The results of the study of the cytogenotoxic activity of mercury make it

possible to assess the toxicity of mercury (Hg $(NO_3)_2$) for plant objects and recommend the object used in the experiment as an adequate model of test systems for studying xenobiotics.

Nanostructured dolomite flour for soil liming

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Abstract. The nanostructured dolomite flour is produced by ultrasonic dispersion of dolomite flour. It is a suspension of evenly distributed mineral particles in deionized water. The visualized surface showed that the minerals had particles of various sizes and shapes. The structure of dolomite flour was represented by a conglomerate of 0.25–1.0 µm. The particle size of nanostructured dolomite flour ranged from 40.0-120.0 nm, the average size was 50.04 nm. The highly dispersed crushing of dolomite flour conglomerates contributed to an increase in the contact area of particles and the soil; it accelerated their interaction. Shift $pH_{salt.}$ by 0.3 units, and an increase in the grain of spring wheat by 2.0% using a nanostructured analogue in doses of 0.1 g. and 0.05 Hr. were comparable at a flow rate of 10 and 20 times less compared with dolomite flour at a dose of 1.0 Hr respectively.

Influence of cultivation technologies of agricultural crops with the use of machines and tools of domestic and foreign production for the dry area of the South of Russia

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Abstract. The problems of improving the tillage systems and crop cultivation technologies are of particular relevance both in terms of energy savings and, in general, resource conservation. The article describes various tillage systems using machines and implements of domestic and foreign production for the arid zone of southern Russia. The initial position in the development of cultivation technology of crops are agroecological requirements of the crop and variety to the growing conditions. Sequential overcoming of factors that reduce crop yields and product quality allows us to form the most optimal growing technology for specific climatic conditions of the economy. The article describes the tillage systems - moldboard, resource-saving using domestic tillage equipment, resource-based on foreign technology and recommended using combined technology, which has different effects on the conservation and accumulation of productive moisture. With the moldboard tillage, these indicators are the smallest, and resource-saving systems give approximately the same results when determining the stock of productive moisture in all phases of crop development. Different tillage systems for crop rotation affect the agrophysical indicators of fertility - aggregate composition, water strength, structural coefficient to the same extent. Moldboard tillage system causes the lowest density of soil in the cultivation of crop rotation in comparison with various resource-saving systems, as for the porosity of the soil, in most cases, these indicators of large values are marked by moldboard tillage. Resource-saving tillage systems significantly complicate the phytosanitary situation in the cultivation of crop rotation in comparison with the moldboard tillage system.

Estimation of surface subsidence during tunneling

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Abstract. The limitations of the traditional methods of assessing the surface subsidence and the state of structures and natural objects in mining operations are shown. An innovative approach to predicting the surface subsidence during tunneling is proposed. A model has been developed to forecast and estimate the land surface subsidence and deformation at any point of the displacement trough in an arbitrary direction at various stages of the tunneling. The model can be used not only at the design stage of tunnels, but also in the process of their construction.

The organization of the territory of agricultural land use in the South of Russia on an environmental-landscape basis (using the example of an agricultural enterprise)

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Abstract. The key position of grain farming and livestock in the South of Russia in the economic sphere is due to the fact that it can be the main factor in ensuring food security and the main condition for the sustainable development of agriculture and the agro-industrial sector as a means of using soil, climatic, orographic and conditions of the land use effectively. These factors make it possible to consider an increase in grain and livestock production for the market a strategic task for the region, and first of all, as an indicator of the most efficient use of the natural resource potential of the territory. An analytical study is conducted on the database management of two multi-parameter systems, the environment and the crop and livestock production state on the basis of reports and statistical materials. The analysis of the current industries state is aimed at identifying decision-making methods for managing agricultural land productivity based on agro-ecological and landscape zoning of the territory of an agribusiness. Currently, there are conditions when it is necessary to switch to a new scientifically based model of the spatial business organization. This will allow implementing the strategy of environmentally adaptive intensification of crop and livestock production. This approach is based on the identification of seven agro-ecological groups of lands and the placement of field, forage and soil-protection crop rotations on them, taking into account the proposed model of the soil-protective complex, reducing the manifestation of water and wind erosion. Such an approach in the use of the territory of an agribusiness will correspond to the grain and livestock specialization of the third agricultural zone of the Stavropol region.

Waste management of dark coniferous trees debarking for producing antibacterial preparations

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Abstract. The article presents the results of studying the antibacterial activity of fir tree and Siberian spruce bark water extracts. As test objects, pathogenic (3-4 hazard class) and saprotrophic bacteria were used. It has been shown that the studied aqueous extracts of dark-coniferous bark do not exhibit biocide activity against the conditionally pathogenic bacterium Escherichia coli. However, all the other studied bacteria are sensitive to the extracts analyzed both on day 3 and day 13. At the same time, the aqueous extract of the Siberian fir bark has a higher biocide activity against conditionally pathogenic and saprotrophic bacteria in comparison with the aqueous extract of the Siberian spruce bark. The antibacterial activity of aqueous extracts of the studied plants bark is determined by their chemical composition, primarily the presence of substances of a phenolic nature. It has been shown that the studied extracts mainly contain compounds of quercetin, dihydroquercetin and kaempferol.

Legal issues of organizing solid waste sorting in apartment buildings

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Abstract. This work focuses on one of the most pressing issues of today's management of apartment buildings, namely the legal issues of organizing the sorting of household waste. We have summarized significant gaps and contradictions in the legislation governing the relationship between facility management companies or housing cooperatives or associations and regional waste disposal entities. This work provides recommendations for optimizing the organization of household waste sorting in order to ensure the interests of residents of apartment buildings are accounted for.

Research experience of the plant development stability in areas with a high anthropogenic load

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Abstract. A multi-year assessment of the impact of the mining industry anthropogenic stress on a stable development of white birch (Betula pendula Roth.) and green strawberries (Fragaria viridis) has been carried out. The results showed that the stable development of the white birch is annually decreasing, which is explained both by the influence of climatic conditions and the increase in anthropogenic load. In contrast to birch, green strawberries demonstrate a strong fluctuation in the indicators of a stable developmental depending on the climatic conditions of the year, which most likely have a decisive influence on the development homeostasis. This species is better used to detect local pollution.

Priming dose in distributed injection systems of overheated alcohol fuel

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Abstract. The expansion of the use of alcohol-containing fuels is evidenced by the release to the market of vehicles operating on benzoethanol mixtures E85 and E90, as well as on pure fuel ethanol E100. For regions with a temperate and cold climate (Russia, USA, Canada, Western Europe), the lack of fuel systems, which make it possible to launch and operate engines on pure alcohols (n-propyl, isopropyl, n-butyl, sec-butyl, iso-butyl, tert-butyl), restrains, among other reasons, the widespread use of alcohols as motor fuels. According to numerous studies, an engine operating on pure alcohols can be started at temperatures above 10 ° C, at lower temperatures it becomes impossible to start and for its implementation at least 10-15% of the priming dose of gasoline is introduced into alcohols. The priming dose of gasoline in gas-alcohol mixtures can be replaced by a priming dose of alcohol injected into the intake manifold in a superheated state. This technical solution is proposed in patents for inventions of the Russian Federation of the authors. This article is devoted to the scientific and technical rationale for the efficiency of the use of pure superheated alcohols in injection systems and their impact on the effective performance of internal combustion engines with forced ignition.

Studying the effect of preplanting tillage on the germination and forage productivity of Kochia prostrate in the northern desert of Kazakhstan

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Abstract. The earlier studies about the efficiency of the main tillage showed that at the overall tillage for Kochia prostrate sowing don not guarantee the uniformgermination throughout the field, both in space and in time. It is due to theunsatisfactory water-physical conditions of the subsurface soil where seeds lie. Taking it into account, a farming system is being developed. It is aimed at accumulating and preserving moisture in the soil strips (10-15 cm wide, repeatedin 45-50 cm in the virgin soil), treated with a help of the method of a surface excavation of a loose soil layer with the formation of a solid compacted bed where seeds of Kochia prostrate are placed. The research results showed a high efficiency of harvesting the upper loose soil layer in strips with a width of 10-15 cm

to a depth of 5-8 cm with the creation of a highly compacted solid seed bed, without conducting basic soil cultivation. In this variant, the optimum completeness of seedlings and a rather high yield of forage by fodder mass of Kochia prostrate were obtained 3.12 g / ha on average over three years. Earlier, before the development of this research, Kochia prostrate with annual sowing provided only 2 years of full-fledged germination from five years of sowing. Then as a result of the conducted research, a number of years providing full-fledged germination has reduced to 4 years of sowing.

Physical and mechanical methods of intensification of the process of extraction of substances from plant raw materials

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Abstract. This paper presents data on the determination of parameters of extraction of plant materials and the assessment of the nutritional value of the obtained extracts. As the main object of research was selected Schisandra chinensis. The optimal extraction parameters were established: duration - 6 hours, temperature - 40-50°C. As a result of the work, organoleptic, physicochemical parameters and nutritional value of the obtained extracts were determined. The results obtained indicate that the developed extracts have a high nutritional value and can be used as sources of biologically active substances in the preparation of functional products.

Geochemical processes of mercury transformation in the river-sea system

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Abstract. In this paper, the average concentrations of mercury in river water and suspension in seawater were presented. The authors gave the spatial distribution of mercury in the dissolved and suspended forms and in the bottom sediments. The studies were carried out at 30 stations twice a year (in the period of high water and low water) in the period 2014 – 2016. Samples of the bottom sediments were collected in the surface layer. The spatial distribution of mercury was performed by Kriging interpolation in ArcGIS 10.2.2. It was shown that the river flow is dominated by dissolved forms of mercury at the top and suspended forms in the mouths of watercourses, while the sea is dominated by dissolved forms. The geochemical transformation processes of the river sedimentary substance (dissolved and suspended forms of mercury) in the mixing zone of the river and sea waters (in the area of the so-called marginal ocean filter) have been studied in detail. It has been shown that, the marginal filter is characterized by flocculation of inorganic and organic dissolved substances with concomitant capture of dissolved forms of metals, which can lead to an increase in the proportion of mercury carried on the suspended substance. The content of suspended forms of metal was reduced due to the self-purification of the water system from the river material and the transition to marine conditions.

Waste management from ships at Vietnam seaports

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Abstract. This paper analyzes and evaluates the situation of waste management from ships at Vietnam's seaport system on the basis of comparing with the requirements of Vietnam's legal regulations on management and treatment of waste as well as provisions of international maritime conventions to which Vietnam is a member. Based on that, some solutions are proposed to improve the management efficiency of waste from ships for Vietnamese seaports.

Application of silver nanoparticles to improve wheat seedlings growth

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Abstract. In the current study, the effects of silver nanoparticles (AgNPs) synthesized under the action of “green” reagent glucose, on seed germination and seedling growth of wheat were investigated. Nanoparticles had a spherical shape and an average size of about 10 nm. Wheat seeds and seedlings were cultivated in Petri dishes for 3-7 days. After this, the number of germinated

seeds, shoot and root fresh mass, and root length were measured. The results showed that the concentration range of 0.001-0.5 mg/L had no effect on seed germination, while the enhanced concentration induced an inhibitory effect. It was found that AgNPs had led to an increase in shoot and root fresh mass in the range of 0.06-1 mg/L and in the range of 0.03-0.1 mg/L, respectively. Beyond the concentrations up to 3 and 5 mg/L shoot and root fresh mass were inhibited respectively. Application of tested nanoparticles in the range of 0.005-0.5 mg/L caused an increase in root length of wheat. AgNPs at the concentration over 5 mg/L caused root length inhibition. The results show that AgNPs in the range of 0.06-0.5 mg/L may hold significant applications in agriculture and could provide as an alternative source of ecofriendly fertilizer for wheat.

Opportunities and prospects of minimum soil tillage in Eastern Siberia

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Abstract. The article considers a multifaceted and universal impact on the soil machine tillage. This agrotechnical method is the most costly and environmentally dangerous with its formulaic and irrational use. Throughout the world, the annual mouldboard tillage led to a number of negative phenomena resulted in the development of erosion, dehumification and a drop in soil fertility. So the doctrine about the minimization of methods and tillage systems appeared. It has been established that both the mold board and the subsurface tillage have both positive and negative aspects. Minimalization of tillage is also not panacea, it has both promising opportunities and limitations. In this regard, at the present stage, the most appropriate combination and alternation mold board and subsurface, deep and shallow techniques up to the sowing in field crop rotations directly. It is most promising to improve the tillage based on the application of multi-operation tillage machines and mechanisms that combine tillage, sowing, fertilizing, levelling and rolling in a single pass across the field.

The new effect of neodymium magnet (NdFeB) on storage quality of potatoes

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Abstract. Modern techniques of potato tubers storage have a number of economic, technical, and technological disadvantages and they don’t ensure high product safety - potato losses run up to 30 % per storage season. The work has been conducted on the effect of magnetic field of neodymium (NdFeB) magnet on sprouting, weight loss and storage of potatoes because this method is the most interesting and understudied. The equipment used in the research: equipment for magnetic potato treatment, NdFeB magnets, magnetometer is used to identify positive and negative magnetic poles, and auxiliary instruments. As a result of the experimental studies it has been found that untreated potatoes had weight loss of 39 %. Weight loss of potatoes treated with positive magnetic field of 330…350 mT and time treatment 60…180 s was 4 %. The positive magnetic field of 330…350 mT was effective in suppressing sprout growth. It is also to inhibit sprout growth in potatoes stored at 25°C. Potatoes receiving more than 330…350 mT dose, were higher in length of sprouts, and higher weight loss of potatoes (20…50 %). Also, potatoes receiving negative magnetic field dose, were higher in length of sprouts, and higher weight loss (60 %) than those given positive magnetic field dose. As a result of experiments, the design of a new device for magnetic processing of potatoes has been developed. It is anticipated that magnetic fields influence the potato cells, as the result of the effects, potato tubers either lock in moisture, starch and other substances, or lose them quickly due to inner-structure destruction.

Calculating the process of straightening low-stiff cylindrical parts by cross-rolling with smooth plates

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Abstract. To restore the shape of curved low-stiff cylindrical parts such as shafts and axles, the process of straightening by transverse bending is considered with subsequent hardening by the method of surface plastic deformation based on the transverse rolling of the cylindrical part with flat plates. The stress states of parts during editing are determined using the Ansys Workbench software package. The results of the distribution of the intensity of operating voltages and residual stresses over the cross section of the cylinder, depending on the absolute compression, are presented. The process in question can be implemented without the use of environmentally hazardous lubricating cooling technological means, which makes it possible to attribute it in the future to one of the types of green mechanical processing technologies.

Vegetable structure balance in agrochernozems and the quality of seed production in the field crops cultivation with elements of soil protective technologies

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Abstract. The combination of elements of soil-protective technologies in crop rotation, such as minimizing the main tillage for grain crops, plowing up wheat residues after soybean cultivation, desiccation and scattering potato tops, along with the classical cultivation of fallow fields contributes 6.8 t/ha, remaining the same the quality of seed products of soybeans, potatoes and wheat.

Food forest resources as a component of environmental management

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Abstract. Forest resources are concerned as renewable natural biological resources. Wood is the main type of forest operation products. Non-timber and food forest resources are also valuable. The article presents an overview of food forest resources of Far Eastern Federal District, such as wild berry, walnut raw materials and pharmaceuticals, and the main ways of its using in industrial production. Article shows food forest resources harvest by types. The main share of it contains mushrooms and berries. Food forest resources harvesting and processing are advanced direction in environmental management, which can stimulate the development of new production organization approaches in related spheres: food, processing and agro-industrial industries.

Comparative economic characteristics of environmental protection tools

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Abstract. The relative advantages of the tools for the environmental protection have been assessed in the article. From the economical point of view emission taxes, subsidies for abatement of emissions, and market-based permit system are more preferable in comparison with the control and management systems. The control of emissions for each organization can be achieved only in case when the marginal costs of abatement for each pollutant are known, which is unlikely in practice. In case of immiscible pollution, the determination of the marginal costs of organizations to control emissions is not required only for permitting schemes, which gives them an advantage over other tools. The least expensive for achieving a particular purpose in the fight against pollution is the tool of minimum technological requirements for the protection of the environment. The long-term effect of the instrument depends on the net income effect and the effect of technological innovation. Subsidy schemes or alternative methods of initial distribution of market permits at the expense of positive effects of income can increase the size of the industry, which is undesirable from the ecological point of view. In order to neutralize this effect, the organizations of the subsidized industry may be obliged to make one-time payments, the amount of which is the total cost of subsidies. The second way is the induced impact on the pace of technological innovation. Control and management tools have weak incentives for innovation. An emissions tax (or emission control subsidy) will encourage environmentally sound innovation. In the market scheme, emission reductions reduce taxes. Pollution control instruments have different consequences for the distribution of income in the economy and the competitiveness of the economy.

Prospects for the use of spelt in organic farming

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Abstract. Organic farming is a way to reduce the negative impact of agriculture on nature and humans. It allows for more efficient use of natural resources and providing the population with safe food. Russia has a huge potential for organic agricultural production. Spelt (Triticumdicoccumschrank) as a grain culture is promising for use in organic farming, for expanding the market of organic products, for manufacturing environmentally friendly bakery products.

Pesticides as endocrine disruptors and neurotoxicants

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Abstract. The role of pesticides in the development of endocrine disorders and neurodegenerative diseases of humans and animals is currently being actively discussed. Epidemic and model studies confirm the link between the use of pesticides in agriculture and the occurrence of adverse changes in the nervous and endocrine systems of people and animals. But the mechanisms underlying pathological changes have not yet been identified. Among the leading links in the pathogenesis of neurotoxicity, oxidative stress, neuroinflammation and epigenetic modification can be distinguished. The cause of endocrine disorders may be low-dose hormone-like effects of pesticides, leading to changes in the synthesis and metabolism of the body's own hormones. Due to the difficulty of establishing cause-effect relationships, as well as the presence of significant gaps in the study of the pathogenesis of chronic pesticide intoxications, further studies of the biological effects of low doses of pesticides are necessary in order to establish patterns of their influence on the population health of people and animals.

Carbon balance in case of short-term green manure of a fallow in the conditions of the Baikal forest-steppe

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Abstract. Changes in carbon balance during short-term green manure of a fallow in the conditions of the forest-steppe zone of the Baikal region are studied on the basis of the results of three-year field experiments. It was revealed that the introduction of green mass of oilseed radish (*Raphanus sativus var. Oleifera Metzg*) into gray forest soil at the end of the summer period significantly activates the processes of mineralization. The total CO_2 emission from the soil surface in the variants with green manure increases by 1.3–1.6 times as compared with pure fallow. Compensation of gaseous carbon losses due to newly introduced organic matter is possible only at high yields of oilseed radish (3-5 tons of dry matter per ha) and hydrothermal conditions unfavourable for its mineralization. Under favourable conditions for the mineralization of fresh organic matter, a negative carbon balance is formed, but its value remains less deficient than in the variants of pure fallow. The data obtained allow us to recommend this technique of agriculture to reduce the share of net sources of carbon dioxide in the carbon balance.

Transformation of soil and land resources of the Middle Siberia in the conditions of climatic changes

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Abstract. The paper describes the fields of transformation of soil and land resources of the Middle Siberia as the result of long-term climatic changes. The description of soil and land resources is given. The climatic changes have been evaluated for the period from 1919 to 2018, and increase of the annual mean air temperature and amount of precipitation in natural zones of the region has been established on the basis of the analysis of linear trends. Under the impact of these factors, shifting of zone borders occurs, which leads to replacement of the soil cover structure at the species, generic and subtype levels. Changing regimes and soil properties cause the necessity to use new sorts and adapted technologies for crop growing.

Comparison of drinking water quality in terms of relative concentrations and carcinogenic risks of trihalomethanes

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Abstract. An assessment of the drinking water quality according to the content of trihalomethanes on the surface and infiltration water intakes of the city of Ufa using threshold and non-threshold methods was carried out. The threshold method was estimated by calculating the summation coefficient. The non-threshold method was based on the calculation of the individual and total carcinogenic risks of the trihalomethanes components: trichloromethane, bromodichloromethane, dibromochloromethane. The summation coefficient, calculated on the content of trihalomethanes, for surface and infiltration water intakes was respectively 0.56 and 0.15. A greater contribution to the summation coefficient is made by trichloromethane. On the surface water intake, the values of carcinogenic risks are within $1.1 \cdot 10^{-6}$ – $6.3 \cdot 10^{-6}$, on the infiltration water intake risks are within $9.1 \cdot 10^{-7}$ - $2.8 \cdot 10^{-6}$, which does not exceed the maximum permissible values. A large proportion of the carcinogenic risk for the two types of water intake accounts for bromodichloromethane. The calculations show the need for measures in order to reduce the total content of trihalomethanes, primarily bromine-containing ones.

Governmental support of environmental protection and reducing of the negative consequences of adverse effects on the environment of the Krasnoyarsk region

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Abstract. The relevance of the research on the issues of governmental protection of the environment and reducing the adverse impact on the environmental situation of the agglomeration is due, first of all, to important problems in developing a favorable environment and protecting it in the regions with a large number of urban settlements.

Problems of landscaping urbanized territory

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Abstract: The paper is concerned with the features of impact of man-induced air pollution on seasonal changes of wood plants for solution of the problem of planting a major industrial city in Siberia. The results of studies of the impact of air pollution components on plants at the stage of winter dormancy are presented. To estimate the depth of the plants winter dormancy a contemporary method of recording the curves of thermally induced changes in a zero level of fluorescence (TCZLF) of phelloderm has been used. The reduction of the period of the dormancy state for wood plants at the growth of the level of anthropogenic impact has been demonstrated. According to the correlation analysis results, the highest effect has been noted for nitrogen dioxide and benzo(a)pyrene. The identified features of the environmental and physiological state of wood plants in the conditions of a city shall be accounted for in the practice of green construction of a city for creating an optical favourable urban environment and maintaining the health of the population of urbanized areas.

Using of the methods of landscape research in determining allowable recreational pressure

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Abstract. The development of tourism, as one of the most dynamically developing sectors of the economy, entails an increase in the recreational pressure on the visited territories. The research of modern landscapes shows that their use for recreational purposes can lead not only to significant negative changes in individual components, but also to fundamental disturbances and degradation of landscapes in general. In this connection, the systematic monitoring of the recreational pressure, the search for its optimal values, which do not entail the degradation of the landscape, is of particular relevance. Research of the recreational capacity of landscapes was started as far back as the twentieth century. Over the past decades, the standards of recreational pressure for the most common types of landscapes have been defined. Based on the developed methods of assessing the degree of recreational landscape digression, measures to improve the landscape have been proposed. It has been established that the increase in the economic effect from the development of tourism and recreation is possible on the basis of landscape and recreational analysis, which takes into account the individual characteristics of the territory when determining the permissible recreational pressure. The article briefly describes the main groups of landscape research methods used in determining the permissible recreational pressure on the landscape. The most important parameter on which the researchers rely when they calculate the permissible recreational pressure on the landscape is the density of the recreational pressure. During research of the density of recreational pressure, some traditional methods of researching landscapes are applicable, for example, conducting reconnaissance routes. The analysis of approaches to the definition of permissible recreational pressure on the landscape is spent, a brief algorithm for conducting landscape research at the local level is given, and the example of creating the appropriate landscape maps is given. The article presents the results of landscape researches, conducted on the territory of the Vorotynsky district of the Nizhny Novgorod region. The analysis shows that sustainable development of tourism and recreation can be based on the results of extensive research, including the establishment of landscape features of the territory and the determination of optimal types of recreational activities and the degree of its intensity for each natural-territorial complex.

Oxygen activity as a function of the composition of mixed fertilizers

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Abstract. The influence of the component composition of mixed mineral fertilizers and soils on the oxygen activity in the composition of mixed nitrogen-containing, phosphorus-containing and potassium-containing mineral fertilizers was studied. The study was performed by the method of physicochemical modeling based on the “Selector” software package. The following system totals were calculated: the isobaric-isothermal potential of the system, the chemical potentials of the respective independent components, the number of components of the solution, the amount of emitted gases, the pH of the solution, the redox potential of the system. A significant positive effect of limestone and hydrated lime on the chemical activity of oxygen has been revealed. It is shown that clay soils, from the standpoint of chemical thermodynamics, are favorable in terms of increasing the oxygen activity when using nitrogen-containing, phosphorus-containing and potassium-containing fertilizers.

The influence of the methods of primary tillage on the biological activity of ordinary chernozem

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Abstract. The article discusses topical issues related to the improvement of the main tillage systems for agricultural crops. The authors draw attention to the general problem of agricultural soil degradation caused by depletion as a result of prolonged non-rational use. The perennial studies conducted by the authors are aimed at preserving soil fertility by reducing the mechanical load on the soil cover. The results of the research make it possible to evaluate the effect of treatments on the activity of the microbial community, one of the main indicators of the orientation of soil-forming processes of chernozem soil types.

Development of an autonomous energy supply system for harvesting wood resources based on wood fuel

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Abstract. A number of original technical solutions of energy supply system of technological processes of wood harvesting and production of chips in the cutting area and upper warehouse are presented. It is proposed to use generator gas from chips instead of traditional motor fuel. The autonomous power supply system includes a power plant with a DC motor and a hydraulic station, a power cable for transmitting electrical energy and a power plant. The power plant is installed on the chassis of the technological machine. The power plant equipment is located on a separate car trailer chassis. The power plant includes a battery of electrical energy, a DC generator, a heat engine on the generator gas, gas generators and a container with a fuel reserve. For cable rolling along the cutting area, special patented rollers are offered. The use of this system can save up to 870 liters of motor fuel from non-renewable resources per 1,000 cubic meters of harvested wood.

The influence of biopolymer modification of mineral fertilizers on main agrochemical parameters of soil

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Abstract. This paper demonstrates the possibility of increasing the productivity of crops, while improving the parameters of soil fertility is significantly limited in modern conditions. This trend is associated with low activity of innovation and innovative activities in the field of mineral nutrition of plants. Nevertheless, the existing work in this area clearly indicates the presence of effective recommendations aren't only to limit the growth of costs for the fertilizer system but to increase its efficiency, besides, to improve the agro-ecological soil parameters.

The relationship of technical-and-technological and ecological components of the mining region development

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Abstract. The specificity and problems of coal industry technologization are identified, its relationship with the environmental safe-ty of mining region is determined. Among the most obvious fac-tors hindering the development of technical-and-technological and environmental spheres are identified: high technological inertness of mining enterprises, significant dependence on import of means of production, abandonment by the state of the process of collect-ing and redistributing raw material rent, low environmental responsibility of owners of coal mining enterprises. The following threats are identified: an insufficient rate of equipment renewal, including parts providing environmental safety; high level of consumption of fixed assets; low innovative activity of coal industry enterprises.

Low carbon global economy: scenarios of sustainable development, power consumption and greenhouse gas emission control

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Abstract. This paper is devoted to problems of a gradual transfer to renewable energy sources and decarbonization of power systems. It presents the analysis of the structure and the trend in global power consumption, greenhouse gas emissions, and target values of decreased emissions by the largest greenhouse gas emitters. A trend in renewable energy sources in total global power consumption is analyzed. The authors study a potential for carbon capture and storage as an instrument of CO_2 emission neutralization in power and industrial processes. The paper contains indicators to evaluate efficiency of power resource utilization and greenhouse gas emission control.

The current state analysis of the agro-forest landscape components based on the geoinformational systems usage

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Abstrect. The implementation of the modern geoinformational technologies allows to structure all components of the agro-forest landscape, define their qualitative and quantitative condition, dynamic pattern and make long-term and long-range programmes for the sustainable territory development absolutely precisely.

Modernization of systems of air clearing in treatment facilities

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Abstract. New options are proposed for the modernization of existing air purification systems using know-how in the wastewater treatment plants themselves and in the area of their location. For air purification, it is proposed to use a new highly effective sorbent material, which is a claydite, covered with a thin layer of pyrolusite (manganese dioxide). This sorbent, which is in a wet state, oxidizes organic and inorganic toxicants on its surface, and also destroys pathogens. The proposed sorbent material is a natural formation obtained from the available raw materials approved for use for which additional permits are not required. Currently on the market there are no direct analogues of this product. Especially it is necessary to note a low cost of a new highly efficient sorbent material. In modern conditions, as a result of the increasing exploitation of water resources, the problems of human impact on the environment become particularly acute. These impacts, as a rule, are accompanied by factors that adversely affect the ecological state of the environment, both in the area of operation of the treatment facilities and in places far from them.

The state of soil fertility during long-term use of fertilizers in agrocenosis

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Abstract. The long-term stationary experiment (1981-2011) on meadow-Chernozem soil has shown that the systematic application of mineral fertilizers and straw, the inclusion of perennial legumes in the crop rotation stabilizes the humus content and increases the supply of labile organic matter in the soil. The humus content in the fertilized variants increased by 0.16-0.30 %, and the content of easily mineralized organic matter by 24-86%. High correlation dependence (r=81) of humus content on mortmass reserves in soil confirms the significant role of labile organic matter in soil fertility preservation.

The recultivation of the soils, contaminated with petrol and diesel fuel, with the help of earthworms Dendrobena veneta and the complex of microorganisms

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Abstract. The article investigates bioremediation efficiency of the soil contaminated with petroleum (20 to 60 g/kg) and diesel fuel (20 to 40 g/kg) with the help of earthworms Dendrobena veneta in the presence of bacteria Paenibacillus pabuli, Azotobacter vinelandii, Lactobacillus casei, Clostridium limosum, Cronobacter sakazakii, Rhodotorulla mucilaginosa, Cryptococcus albidus, eria, yeasts Saccharomyces, fungi Aspergillus and Penicillium, as well as Actinomycetales, all being components of biopreparation Baykal-EM. It was demonstrated that in oil-contaminated soil, the content of hydrocarbons decreased by 95 % after 22 weeks in the presence of worms and bacteria. The microbiological preparation introduction increased the earthworms' survivability in oil-contaminated substrate. Microbiological preparation introduction improved the earthworms' survival in contaminated substrate. The microbiological preparation introduction, therefore, allowed to use Dendrobena veneta for soil recultivation with higher oil concentrations that was impossible in the past. In petroleum-contaminated soil the content of hydrocarbons decreased by 97% after 5 months. The presence of the diesel fuel in the amount of 40 g per 1 kg soil had an acute toxic effect and caused the death of 90 % earthworm species in 14 days. Bacteria introduction enhanced the toxic effect of the diesel fuel and resulted in the death of 100 % earthworms after 7 days.

Some areas of agribusiness participation to ensure food security of the Yenisei Siberia

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Abstract. The study analyzes the indicators of production and actual consumption of certain types of food in the territories of Tyva, the Republic of Khakassia and Krasnoyarsk Krai united in the Yenisei Siberia. The research makes conclusions about ensuring food security on the basis of the ratio of actual consumption, production and norms of rational food consumption and suggests some directions for agribusiness to be involved in food security.

Environmentally friendly technologies for obtaining fuels for agricultural energy

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Abstract. The paper describes some ways of greening the agricultural energy industry, in particular, methods of utilizing industrial waste to produce fuel briquettes using pig manure as a binder and creating a biogas plant in the climatic conditions of Siberia, which allows organic waste (manure, bird droppings, household waste) to be recycled etc. The optimal ratios of the initial components in the briquette mixture are revealed. It is established that the best compositions, taking into account the strength of the briquettes obtained, are briquettes with coal of grade D - up to 10%: grade B2 - from 60%: manure with moisture content 72% - not more than 30%. It was determined that reducing the proportion of binder (manure) to 15% leads to the need to increase the pressure of the press to 300 kgf / cm^2. Adding manure in the briquette changes the burning characteristics, the briquette burns longer, and it becomes possible to reduce the pressure. The data on the kinetics of drying the prepared briquettes with the determination of the optimal mode providing explosion-fire safety and the absence of volatile substances were obtained. The possibility of introducing biogas technologies into the agricultural sector of the Krasnoyarsk Territory economy has been considered.

The recultivation of soils contaminated with oil using the vermiculture of earthworms and their probiotics

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Abstract. The recultivation technology for soils contaminated with oil in the concentration of 50 g/kg in Western Siberia with the use of microbiological preparation received from coprolites of earthworms Eisenia fetida and vermiculture of earthworms E. fetida, E. andrei, D. veneta was developed. The coprolites microflora composition of the earthworms E. fetida was studied. The microbiological preparation from coprolites of the earthworms was received. Microorganisms – oil destructors were isolated, which were used as the basis of the microbiological preparation "Muck" containing Pseudomonas aeroginosa, Bacillus careus, Bacillus mucoides, Bacillus thuringiens, Pseudomonas putida, CFU – 3.3*10^8. The following characteristics were determined: the

remediation effectiveness for the soil contaminated with oil in the concentration of 50 g/kg when using the microbiological preparation "Muck" and earthworms E. fetida, E. Andrei and D. veneta.

Studying SHF electromagnetic field modes on germinating ability of seeds of coniferous species

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Abstract. Experiments were performed to study the effect of the electromagnetic field of ultra-high frequency on the heating and germinating ability of seeds of coniferous trees. The seeds of Scots pine were investigated. Active planning was applied for the purpose of experiment; Kono-2 two-factor plan, which included 9 experiments, was selected. Parameters like unit specific power and treatment time were changed, when the seeds were irradiated. According to the results of the laboratory experiment, the article presents the data obtained and control tests on the effects of UHF EMF on germinating ability of the pine seeds, technological modes and installation parameters (time and heating power) have been considered. It was established that the mode with power level of 200 W/cm3 and maximum time of 60 seconds had the maximum stimulating effect on the seeds.

The problems of recreational territories of Pre-Olkhon area and Olkhon island

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Abstract. This paper contains the studies of the basic processes of degradation of geosystems on two key plots, exactly, Pre-Olkhon area and Olkhon island under conditions of recreational impact. As a result of observing this territory the assessment of terrestrial vertebrate diversity has been determined, the rate of degradation processes has been established and statistical dependence between parameters of geosystems and intensity of degradation has been found. Basing on the conducted researches it was revealed that the recreational territory of Pre-Olkhon area and Olkhon island has a high degree of degradation (IV-Vth stages of digression). The most difficult situation takes place on the coast of the Small Sea and on the island of Olkhon. The safe level of recreational load in this area without special arrangement of the territory should not exceed 1 person/ha.

Effects of structural materials' chemical composition as considered in mathematical modeling built objects combustion processes

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Abstract. The article presents a symbolic (mathematical) model of combustion process alongside with its software implementation. The authors focus on effects of chemical composition of construction and finishing (decoration) materials involved in the process. The model was programmed before validation for adequacy and thus presents something more than description of chemical and physical moieties of combustion process.

Rational nature management of urban flora in urban floristry

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Abstract. Recently rational nature management of the urban flora in the sphere of the influence of anthropogenic factor on the life state of plants has become one of the urgent problems of the environmental protection. The urban flora used in urban floristry should include the adapted species resistant to abiotic and biotic stress- factors, as well as to damage by entomological and phytopathological agents. The assessment of flowering shrubs-introducents and native species in the urban environment of the city of Orel allowed us to rank the plantings of general and limited use andplantings for special purpose accordingto their life state for the tolerance to stress factors. The promising species for the urban floristry are: Berberis thunbergii, Chaenomeles japonica, Lonicera caprifolium, Physocarpus opulifolius, Philadelphia coronaries, Sorbaria Sorbifolia, Syringa velutina and Weigela florida.

A study of the reliability of a solar-wind power supply system

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Abstract. The growing demand of agricultural consumers for autonomous energy generating systems based on renewable energy sources leads to a need for an evaluation of the reliability of electricity supply. In this regard, the present study is devoted to considering approaches for the reliability evaluation of a solar-wind power supply system taking into account the changeability in the power of solar and wind energy flows, as well as methods for calculating the parameters of its reliability. As a result of a theoretical study, a mathematical model was developed to estimate the reliability of a solar-wind power supply system. This paper presents the obtained reliability parameters of the power supply system for a dwelling house on the basis of a solar-wind installation.

Research of processes of lead ion sorption on bentonite clay and pectin

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Abstract. The kinetics of lead ion sorption on the pectin, excreted from vegetable objects, bentonite clay and complex sorbing agent, received on their basis, is studied. It is shown that the speed of sorption is maximum in the initial 10 minutes. The equilibration time ranges from 30 to 90 minutes, depending on the concentration of metal ions and the composition of sorbing agent. The processing of experimental sorption isotherm is made it is stated that Langmuir model suits best for the description of sorption processes.

The study of polyurethane adhesive composition in aggressive environments

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Abstract. As a result of the research, the effectiveness of the use of the proposed fast-curing adhesive composition based on cold-curing polyurethanes during car repairs was confirmed. Prerequisites have been created for creating a new generation of universal polyurethane adhesive compositions for restoring vehicles with improved adhesion, physical engineering and performance properties that are highly resistant to aggressive environments and are made from materials of domestic production. The feasibility of the work is due to the presence in the market of expensive analogs of foreign production for the restoration of car parts, and therefore the task is to develop import-substituting compositions.

Plants species for ecological landscaping in urban territory in Central Siberia

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Abstract. Green spaces such as parks and street trees represent a key component of urban ecosystems. Planting trees and shrubs in cities provides a number of environmental, economic, social and health benefits and also preserves biodiversity in highly urbanized areas. The key problem of the ecological landscaping in Central Siberia is to select plants species resistant both to high level of pollutants and to large variations in temperature. Basing on the comparative study of growth characteristics and physiological state of plants in natural and urban ecosystems we recommend 31 plants species of 16 families for ecological landscaping. Recommended species for ecological landscaping in Central Siberia are Abies sibirica, Acer platanoide, Amorpha fruticosa, Berberis thunbergii, Berberis vulgaris, Cornus alba, Cotoneaster lucidus, Crataegus sanguine, Dasiphora spp., Forsythia spp., Juglans mandshurica, Juniperus Sabina, Larix sibirica, Philadelphus spp., Physocarpus opulifolius, Picea obovata, Picea pungens, Pinus sibirica, Pinus sylvestris, Ribes aureum, Rosa rugosa, Salix alba, Salix ledebouriana, Salix purpurea, Sorbaria sorbifolia, Sorbus aucuparia, Spiraea salicifolia, Syringa josikaea, Tamarix ramosissima, Tilia cordata, Viburnum opulus. Coniferous plants are presented with 7 species of 5 genera. Deciduous plants are presented with 24 species of 21 genera. The list of recommended plants species includes both trees and shrubs.

Recommended practices for radioecological monitoring of the environment

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Abstract. Radioecological monitoring is crucial for observation, assessment and forecast of the impact of radiation factors on people and environment. The analytical paper provides recommendations for the sampling of soil, snow, and vegetation for radioecological monitoring in arctic areas. It also presents different aspects of organizing general assessment of ecological condition in the buffer and control areas. The paper reveals the basic mechanism of radical accumulation in the soil, and radioisotope sorption factors depending on mechanical and mineralogical soil composition and on plant structure.

The methodology for the development of enterprise competitive strategy

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Abstract. The article is about achieving and maintaining advantages over competitors in the agrarian and rocket and space industry, which activities are a powerful generator of innovation. The mission of a large strategic enterprise for the agrarian and the rocket and space industry is creation, manufacturing, selling and after-sales service of competitive science-intensive products for military and civil purposes on the basis of advanced scientific and technological developments, efficient production and developed services in different interests. In order to reach this goal a full methodology for competitive strategy was developed, which is used in many organizations. This technique is presented as a step-by-step algorithm for the development and implementation of a competitive strategy, which is based on some management methods. The implementation of this algorithm requires the most up-to-date and accurate information to perform all the stages in the most productive and fast way. The algorithm itself is simple and provides an opportunity to get a positive economic effect due to the fact that the organization occupies a stronger position.

Dust emissions of industrial enterprises as a factor of negative impact on the agricultural territories

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Abstract. The study is devoted to the determination of the dispersed and component composition of industrial dust emissions as factors of a potential negative impact on the quality of atmospheric air, precipitation and soil, including agricultural use. It is shown that the dust emissions of ferrous and nonferrous metallurgy, engineering and the mining industry facilities have a complex composition, including toxic heavy metals. The presence in emissions of fine-dispersed fractions (PM10, PM2.5) causes the transfer of contaminants over long distances. The location of agricultural areas in close proximity to industrial enterprises can lead to snow and soil contamination by heavy metals. Agricultural plants can be included in the chain of heavy metals migration and accumulate them. In order to develop measures for the protection of environmental objects, studies have been carried out on the in-depth analysis of the component and dispersion composition of emissions. An estimate of the distribution areas of emissions has been performed. Proposals for the organization of environmental monitoring are developed.

Determination of the stress state in the deformation zone under local loading

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Abstract Based on the theory of small elastoplastic deformations and the finite element method, a mathematical model of local loading was created using the ANSYS application program, which allows determination of the stress state in the deformation zone and residual stresses in the hardened part. Paper studies the influence of various factors on the stress state: ball diameter, penetration depth and the cylindrical sample diameter. The results show that using the finite element method in the analysis of technological processes of hardening gives a deeper understanding of the stress development that occurs during the deformation of the workpiece. The process in question can be implemented without the use of environmentally hazardous lubricating cooling technological means,

which makes it possible to attribute it in the future to one of the types of green mechanical processing technologies.

Carbonization products in D-glucose - p-toluidin system as sorbents of carbohydrate caramels from aqueous solutions

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Abstract. The results of studies of the sorption of carbohydrate caramels from aqueous solutions by highly dispersed adsorbents - carbonization products synthesized in the D-glucose - p-toluidine system are presented. Based on the analysis of the structural features of the adsorbent and the adsorbate with the use of infrared Fourier spectroscopy data, the physical nature of the interaction of the caramel components with the surface is mainly shown. Meanwhile binding probably occurs due to polar groups of carbonyl nature. An analysis of the difference spectra in the region of 1500-1740 cm^{-1} allows detailing the examination and confirming the nature of the sorption interaction. The research results are promising in the development of methods for the synthesis of carbon-saturated products, sorption-active with respect to substances of carbohydrate nature, which is of interest for food and pharmaceutical industries.

Simulation of the deflection of the ice cover

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Abstract. The paper proposes a mathematical model describing behavior of ice cover under loading. Not taking into account the chemical characteristics, and considering it a solid continuous medium on an elastic base, the role of which is played by water, to simulate the deflection of the ice cover under loading, it is possible to use the theory of thin shells and plates. Thus, the proposed mathematical model is based on the partial differential equation of the bending of a thin plate on an elastic base. Boundary conditions are set depending on the method of fixing the edges. Delivered the boundary value problem is solved in the class of almost-periodic functions by means of a generalized discrete Fourier transform, which allows us to move from the partial differential equation to the ordinary differential equation. The graph of the function of deflection of the ice plate is constructed.

Ecological engineering in the process of gas treatment from dust and prospects for its use in agriculture

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Abstract. In this paper it is shown that the implementation of technological measures of ecological engineering in the sintering technology of alumina production allows reducing emissions of polluted gases into the atmosphere. The conducted industrial testing of the additional stage of wet gas treatment on sintering furnaces confirmed its high efficiency of gas treatment from fine-disperse dust. Physical chemical and morphological dust properties of gas treatment facilities of alumina production are investigated. The characteristic of the chemical dust composition of various technological equipment of gas treatment is given. The dust application of electrofilters in the alumina production as ameliorants for deoxidation of gray forest soils of the Western districts of the Krasnoyarsk territory. This will improve soil fertility and crop productivity through the absorption of soil cations calcium-containing waste and the sustainable functioning of the agrocenosis.

Research of cyanobacterial complexes in Krasnoyarsk in the context of creation of a complex of actions for ecological engineering

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Abstract. The research is devoted to studying of cyanobacterial complexes in Krasnoyarsk and their influence on an ecosystem. For the first time in Siberia a specific variety of soil algae while using different options of fertilizers in greenhouse facility is studied. The taxonomical structure of the studied algal flora includes 4species, however the obtained data quite are agreed with available in literature. In total within the region 238species and intraspecific algae of taxons are revealed. In a floristic range of all soil algae studied algosinuziyas a ratio on departments is as follows: Cyanophyta - 40.4%, Chlorophyta - 39.7%, Xanthophyta - 14.1%, Bacillariophyta of-5.8%. The greatest role in forming of algocenosis belongs to representatives of cyanoprokaryotes and green algae, and on undisturbed areas presence of flavovirent algae species is noted.

Experimental research of the bovine black albumin spray drying processes

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Abstract. The paper shows the results of the experimental research of the spray drying of the bovine black albumin. The physicochemical properties of the dried bovine black albumin were obtained. The granulometric composition and the particle shape structure of the dried product were obtained for the spray drying using the centrifugal sprayer and the pneumatic sprayer for the various solid content range in the source product and the various drying agent initial temperature. The effect of the spraying method, the drying agent initial temperature and the solid content range in the source product on the dried bovine black albumin particle average size was defined.

Optimization of the daily load schedule with the help of energy storage device in order to ensure compliance with the declared tariff price category in the retail electricity market

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Abstract. This paper is devoted to the analysis of electricity consumption by a real enterprise in Western Siberia and the development of recommendations for optimizing its electricity consumption in the context of the tariff policy for the region. The paper discusses the possibility of using energy storage device to reduce the maximum power consumption by organizing charge and discharge cycles of the drive in certain periods of the day. During minimum power consumption, the daily load curve is levelled due to the process of charging the drives. The energy is released into the circuit at the maximum power consumption of the enterprise, reducing its peak load. Aligning the daily schedule of the projected power consumption allows selecting a price category with a lower tariff rate when applying for technological connection. It is concluded that the use of energy storage device for saving for these purposes is unprofitable, since the payback period of the drive significantly exceeds its service life. It is noted that a possible area of application of energy storage device includes enterprises where process violations lead to significant economic damage, the minimization of which justifies the use of expensive energy storage devices.

Experimental investigation of aerodynamic properties of colour pigment for calcium silicate bricks

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Abstract. At construction industry enterprises, in particular at plants manufacturing coloured calcium silicate bricks, aerosols and fine dusts of raw materials are formed in the course of various processes of grinding, transporting, mixing, pouring etc. They are characterized by a high degree of dispersion and high concentration in working zone air and exceed the Maximum Permissible Concentrations by several times. One of the most significant reasons for increased dust amount in the air of working zones of industrial shops is the presence of locations of dust wastes storage. For the purpose of complete evaluation of dust conditions inside an industrial shop for components mixing for coloured calcium silicate bricks, it is necessary to investigate the dispersion process and the aerodynamic properties of the finest dust – colour pigment. The authors have conducted experimental investigations of the aerodynamic properties of colour pigment for calcium silicate bricks and formulated the conclusions.

Innovative approaches to modeling the gerontological beverages composition

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Abstract. The article presents the results of the formulating gerontological beverages with high antioxidant activity. To determine the antioxidant activity a potentiometric method was used using the K3 [Fe (CN) 6] / K4 [Fe (CN) 6] mediator system. Drinks were prepared on the basis of whey with the addition of sea buckthorn, carrot juice, green tea extract, curcumin in water-soluble form in the composition of the compound stevioside-curcumin, aspartame, vitamin premix, yeast extract, natural flavor and milk whey. By mathematical simulation using the method of multicriteria optimization, a drink was chosen that has the best set of particular optimization parameters: 1.83 ± 0.03 mmol-eq / l, which is 10 times higher than the antioxidant activity of a drink without curcumin, the content of vitamin C is 40.3 ± 0.9 mg / 100 ml, acidity - 2.0 ± 0.1 cm3 1 M NaOH solution per 100 cm3.

Environmental problems of fighting fires in the permafrost zone

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Abstract. The impact of existing methods and technologies for extinguishing forest fires in the permafrost zone of the Krasnoyarsk Territory has been studied. Technologies to extinguish forest fires and the design of tools intended to carry them out environmentally safe for the nature of the North presented are. Methods for the delivery of technical equipment to the combustion centre and tactical extinguishing tactics that ensure the elimination of violations of forest ecology in permafrost are proposed.

Improvement of dedusting efficiency of technological equipment for manufacturing of coloured calcium silicate bricks

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Abstract. The key factors for obtaining coloured calcium silicate bricks is the high degree of dispersion and precise dosage of the colouring matter, as well as its uniform distribution in the silicate mixture. Dust particles of a colour pigment pose the most harmful effect on the health of workers at the industrial shop. In the course of components mixing, a large amount of dust from sand, lime and pigment is released into the working zone air since the process of components mixing implies materials pouring while proportioning as well as vigorous mechanical mixing. For the purpose of the quantitative and qualitative analysis of the working zone air contamination in a components mixing shops, it is necessary to investigate the dust conditions at the shop, the particle size distribution of the mixture components, the concentration of hazardous substances in the working zone air, the aerodynamic properties of dust.

Study on the efficiency of ARPD (asphaltenes, resin and paraffin deposit) hydrocarbon solvents

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Abstract. Intensive asphaltene-resin-paraffin deposits (ARPD) precipitation is one of the main problems in oil production, processing and transportation. The present study describes the selection of ARPD hydrocarbon solvents using the express method of effective hydrocarbon solvents according to which optimal ratio of alkane and aromatic component is determined. On the basis of laboratory data, the binary solvents efficiency graphs of n-hexane-toluene mixtures were produced, and the conclusion was drawn about the optimal ratio of alkane and aromatic components for dissolving the Vankor field (ARPD) asphaltene-resin-paraffin deposits.

Reasons for formation of stable intermediate layer water-in-oil emulsions in tanks

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Abstract. The present paper describes the possible causes of a high stable intermediate layer emulsion in tanks. Detailed studies have revealed that the main ones are mixing of oil from different oil-bearing horizons, presence of mechanical impurities in oil emulsions, presence of refractory paraffin hydrocarbons with melting temperature up to 85 ° C in oil, use of oilfield chemistry reagents, long-term oil production technological chain according to the integrated well-to-settling tank approach, application of intensive hydrodynamic well production modes, dispersion in metering and pumping installations. It is therefore important to understand and appreciate the high stable emulsions formation involved in processing and disposing of oil waste.

Electromagnetic worm-like locomotion system for in-pipe robots: novel design of magnetic subsystem

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Abstract. This paper describes a magnetic subsystem of an electromagnetic worm-like locomotion system (WLLS) with coupled electromagnets. WLLS simple-design consists of two elastically connected ring-like segments that form two magnetically coupled electromagnetic actuators. The actuators generate longitudinal and transverse displacements which lead to locomotion due to synchronized changes of inertial, normal pressure, and friction forces. In present paper, analysis of the magnetic circuit of the WLLS had been performed. From symmetry and general consideration of magnetic system effectiveness, a novel design of the coupled magnetic circuits had been developed. The novel WLLS has two-force component electromagnetic actuators that produce the transverse and longitudinal forces. The novel design of the electromagnetic WLLS is able to move an in-pipe robots and should have better specific pulling force.

Justification of design-mode parameters of the chopper soaked soybean grain

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Abstract: The most efficient way to prepare the leguminous plants' seeds for the livestock animal food is making of the protein emulsion. There are a lot of ways of obtaining the protein emulsion. However, process operations provide for the use of large-scale, energy-intensive and expensive machines, which often cannot be afforded by the small enterprises producing more than 50% of animal and poultry products today. This way, it is necessary to develop a universal technology of making the protein emulsion applied in small holdings. The research objective is development of a waste-free technology of making the protein emulsion for the animal food, which is implemented by means of one facility. Proceeding from patent search for technologies and designs to make a protein emulsion we offered a waste-fee technology, which makes it possible to unite a whole number of technological operations (chopping, extraction, division of suspension into fractions) into one operation through using a new facility, the RF Patent No. 2614777. Theoretical and experimental research of processes of the grain chopping and the soya protein extraction into emulsion was described. The main design and standard parameters of the device developed were substantiated theoretically and experimentally.

Ensuring the operational reliability of the tractor fleet

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Abstract. One of the major problems facing the engineering and technical service of agricultural enterprises is to figure out the volume of repair and maintenance impacts to ensure the optimal operation of the tractor fleet in conditions of limited financial resources. The study introduces individual reliability indicators of tractors, based on the analysis of the machine and tractor fleet in the Vologda region. The condition for the formation of rational and effective repair and maintenance impacts is the constant monitoring of reliability indicators of tractors and agricultural machinery, which allows not only identifying their individual characteristics, but also predicting changes in technical state. Studies have shown that different systems of tractors, in particular MTZ tractors, can differ by reliability actually n several times. The interrelation between the invested funds for repairs and the subsequent failure-free operation was found out. The increase of failure-free operation allows reducing the probability and the amount of downtimes in the busy farming season, thereby reducing the possible costs associated with losses due to downtime of machines, such as: violation of agro-technical terms, which is especially important for sowing and harvesting, being one of the factors of yield reduction. These studies laid the foundation for the method for determining the rational volume of repair and maintenance impacts, which consists in minimizing the total costs aimed at improving the failure-free operation of tractors. All this, along with using the up-to-date diagnostics tools, will increase the efficiency of preventive repair and maintenance impacts.

Identification of qualitative regularities in the functioning of neural network models of a critical resource of lubricating oils

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Abstract. In the present work, it is proposed to compare two approaches to building a model of a critical resource of lubricating oils that describe the rate of change in the optical density of oils with time, depending on the duration and temperature of temperature control. The initial data for building models of a critical resource are the results of measurements of the optical density of oils. The data obtained as a result of experiments are processed using a neural network model with Bayesian regularization, which has high smoothness and works well in conditions of small training samples. In this case, emphasis is placed on the ability of the model to contribute to the mapping of the general laws governing the process of thermo-oxidative destruction for more detailed study. As a result, the approach in which the initial data for the model are calculated values of the differential estimates of the partial derivative obtained from the primary neural network model of optical density is more

informative from the point of view of describing the qualitative patterns observed in lubricating oil under high temperatures.

Numerical simulation of aerosol particle aspiration in a passive sampler

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Abstract. A mathematical model and numerical calculations of the coefficient of aerosol aspiration into a passive sampler are realized. In the absence of the effect of particles influence on the gas flow the carrier medium is calculated in the approximation of an incompressible potential flow by the boundary element method. The equations of motion of the particles are calculated in the velocity field results to determine the coefficient of aspiration. The coefficient of the aspiration depending on the Stokes number and sampler angle is studied.

Hydrodynamic cavitation unit for improving the performance of irrigation water during plant growing

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Abstract. The computational and experimental work was carried out using the SolidWorks system. The main structural parameters of a hydrodynamic cavitation unit, designed to prepare irrigation water in the process of watering plants and pre-soaking seed before seeding, are determined. The unit has been manufactured and tested. It was established experimentally that the opening angle of the impeller wedge should be 40 and 80^0, and a sufficient rotor speed – 10.000 rpm. A more effective form of a hydraulic brake for this cavitation unit was determined, which made it possible to obtain irrigation water with a pH of from 7.2 to 8.5 on average, and an oxygen content of 4.6 to 6.5 mg / l. It is shown that cavitation allows the use of water for irrigation, even

from polluted natural sources, since the process of purification of polluted wastewater proceeds in parallel.

Probability analysis of water quality by turbidity

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Abstract. The distribution of turbidity values in given sample is analyzed. The results demonstrated that the nature of the distribution of turbidity values during the year largely depends on the seasonal factor, hence the analysis of the distribution of turbidity is performed separately for each month. Order statistic (variation series) is computed and an empirical distribution function of turbidity values is derived. It is concluded, that the distribution of turbidity in given water sample differs from normal, log-normal and gamma distributions. However, it can be described with sufficient accuracy by a cubic polynomial function. The turbidity distribution hypothesis is tested by the Kolmogorov–Smirnov test. The water turbidity distribution function predicts the probability of exceeding the specified values of turbidity and enables numerical assessment of its likelihood.

Influence of innovative calcium-containing additive on growth and development of heifer replacement

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Abstract. The comparative effect of the use of various physical forms of calcium gluconate on the growth and development of heifer replacement has been studied. Calcium-MAG is a nanodispersed nanostructured amorphous form of calcium salt of gluconic acid with a dispersion of tens to hundreds of nanometers and sizes of agglomerates not exceeding 500 nm. It is established that the use of calcium gluconate of various forms in diets promotes the growth of heifer replacement. Thus, the absolute growth of live weight in the animals of experimental groups in the main period of the experiment was 3.1 to 7.8% higher than in the control group. At the same time, the heifers that

received Calcium-MAG were characterized by great superiority (7.8%). The positive effect of calcium gluconates was also observed in further age periods, which led to a statistically significant difference in live weight between the control and second experimental group at the age of 18 months by 7.1 ($P \geq 0.99$) and 2.6%, respectively. The animals of the second experimental group were 10.9% and 2.9% more than their average counterparts in the control group ($P \geq 0.99$) and the first test group, respectively, in terms of the average daily weight gain. Observations showed that the height at the withers in animals, both at the age of 12 months and at the age of 18 months in the second test group was significantly higher than in the control group by 2.7 cm and 3.8 cm, respectively. A similar trend was observed in measuring the depth of the chest. A significant difference in this measurement was established between the animals of the control group and the second test group. At the age of 12 months, the advantage was 3.6 cm, at the age of 18 months - 2.6 cm ($P \geq 0.999$). The use of mechanically activated calcium gluconate in rations of heifer replacement at an early age contributes to their better growth, preserving the aftereffect in subsequent periods.

Expert study of emission monitoring equipment for Russian thermal power plants

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Abstract. The equipment for production and environmental monitoring, which is operated at many thermal power plants of the Russian Federation at the lower level of systems for continuous monitoring of emissions, is considered. At this level, measurements are carried out on the basis of agreed and certified methods, the collection and conversion of primary information to a standard type, routine maintenance and monitoring of the functioning of measuring systems and auxiliary equipment. The choice of specific gas analytical systems is associated with certain difficulties, since they all have their own advantages and disadvantages, and for the optimal choice of equipment it is necessary to take into account many different factors and parameters. The expert analysis carried out can complement the results of a preliminary survey by personnel of pulverized coal-fired power plants or by a specialized organization that designs systems for continuous monitoring of emissions of such stations, used in the development of the reference terms.

Integrated assessment of the influence of shungite-containing fertilizer on physical and chemical properties of typical chernozem in Rostov region

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Abstract. The aim of the presented research was to study the impact of the shungite-containing fertilizer on elemental composition and physical and chemical properties of typical chernozem in Rostov region, Russia. The trial was conducted under conditions of a model experiment with application of laboratory and instrumental methods of soils analysis in accordance with established procedures. The novelty of the study is that it defines the influence of the shungite-containing fertilizer on the content of humus, exchangeable base in the soil, active soil acidity, intensity of processes of nitrogen, phosphorus and potassium transformation in typical chernozem.

Technological parameters for vehicles in the organization of cargo transportation in the agro-industrial complex

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Abstract. The result of the research conducted shows that cargo transportation is one of the components of successful activity and efficiency of the enterprise in the agro-industrial complex. The collected data have shown that economic efficiency is influenced by many process parameters. The data collected allowed to make a conclusion that. For the optimization of cargo transportation, the AIC needs careful choice of the number, type and brands of vehicles, taking into account the type of activity of the enterprise, its production volumes and range of cargo transportation. When collecting the data to choose the type and construction of motor vehicles with regard to the operating conditions it was found out that it is necessary to consider many parameters: the type of cargo, the nature and volume of transportation, the mode of operation of motor vehicles, organization of transportation, road and weather conditions. For this purpose, the following information was specified: necessary parameters of the cargo taking into account volume and weight, the choice diagram of the vehicle based on the properties of the cargo. The data received which were used for choosing are provided in tables and graphs. After choosing the type and the number of vehicles and determining the volume of transportation, one of the components of efficient use of vehicles is to optimize the transportation. Optimization of transportation is considered and provided in the form of mathematical formulas. Everything is presented as an example for one of the types of

transportation. The issue studied and presented in this article is topical for the farms of the Mari El Republic in conditions of the market economy. That is why the data and calculations received are of practical application in the organization of cargo transportation in the agro-industrial complex enterprises and their optimization for maximum efficiency.

Assessment of impact of accumulated environmental damage to the quality of soil, surface and groundwater, agricultural products resulted from the mining enterprise

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Abstract. The study is devoted to the assessing the impact of environmental damage caused by mining enterprise to the quality of environment and agricultural products. It is shown that the waste storage of mining plant close to residential areas forms a complex of environmental and hygienic issues associated with pollution of air, surface and groundwater (including drinking water of private and public wells), soils with hazardous metals. The key problems include air pollution with suspended substances, lead, chrome and manganese – impurities typical for the mining plant wastes. Besides, increased level of some heavy metals in the water of city wells and the compounds in local food, a comprehensive combined effect of which might form a danger to public health, is also investigated. The current environmental situation requires the development of a set of environmental and ecological-hygienic measures aimed at improving of environmental quality and minimizing the negative impact environmental risk factors on people health.

Modeling the process of straightening low-stiff cylindrical parts by cross-rolling with smooth plates

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Abstract. To restore the shape of curved low-stiff cylindrical parts such as shafts and axles, the process of straightening by transverse bending is considered with subsequent hardening by the method of surface plastic deformation based on the transverse rolling of the cylindrical part with flat plates. The stress states of parts during editing are determined using the Ansys Workbench software package. The results of the distribution of the intensity of operating voltages and residual stresses over the cross section of the cylinder, depending on the absolute compression, are presented. The process in question can be implemented without the use of environmentally hazardous lubricating cooling technological means, which makes it possible to attribute it in the future to one of the types of green mechanical processing technologies.

Increase of bending rigidity of long-dimensional shaft by surface plastic deformation

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Abstract. The results of computer simulation of bending stiffness of cylindrical part are presented. The effect of residual stresses on the maximum bending is considered. It is established that the formation of residual stresses in the surface layers of a certain thickness have a positive effect on increasing the rigidity of the cylindrical pieces. The influence of the degree of relative deformation with the covering surface plastic deformation on the flexural rigidity of long shafts is determined. It is established that the degree of relative deformation in the range from 0.4 to 1.0% has a positive effect on the flexural rigidity of the shafts. The process in question can be implemented without the use of environmentally hazardous lubricating cooling technological means, which makes it possible to attribute it in the future to one of the types of green mechanical processing technologies.

Evaluation of microgeometry of cylindrical parts after cross-rolling in smooth plates

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Abstract. Hardening and finishing processing of cylindrical parts by transverse rolling in smooth plates was studied. The effect of the relative deformation and rotational speed of the workpiece on the main quality characteristics of the surface layer of hardened parts, such as diameter accuracy, roughness and ripples of the surface layer was determined experimentally. The results of the work offer a means for adopting the described method of cross-rolling for manufacturing of machine parts. The process in question can be implemented without the use of environmentally hazardous lubricating cooling technological means, which makes it possible to attribute it in the future to one of the types of green mechanical processing technologies.

Photosynthetic and symbiotic efficiency in shaping the yield of pea seed in the agro-ecological conditions of the southern forest-steppe of Western Siberia

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Abstract. The article presents data on the contribution of photosynthetic processes and symbiotic nitrogen fixation to the productivity of pea seeds. The interdependence of the processes of photosynthesis and nodule formation has been revealed, as well as the share of influence of factors on yield formation.

Methods of air-cured and dried fish storage technique improvement

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Abstract The article gives the review of production and consumption of air-cured and dried fish in Russia. While storaging there may be prominent mass losses because of shrinking caused by different factors. To reduce air-cured and dried fish shrinking there may be used different methods of creating and supporting the temperature and humidity conditions, different kinds of packaging, solutions for fish surface treatment. Refrigerated counters, used for fish storage and sales, have some drawbacks. The major drawbacks of the traditional methods of fish storage are changes of relative humidity in a holding room, of fish humidity, and of temperature, which leads to shortening of storage time and to fish shrinking. The use of different adsorbents allows to reach the necessary air humidity in refrigerated counters, and a fat substitute allows to reduce food shrinking. The investigation shows that the use of monoglyceride helps to increase fish storage period, but at the same time the taste of sea- or river-fish changes. Carbon dioxide considerably slows different microorganisms development, and consequently, increases a storage period. The use of carbon dioxide does not substantially influence the taste of fish. Though carbon dioxide increases the humidity in a holding room, its chemical properties sustain considerable lessening of oxygen concentration in a holding room, thus slowing the process of outer and inner changes in fish tissues, which results in a longer storage period. In the course of investigation the advantages and disadvantages of each method have been developed and their efficiency has been estimated.

On the problem of monitoring a technological process based on multipoint spatial measurement of parameters

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Abstract. The article considers a method for increasing the parameters reliability of a multipoint spatial measurement during the environmental monitoring at thermal power plants. The result is achieved by using functional dependency and applying fuzzy voting by the agreed majority for decision making. The functional dependence is caused by physical processes occurring while the flue gases transformation along the length of the pipe. The proposed approach helps to compare directly the values of the measured parameter obtained at different points in space, due to their

reduction using functional dependencies. This approach also can detect the faults in the sensors. The detection of failures occurs by comparing the direct readings at a given point with the readings calculated about other points.

Ecological state of honey plants in apiaries of the Tyumen region

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Abstract. The paper is devoted to the problems of the ecological state of honey plants of the Tyumen region. It is shown that the local conditions are very prominent for locating the apiary and its branches in the most advantageous place. As a result of the research, it was found that the flowers of the yellow clover, meadow clover and coltsfoot exhibit low cumulative properties to pollutants. Studies have shown that honey plants in the spring and summer flowering periods show different cumulative properties of pollutants. The regularity of the content of heavy metals, radionuclides and pesticides in honey plants of beekeeping areas has been established.

Stocks of raw materials of wild medicinal plants in the Western Baikal Region

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Abstract. The paper presents the results of resource studies of wild medicinal plants of the Western Baikal. The area of thickets, productivity, operational stock and volumes of possible annual procurement of raw materials of the studied species are determined, 10 species are recommended for industrial blanks for the needs of the region and for Russia, 5 species are recommended for regional and district use. The collection of medicinal raw materials is possible subject to scientifically grounded recommendations on the procurement of medicinal plants, taking into account the frequency of collection and the possible annual removal of raw materials from a specific territory.

Protected plants of Siberian forest-steppe ecosystems

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Abstract. Protection of Red Book plants in the forest-steppes of Central Siberia (Krasnoyarsk, Kansk and Achinsk) is carried out in nature reserves and nature monuments of regional significance, as well as a result of preserving landscapes in general, and, consequently, plant communities, without which conservation of rare plant species in nature is impossible. The aim of the work was the analysis of protected flora species of forest-steppe ecosystems of Central Siberia. The object of the analysis is a synopsis of the vascular plants of the forest-steppe, compiled on the basis of the collections of the plants of Herbarium named after L M Cherepnin (KRAS), collected by the authors from 1985 to 2018 by methods of local floras and model sections. There are 106 protected species, among which 31 are endemic taxa, 17 species of relict origin (5 relics are endemics), 19 species at the boundary of ranges (16 species at the border of ranges - relics and endemics). Krasnoyarsk, Krasnoyarsk-Kansky, Altai-Sayan, Altai-Sayan-Mongolian, South Siberian, Yeniseyian, Tuvino-Khakassia-Krasnoyarsk, South-West Siberian and Siberian ones were found among the Red Books of endemic and hemiendemic species of forest-steppes. Tertiary relics are mainly forest species of the immoral complex, steppe relics - Pliocene and aquatic. Relics of the Pleistocene age are represented by glacial and forest-steppe. The low category of rarities in many species, including relics and endems, is associated with the boundary of their ranges. Compared to the whole Krasnoyarsk Territory, the share of species 0 and 1 of rarity categories is increased, which indicates a strong anthropogenic effect on the natural forest-steppe ecosystems of Central Siberia.

Rare plants in the focus of the modern concept of biodiversity (on the example of Transbaikal)

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Abstract. Rare plants are endemic and relict species, and plants that are on the borders of their ranges. Only in the flora of the steppes of the Baikal Siberia, 48 endemic species are known, i.e., 7.0% of the total structure of the flora. In addition to endemics, relicts are typical for the historical phytogeography of Siberia. Twenty-seven of them belong to the oldest tertiary. It is often observed that the historical phytogeography of Siberia contains very little information about relict vegetation communities in comparison to a large volume of Pleistocene steppe relict species, for example. Logically one can assume that if species are preserved, it is likely to find islands of former vegetation, relict phytocenoses. Fragments of these communities are combined with tundra groups, forming relict tundra-steppe landscapes in the mountains of the Sayan mountains and Tuva. For the first time taking Transbaikal as an example, an approach for a holistic view of rare plant species in accordance with the concept of biodiversity is proposed. This means the disclosure of this phenomenon not only on the species, but also on the coenotic and landscape levels. As a result, rare plant species are represented in systemic integrity at three conjugate levels: 1. Characteristics of a unique species as a system of uneven-age individuals; 2. Analysis of plant communities with dominance or participation of the species under consideration; 3. Description of the original landscape with the development of rare phytocenosis. The holistic and related discovery of the biology and ecology of endemic, relict and boundary populations of plant species will serve as a basis for creating a valuable scientific synthesis, the Atlas of the unique gene pool of natural flora.

Floral finds in the city of Abakan (Republic of Khakassia, Russian Federation)

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Abstract. Abakan is a city district, the capital of a constituent entity of the Russian Federation of the Republic of Khakassia, with a population of 171.2 thousand people. On botanical and geographical zoning of L M Cherepnin Abakan is located in the Priabakanskaya valley steppe (S1) in the central part of the Khakass-Minusinsk depression at a height of 250 m above the sea level at the mouth of the Abakan river. Despite the fact that the territory of the Republic of Khakassia is studied well from the botanical point of view, there is not enough information about the current state, structure and species composition of the flora of the city of Abakan, which constituted the basis for

in-depth studies of its vegetation cover. The aim of the work was to identify new and rare plant species in the flora of the city of Abakan. Floristic collections in the city were carried out from 2016 to 2018 by the method of model section of the urbanized landscape. As a result of the expeditionary research of 11 model sections, new plant species for the Republic of Khakassia (Centaurea ruthenica, Galium coriaceum, Myosotis sparsiflora, Oxytropis candicans, Peucedanum morisonii, Sagittaria trifolia, Silene turgida) and the city of Abakan were found and identified for the first time in the administrative boundaries of Abakan (Aquilegia grandulosa, Batrachium peltatum, Potamogeton crispus, Scirpus radicans, Viola canina). Habitats and model sections with the coordinates of the collection are specified, the boundaries of the ranges of species in the regions are marked.

Receiving new perspective for biotechnology and virology cell cultures of fishes

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Abstract. Due to the increase in the population of the planet and the increasing need for proteinaceous food one of the most important sectors of agriculture - the aquaculture - is crucial for ensuring food security of the country. Control of viral diseases of fishes with use of biotechnology methods - such as cell cultures is necessary for development of the industry. The new lines of cells offered by authors from fabrics and bodies of the fishes which are industrially grown up in Russin Federation (sturgeons, a trout, a bull-trout), the technology of their receiving and also information on sensitivity to viruses will allow to solve a problem of timely diagnostics of viral infections of fishes and to provide an intensive development of aquaculture. The obtained cultures: SSF (VIEV) -1,2,3; OMG, STLE are incorporated in the cryobank and deposited in the Specialized Collection of Intermittent somatic cell cultures of agricultural and commercial animals RKKK (P) (SZHZ RAAS) at the FGBU of the FSC of the VIEV RAS and can be demanded by other scientific-research institutions for the solution of different tasks.

Microbiological monitoring of causative agents of infectious diseases of salmons in the Northwest region

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Abstract. In article results of microbiological monitoring of aquatic organisms of different species in the territory of the northwest region of the Russian Federation are provided. During the period from January, 2016 to December, 2018 it was subjected to a research of 13 439 samples of salmons. As a result of bacterial researches it is allocated 235 etiologically significant strains of microorganisms. By microbiological plating gram-negative microflora such as yersiniya, mixobacteria, pseudomonas is most often detected, it has high sensitivity to cephalosporins, fluoroquinolones, chloramphenicol and it is resistant to furasolidone, piperacillin, kanamycin, amikacin, aztreonam. In a mariculture at mass death from internals and gill apparatus of fishes allocated microorganisms of Flexibacter branchiophila (Flavobacterium branchiophilum) with the accompanying coccal microflora**.** For the first time in the country the allocation case in an aquaculture of gram-pozitive bacteria of Renibacterium salmoninarum is described and it's antibiotic resistanse is studied.

Situation and trends in food consumption by the population in the region with extreme natural conditions

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Abstract. The paper is devoted to the study of the food provision for the population of the Krasnoyarsk Territory - a region with a continental climate. It gives the estimation of per capita food consumption in the dynamics from 1990 to 2017 compared with rational norms and the minimum food basket of the Krasnoyarsk Territory. Almost all types of foodstuffs increase their actual consumption in recent years as compared with 2000. The energy value of the food ration mainly exceeds the energy content of the ration according to the norms due to the consumption of increased volume of potatoes. The current structure of consumption does not correspond to a rational one: consumption of milk and dairy products, fruits and berries, vegetables and melons and gourds is lower than the recommended norms. In the structure of the diet, the lack of protein is replenished by less valuable protein that comes with potatoes, bakery, cereals and pasta. Such a structure causes an increase in mortality from diseases of the digestive organs and the endocrine system of the regional population. The part of the population (18.5%) of the Krasnoyarsk Territory, which has incomes below the subsistence minimum, has low economic accessibility to food. Taking into account the differentiation of the territory of the region according to the degree of continentality of the climate, the need for foodstuffs for the future is determined for each zone of discomfort. Norms of rational nutrition are developed for the population of the regions of Russia on the basis of their natural and climatic condition characteristics.

Forests of the Angaro-Chunsky interfluve (Krasnoyarsk region)

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Abstract. The territory of the Angaro-Chunsky interfluve is located in the south-western part of the Central Siberian Plateau in the southern taiga subzone. The paper presents a review of forest vegetation studies in the region, which is represented by dark coniferous (Abies sibirica, Picea obovata, Pinus sibirica), light coniferous (Larix sibirica, Pinus sylvestris) and small-leaved (Betula pendula, Populus tremula) forests. The classification of forests of the Angaro-Chunsky interfluve is based on the ecological-phytocenotic classification of forests of V N Sukachev.

Biotechnology method of salmon protection against vibriosis

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Abstract. Our country has all potential for development of an aquaculture as one of sectors of agriculture, due to a huge number of fresh water areas and the extended line of the seas. Vibriosis is a bacterial salmon disease, it is one of the reasons of the volumes of the fish which is grown up in a mariculture constraining increase. Modern trends on refusal of use in agriculture of antibiotic drugs, to creation of eco-friendly productions and decrease in economic expenses in fish breeding set a world task of use of biotechnology methods of protection of fishes against infectious diseases, in particular from vibriosis. In the present article results of designing of vaccine from domestic strains of vibrioes are provided. It is shown that immunization of fish antigens of the tested strains of vibrioes (Listonella anguillarum) in an inoculative dose 7x108 m.c. with adjuvant ensures safety of a livestock to 97%, does not cause allergic reactions, the host defense remains not less than 12 months.

Strategic planning as a vector of the poultry industry development

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Abstract. The paper touches upon the issue of strategic planning of the poultry industry as a whole, as well as of its individual business entities, and shows the difference between strategic and long-term planning. A comparison of strategic planning in domestic and foreign practice is carried out. The methods and methodology of strategic planning are considered. The goals, directions, tasks of the Poultry Development Concept of the Russian Federation are described. The main digital information of the forecast of domestic production of poultry meat and eggs for the period 2013-2020 is presented. The features of the strategic planning of a specific poultry enterprise with digital information by year are presented.

Features of the phytocenosis structure in the urban ecosystem of the southern industrial centre

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Abstract. The structure of the urban phytocenosis and its constituent plant life forms are analysed. The percentage ratio of life forms found on the objects of landscape construction has been determined, dendrological groups for green construction in Volgograd have been designed and recommended.

Environmental condition of saline compact soils of the Central Pre-Caucasian region and its sanitation

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Abstract. The main factors determining the change of the ecological situation in the zone of salinized compact chernozems distribution are the hydrological state, waterlogging, water erosion and the use of chemical crop products. In order to prevent further progress in the degradation of these lands, a number of activities are required. The most important task is to ensure the expanded reproduction of soil fertility. Its solution suggests the systematic application of fertilizers. A great advantage on saline soils should be given to organic fertilizers in order to maintain stocks of humus. The value of humus in their composition increases even more due to the fact that it reduces the possible negative impact on plants of some components of the mineral part of the soil, improves its water-physical properties. Humus limits the leaching of nitrogen caused by uncontrolled mineralization, increases the filtering and buffering effect of the soil and groundwater. In the intensive farming system, a deficit-free humus balance can be observed by combining the use of organic and mineral fertilizers. At the same time, the use of higher doses of them leads to pollution of the soil, plants and the environment. Therefore, the use of fertilizers should be carried out taking into account the biological needs of plants and specific soil conditions. On saline soils, due to a significant reduction in plant growth parameters and the biomass formed by them, the removal of nutrients in the composition of the primary and secondary crop significantly decreases. In addition, they are characterized by relatively high osmotic potential, which may further increase due to the application of higher doses of fertilizers. Therefore, in these conditions, moderate and small doses of mineral fertilizers are effective, and they meet the needs of plants and the interests of the soil ecology.

Cultivation of mammals early male germ cells in a semi liquid medium

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Abstract. Spermatogenesis is one of the most complex processes of cell differentiation. The ability to cultivate early male germ cells and subject them to differentiation to produce mature gametes in vitro is an important task for both biology and veterinary and regenerative medicine. In vivo, spermatogenesis is known to occur in a three-dimensional structure, in the convoluted seminiferous tubules of the male reproductive glands, and Sertoli cells and the extracellular matrix have a significant impact on the survival, proliferation and differentiation of early germ cells. At present,

methods of creating a microenvironment, similar to the native, are being actively developed to support spermatogenesis in vitro. This paper reflects research on the use of semi-fluid media as a three-dimensional matrix for the cultivation of early male gametes of mammals. These culture systems have been shown to support the differentiation of early germ cells to the stage of elongated spermatids with the subsequent formation of spermatozoa. However, it is necessary to continue research to create a culture system that can induce and maintain complete spermatogenesis.

Migration flyways of geese in Central Siberia

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Abstract. Observations of geese abundance and migration in Central Siberia are especially relevant for international scientists due to the lack of objective data on this topic in English literature. The goal of this paper is to summarize the results of a long-term study (1980-2016) on migration of geese in Central Siberia, to distinguish and describe their migration routes in the environment of Continental Asia. The authors used a methodological complex comprising universally accepted techniques of ornithological studies, such as visual and instrumental observations at staging sites and along geese migration routes, registration of birds on the ground (travelling on foot, by boat or by car) and in the air (using aircraft). To clarify the subspecies, the authors carried out collection of birds or their body parts (heads, wings, legs, n = 1032 units). Capture and banding of nesting geese was done in the Altai-Sayan Ecoregion. The places and dates of maximum geese concentration, as well as the time of their departure, are quite permanent; that made it possible to carry out their definite registration using aircraft (25.5 thousand km). The works at each of the most significant sites were performed annually, at the same time of the year. They also analyzed data available in scientific literature and reports on returns of rings from the Ringing Center of the Russian Academy of Sciences, as well as information about geese received from hunters and specialists of environmental services. The paper shows main migration routes and their territorial connections. The Great Lakes Depression in Mongolia is a kind of “migration dead end” for a great number of waterfowl migrating in spring.

The role of voluntary forest certification in solving the problem of minimizing the impact on the environment in the process of logging

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Abstract. Conservation of forest biodiversity is a global challenge. These goals are the main objectives of voluntary forest certification. This article presents the results of the activities of one of the enterprises of the Krasnoyarsk Territory, Russian Federation, aimed at sustainable forest management and biodiversity conservation. The company is certified by the PEFC RUSSIA system and is guided by their requirements and recommendations. In order to minimize the environmental impact, adjustments were made to the process of logging. The change in the technological process made it possible to reduce the damage of the soil and undergrowth of trees. As a result of research activities of the enterprise, it should be admitted that during logging negative effects on forest ecosystems dominate, a significant transformation of the natural environment takes place. However, with the help of certain organizational measures, this damage can be minimized. Voluntary forest certification systems are designed to reduce the impact of the activities of enterprises and promote the best management of forest resources. To simplify the use of certification requirements, an algorithm for minimizing the impact on the environment through the tools of voluntary forest certification has been proposed.

Enzymatic treatment of Rubus saxatilis L. wild growing berries: technological parameters optimization

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Abstract. The influence of pectolytic (Vinoferm zymex) and cellulolytic (Bryuzaim BGX) enzymes treatment on *Rubus saxatilis* L. berries' processing became subject of this study, aimed at forming a complex of technological operations providing for increase in efficiency of Siberian plant raw material processing thus leading to obtaining planned amounts of final product with increased nutritional value from reduced amounts of food stock. Mathematical modeling of the dependence of the juice yield on the duration of the treatment process and the concentration of enzyme preparations was carried out. Application of enzyme preparations of pectolytic and cellulolytic action for increase of level of technological perfection of reception of berry juice is proved.

Poultry waste recycling - highly efficient business

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Abstract. The article discusses the issue of increasing the income of poultry farms when using waste recycling. Based on the analysis of the poultry products market and waste structure, it was concluded that waste recycling is extremely important from the point of view of environmental factors. As a result of the marketing research, possible loss of profits of the poultry farms were revealed when not using recycling. A review of existing methods of calculating the financial efficiency of recycling is given, and a calculation toolkit confirming the economic feasibility of using recycling when taking into account new indicators proposed by the authors is given.

Use of innovative space technology in progressive crop production

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Abstract. Over the past decades, the mankind has been preparing for the exploration of the nearest planets. To this end, the problems of growing useful and nutritious biomass (providing food for astronauts and space colonists) are being solved. Technologies for securing the life of closed space systems are being developed. For the preceding decades, a lot of unique engineering solutions have been obtained that allow implementing the technology of progressive crop production in the conditions of the Earth. The ready-made solutions for growing vegetables and fruits, berries and mushrooms are offered. The introduction of these technologies for the foundation of agricultural greenhouses based on the methods of hydroponics and airponics has already been taking place. However, the majority of these decisions are devoted to the problems of plant care obtaining the maximum amount of biomass. It does not disclose the features of the application of these technologies in the conditions of Siberia and the Far North. This article reveals the consideration of engineering problems in developing agricultural greenhouse facilities in conditions equal to the conditions of the Far North.

Preliminary results of a Taimyr-Evenk reindeer population study using the Argos/GPS satellite system in 2015-2016

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Abstract. The goal of the study was to investigate the distribution of tagged wild reindeers on the territory of Evenkiya and to provide recommendations on preserving and rational use of the population. The study was performed in 2015–2016 by the Department of Hunting Resources Research and Nature Reserve Management of the Siberian Federal University. The relocations of 10 wild reindeers equipped with Argos satellite tags were monitored, land and aerial surveys of the reindeers were also performed. Besides, taxation and cartographic documents of the State Hunting Register, as well as information received from hunters and hunting providers were used during the research. The areas of divisions were delimited mostly with the help of GIS-technologies. The borders of habitats, their size and the character of animal moving were found through signals received from satellite radio tags. To assess the behavior of the animals, the speed of their movements was analyzed both by the azimuth straight line between two daily points and by a tortuous trajectory. The maximum duration of signal from collars with new battery blocks in 2015-2016 was 438 and 444 days. The total distance covered by reindeers by the beginning of the third decade of July was 1641.1 km from locations of tagging, according to the satellite positioning data. The average speed was 13.5 km per day. A radical decrease in the number of tagged reindeers occurs with the beginning of spring migration. Two large waves of reindeer migration with an interval of 20–26 days have been observed in recent years. The positioning of tagged animals provides objective information on the migration of the herds, their fawning and wintering grounds. The possibilities of using a database for complex quality assessment of the population size and location of reindeer resources of Yessey group, as well as features of their habitats, are discussed in the article, with the biotic, abiotic and anthropogenic factors being taken into consideration.

Experimental model of toxic hepatitis on rabbits

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Abstract. One of the methods for investigating complex mechanisms of pathological process development in the body is biological modeling. Absence of standardized reproducible experimental models makes comparative assessment of multiple drug efficacy studies including in case of liver diseases much more difficult. Among experimental toxic lesions of the liver, the model of liver lesion induced by tetrachloromethane in mice is widely spread, which has considerable drawbacks. So, for certain tasks it becomes necessary to work with other animal species, in particular, with rabbits. Modeling of acute and chronic lesion of liver was done by intraperitoneal administration of

50 % carbon tetrachloride olive oil solution based on 1 ml per kg of body mass twice a week. In the course of experiment, on day 5 rabbits develop toxic lesion of liver supported by hematology examination. Hepatic functional insufficiency was characterized by hypoproteinemia, dislipidemia, statistically significant increase of serum transaminase activity, total bilirubin. Ultrasound, x-ray, morphological analysis of liver tissues in experimental rabbits showed changes consistent with hepatitis signs. Thus, this investigation has demonstrated that use of rabbits as a model gives a number of advantages: the possibility of studying biochemical markers in dynamics, ultrasound and x-ray monitoring of lesion.

Influence of the ratio of ingredients in the processed substrata on adaptation of the Eisenia Foetida (Sav.) worms to them

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Abstract. Recently in Russia and in the near and far abroad the vermikomposting of organic wastes has been widely adopted. In a vermiculturing the species of worms specializing in eating of vegetable oddments and excrement of mammals are used, it is Eisenia foetida (Savigni, 1826) and its subspecies E.f. foetida, E. Fandrei, and also an ordinary earthworm which is Lumbricus terrestris, the small red worm L. rubellus and types of Dendrobaena subrubicunda and D. Veneta. Many researchers consider that the vermicomposting promotes a solution of the problem of utilization of large numbers of household garbage, rainfall of sewage, wastes of the food industry, the cellulose-paper and woodworking, tanning, hydrolyzing industries, and branches of agriculture. The technology of a vermiproducting supposes the preparation of substrata. Such receptions as humidification of wastes; their aeration, neutralization; crushing and homogenization, use of various excipients in substrata (straw, rotten hay, opit, peat, some quantity of the mineral soil) reduce terms of preparation of substrata for a vermiculture. Our researches were devoted to definition of an optimum ratio of ingredients in the substrata prepared for a vermiculturing on the basis of a bird's dung for successful adaptation of Eisenia foetida (Sav.) to them.

Environmental management factors

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Abstract. The article analyses some factors of rational nature management. The concept of the rational is specified. The prospects of explication of this concept not only in the epistemological aspect but also in the sociological, praxiological and axiological aspects are shown and essential characteristics of rationality are revealed. The main conclusions of the study are that the rational improvement of the mechanism of environmental management inevitably involves humanisation of all spheres of society: social economic, political, managerial, educational, etc. A fundamental regulator of human activity in the field of environmental management is the ethical component that contributes to the implementation of the principle of co-evolution in the relationship between man and nature and the development of optimal factors of environmental management.

Weediness of crops in various crop rotations

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Abstract. Weediness of crops of field crops is examined in various crop rotations. Different types of weeds have unequal effects on crop plants. An expression of this effect is the harmfulness of weeds, which leads to a decrease in yield and a deterioration in the quality of the products. It is possible to change the species composition of weeds in the course of time on agricultural crops, which depends on the intensity of the cultivation technology and, first of all, on the alternation of crops and the introduction of straw. Monitoring of weed infestation of crops is necessary to predict the spread of the most harmful weeds in crop rotations. The aim of the research is to trace the dynamics of weediness and species composition of weeds on sod-podzolic soil in field crop rotations. The research was carried out in 1998 -2017 on a stationary site, on sod-podzolic medium loamy soil with a high content of mobile forms of phosphorus and exchangeable potassium. The biomorphological spectrum of weed species indicates that 26 species of juvenile weeds occur, and 9 species of perennial species. The appearance of *Chenopodium album* L. was the most common. There is an increase in the abundance of weeds during the research in the studied agrocenoses. If 61 specimens of weed vegetation per 1 m2 were observed in the first rotation, including 50 annual ones, then in the second rotation the abundance of weeds increased to 67 pieces / m2. The greatest amount of weed vegetation was observed - 76 pieces/m^2 in the third rotation of crop rotations. We come to the conclusion that the weediness of field agrocenoses increases, examining the dynamics of the contamination of crop field crop rotations, especially over the last six years of research. The number of species of Fumaria officinalis L. and Stellaria media (L.) Vill increases during the study. The number of species of Chenopodium album L. and Echinochloa crus-galli L. has increased significantly over the past six years. We found that the crops in the first crop rotation were the most littered. The rotation, including grasses and row crops, helps to cleanse crops of other crops from weeds. The quantity of weeds in crops of field crops increases with cultivation of crops by organic technology.

Normalization of the immune system of large cattle with the help of “Immunopheron” and “Ribotan” medicines

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Abstract. This article presents the results of studying the effect of immunostimulants "Immunoferon" and "Ribotan" on the indices of specific and non-specific resistance of calves. To this end, according to the principle of analogues, 3 groups of calves were formed, with 5 animals each. Calves of the third group served as a control. In the blood of calves, the content of immunoglobulins A, M, G was determined on the analyzer "Uniplan". The number of T-lymphocytes in the blood was determined by the method of spontaneous rosette formation with erythrocytes of a ram, B-lymphocytes - by the method of complementary rosette formation using standard rabbit hemolysin and as a complement - fresh serum of cows. The bactericidal activity of the blood serum (BASK) was determined by O.V. Smirnova and TA. Kuzminoy, lysozyme activity of blood serum (LASK) - according to KA. Kagramanova and Z.V. Ermolieva, phagocytic index and number (FH and FI) - according to V.S. Gostevu. Experiments showed that the calves of the experimental groups showed an increase in serum levels of immunoglobulin A, M and G, as well as bactericidal and lysozyme activity of blood serum, a phagocytic number and an index. The relative and absolute levels of B-lymphocytes and T-lymphocytes were also significantly higher in the calves of the test groups than in the control group. And the most significant changes were noted with the use of the drug "Immunoferon".

Indexes of nitrogenous exchange in organisms of high-yield cows in dependence from various concentration of lipids in diets

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Abstract. Animals of control groups received a diet with the maintenance of 3,5% of fat according to the detailed norms of feeding. Increase in level of fat in diets of analogs II and III groups up to 4,5 and 5,4% of its nonvolatile solid was carried out at the expense of the sunflower-seed oil entered into a diet by interfusing with concentrated compound feed. Zootechnical, hematological and biochemical researches were conducted with use of the practical standards. In this article the expediency of optimization of level of crude fat in diets of high-yield cows of golshtinsky breed is experimentally proved. It improves a condition of proteometabolism in their organism what the positive nitrogen balance, increase in extent of its deduction in a body and uses on formation of milk to testifies. Thus, strengthening of lipids in nonvolatile solid of diets of the high-yield lactating cows

renders particular and, in general, positive influence on key indicators of nitrogenous metabolism in their organism.

Influence of habitat factors on economic traits of cows of different lines

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Abstract. Influence of maintenance conditions of cows of different genealogical lines on milk productivity and physiological parameters of animals is studied. Different maintenance conditions of cows in the hulls affected the level of milk yield of animals of all lines: with yard housing there is a difference in the index of milk yield for 305 days of lactation from 59.4 to 252.3 kg compared to the indexes for tie-up housing. Minimum difference in the index was observed in first-calf cows of the Reflection Sovering line (59.4 kg), which indicates the better adaptability of animals of this line to less favorable housing conditions. The relationship between high-altitude measurements and measurements determining the milk type of animals (between the height at the withers and the chest width - a positive average interrelation (0.3), and between the height at the withers and the chest girth - a positive weak (0.11)) was revealed during the study. Also, a weak positive relationship between some measurements of cows and their milk productivity (between milk yield of cows and chest depth (0.11), chest width (0.13), chest girth (0.15) was found. Comparison of the physiological parameters of cows of different genealogical lines in different housing conditions showed that significant differences were found only in terms of "respiration rate" and "pulse frequency": when the tie-up housing, the aforecited indicators for cows of the Reflection Sovering line are significantly higher than those for herdmates. This suggests more intensive physiological processes that ensure better development and a higher level of milk productivity. Tendency to increase the number of erythrocytes and hemoglobin level in the blood of cows of the Reflection Sovering line, found during the study of influence of housing conditions of cows on the morphological and biochemical composition of blood, is preserved both in tie-up and yard housing.

Beef production of black-and-white breed depending on the degree of fattening

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Abstract. The studies present the indices of lifetime beef production of fed and non-fed culled cows and young cattle. The research findings showed that the average preslaughter body weight of cows after fattening upon sale to the meat-processing plants was 696.0±28.39 kg, and in cows that were not on feed it was 567.0±15.58 kg, which was 129.2 kg less compared to cows sold after fattening. The average preslaughter body weight of first-calf heifers after fattening when sold to the processing plants was 474.8±6.87 kg, and in first-calf heifers that were not on feed it was 444.0±4.29 kg, which was 30.8 kg less compared to first-calf heifers sold after fattening. The average preslaughter body weight of fattened young cattle when sold to the processing plants was 400.50±4.64 kg, and in young cattle that was not on feed it was 353.25±8.43 kg, which is 47.25 kg less compared to fattened young cattle. Not a single animal met the criteria of “super”, “prima” and “extra” category in terms of the body weight. Preslaughter body weight of studied cows according to age-sex groups also met the criteria for black-and-white cattle breed. Fatness category after fattening of first-calf heifers mainly corresponded to “extra” and “prima” categories, class B and subclass 1, while non-fed first-calf heifers corresponded to “excellent” and “good” category, class G, subclass 1. Fattened young cattle is classified to “good” and “satisfactory” category class G and D, subclass 1 and 2.

Milk productivity and exterior of holsteinized cows of the Kholmogory breed of different generations

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Abstract. The indicators of milk productivity and exteriors of holsteinized cows of Kholmogory breed of different generations were studied during the work. An analysis of the change in the features of the physique with age and the increase in pedigree in the Holstein breed was carried out. As a result of the research, it was found that linear measurements of cows of different generations have certain differences. Thus, the first-calf cows of the 4th generation have larger latitudinal measurements than the herdmates of the 1st, 2nd, and 3rd generations. In height, at the withers, they exceed the herdmates of the 1st and 2nd generations by 7.54 cm, the 3rd generation by 4.7 cm, an oblique corpus length - by 6.79-5.55-2.75 cm, respectively. At the same time, the first-calf cows of the 4th generation have a more tender type, their chest girth is smaller than herdmates at 4.04-1.66 cm, the pastern girth - at 1.1-0.29 cm. Reduction of the chest depth from the first generation to the fourth by 2.63 cm is observed in cows of all ages. Full-grown cows of the 4th generation also outperformed their herdmates in the following measurements: the withers height by 7.03 cm of the herdmates of the 1st and 2nd generation and by 2.81 cm of the cows of the 3rd generation, the chest width by 0.12-2.27 cm, width at hips - by 0.23-0.58 cm herdmates of 2 and 3 generations, but gave way by herdmates of the 1st generation by 0.46 cm, an oblique corpus length exceeded the herdmates by 1.27-6.34 cm. The circumference of chest behind the shoulder blades of the 4th generation cows was smaller by 5.37-8.01 cm than in the case of herdmates. The pastern girth in the 4th generation cows was 0.41 cm larger than that of the 3rd generation cows and 0.37-0.45 cm less than in the ones of the 1st and 2nd generation. When comparing milk productivity in cows of different generations, it is clear that the cows of the 4th generation had the highest milk production and live weight.

The study of the influence of exogenous factors on Saccharomyces cerevisiae DNA spheroplast

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Abstract. The possibility of fixing genotoxic changes in Saccharomyces cerevisiae yeast under the influence of physicochemical factors was evaluated using the DNA-comet assay. Peripheral blood leukocytes of mice subjected to similar effects were used as an object of comparison. The data obtained showed that under the action of both the alkylating agent and X-ray irradiation, the changes were more pronounced in experiments with leukocytes of the blood of mice. At a methyl-methane sulphonate concentration of 10 mM, the comet tail length in mouse peripheral blood leukocytes was about 40 µm, while the yeast spheroplasts tail length of a comet was 0.16 µm. The DNA content in the tail of the comet did not exceed 5 % for yeast after treatment with an alkylating agent at a concentration of 40 mM, which is 10 times less than in peripheral blood leukocytes of mice under similar conditions. Under the action of X-ray radiation, the length of the comet's tail and the DNA content in it for spheroplasts of yeast also differed significantly from the leukocytes of the peripheral blood of the mouse. Thus, the comet test allows to register a significant increase in the level of DNA damage in yeast spheroplasts under the action of physicochemical factors in relatively high doses.

Cellulose-decomposing microorganisms of light chestnut soils of the Volgograd region

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Abstract. The results of the dependence of the activity of cellulose-decomposing microorganisms on the anthropogenic impact on the soil are presented in the article. The qualitative reaction of microbial community to cellulose was assessed by the decomposition of linen fabric. The decomposition of the textile fibers and the increase of the weight of pieces of linen fabric by 30.64% in samples which were laid at the level of 10-20 cm in favourable soil conditions were demonstrated. It was determined that the highest microbial number was observed when a soil extract was cultivated on the Chapek medium, regardless of the soil conditions in which the microorganisms lived. The soils of the Volgograd region in the sphere of anthropogenic impact are contaminated and poor in micro- and macroelements, so they are not suitable for the life of the soil microbiota. That fact is evidenced by the lack of growth of microorganisms on an agarized soil starvation medium.

The effect of sterilization modes used for pork preserved in polymeric consumer packaging on the destruction of fatty acids

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Abstract. The article is devoted to solving an actual problem aiming at substantiating the rational modes of sterilization of preserved meat in order to minimize destructive effects on the main components of the products, including fats. The authors emphasized mainly on the change of polyunsaturated fatty acids (PUFAs) more specifically, essential fatty acids, which are under the close attention of researchers, both in our country and abroad. Particular attention is paid to the influence of sterilization modes on changes in the quality composition of fatty acids of meat lump in preserved pork. The article summarizes the new material on the effect of sterilization modes of preserved food on the degree of hydrothermal destruction of fat and the formation of free fatty acids on the total content of saturated, monounsaturated and polyunsaturated fatty acids. In this article, the approach for assessing the degree of destruction of the fat component of preserved meat from the point of separation of volatile substances, the content of which, as studies have shown, either decreases with sterilization, is completely destroyed, or increases after sterilization. It is established that most of the compounds, the proportion of which decreases with sterilization, belongs to the class of carboxylic acids, including heptadecanoic, decanoic, eicosanoic and octanoic acids. The idea is that the main factors influencing the change in the initial chemical composition of the product lipids are the presence of moisture in the raw food, the sterilization temperature and the pressure. It is shown that the free fatty acids identified in the raw food: arachidonic acid and hexane are absent in the finished product. As a research task, the authors evaluated the effect of gentle sterilization modes on the safety of oleic acid, which can inhibit the formation of cholesterol plaques in the blood vessels, preventing the development of atherosclerosis. A small amount of nervonic acid was found with a dietary value. It was shown that irrespective of the sterilization modes, γ-linolenic acid was preserved, which contributes to the strengthening of the structure of cell membranes. In conclusion, analysis results obtained indicated a shallow destructive change in the fat content of the preserved food under the influence of gentle thermal loads.

The state and problems of increasing milk production in Russian Federation

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Abstract. Milk production in the implementation of a competent management approach is a profitable agricultural business. To improve management decision making, regular monitoring of the situation on the milk market is needed. Our analysis showed that, despite the reduction in the number of dairy cows in all forms of management and despite the decline in milk production, in the period from 1990 to 2016 in the agricultural organizations of the country, the productivity of dairy

cows increased by two folds. Secondly, the cost of producing one center of milk decreased four-fold, which indicates the processes, innovations, mechanization and automation of production are in place and working well. Thirdly, labor costs per cow, in man-hours decreased by 2.5 times. Fourthly, it is positive that the loss of milk decreased by half. Fifthly, the export of milk, which includes exports both to non-CIS countries and the CIS, has increased by 93%. In order to identify the factors that affect the productivity of dairy cows, we performed a special correlation regression analysis. Our analysis allows us to conclude that the most significant factors affecting the productivity of dairy cows are: (1) the cost per year for the maintenance of one cow, in thousands of rubles; (2) labor costs for the production of one center of milk, man-hours; (3) the number of livestock per 100 hectares of agricultural land, heads; (4) the mass of one calf at birth, in kilograms; (5) the load per operator of machine milking, heads; (5) average monthly salary of a machine milking operator, rubles. The state regulation of dairy cattle breeding should be carried out on the basis of competent economic mechanisms, it presupposes rationalization of the structure of agricultural production, inter-industry and inter-farm relations, the creation of stable economic, legal and social conditions for the development of agriculture, taking into account the already achieved production results, available and potential resource base, especially availability of basic production assets.

Post-mortem indices of black-and-white breed

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Abstract. The research findings showed that the carcass weight of cows after fattening made 325.20±18.23 kg, and in cows that were not on feed it was 251.34±10.23, which was 73.86 kg less compared to cows sold after fattening. The carcass yield made 46.70 and 44.26±0.61% or 2.44% higher, respectively. The carcass weight of first-calf heifers after fattening made 193.78±2.81 kg, and in first-calf heifers that were not on feed it was 171.0±2.98 kg, which was 22.78 kg less compared to first-calf heifers after fattening. The carcass yield made 40.80 and 38.50±0.46% or 2.30% higher, respectively. The carcass weight of young cattle after fattening made 183.2±4.49 kg, and in young cattle that was not feed it was 136.93±5.69 kg, which was 46.27 kg less compared to young cattle sold after fattening. The carcass yield made 45.70±0.63 and 38.70±0.70% or 7.00% higher, respectively. The carcass yield in all age-sex groups corresponds to the indices for black-and-white breed. Not a single carcass of slaughtered animals is qualified as “super”, “prima”, “extra” and “excellent” category because they do not meet the requirements of GOST according to the carcass weight. The carcass of slaughtered animals is mainly qualified as “good”, “satisfactory” and “low” category. The results of the slaughtering of the researched animals by age-sex groups are as follows. The first-calf heifers after fattening belong to “good” category; because their carcass weight is in the range of 187.3-204.1, class G, subclass 1. The first-calf heifers without fattening correspond mainly to “satisfactory” category, because their carcass weight is in the range of 163.5-183.6 kg, class D and subclass 2. The heifers between the age of 8 month and 3 years old after fattening are mainly qualified as “excellent” category, because their carcass weight is in the range of 166.8-193.9 kg, class G, subclass 1. The heifers between the age of 8 month and 3 years old without fattening are mainly qualified as “low” category, because their carcass weight is in the range of 1128.1-153.5 kg, class D and subclass 2.

Biotechnological potential of the straight-wing species Acheta domesticus as raw material for the production of feed for aquaculture

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Abstract. The article assesses the biotechnological potential of crickets of Acheta domesticus species for use as feed for aquaculture. The optimal diet was selected and the most favorable conditions for the reproduction of insects in a mini-farm were determined. Studied the qualitative composition of the substrate on the basis of the crickets of the species Acheta domesticus. With the aim of selecting the optimal technological modes of processing of raw materials on the basis of the insects investigated the total antioxidant activity of aqueous extracts of dried crickets of the species Acheta domesticus crustaceans of the genus Gammarus pulex. For crickets Acheta domesticus activity was 1.508 g routine per 100 g absolutely dry sample and 1.888 g routine for Gammarus pulex. It was found that the samples of Gammarus pulex have the property of thermal stability according to the criterion of total antioxidant activity during drying of dry samples to a constant weight at 105°C.

Researching of fatty acids and amino acid structure of yogurts with use of mare's milk

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Abstract. Mare's milk is special dietary raw materials with treatment-and-prophylactic properties. The only product released by the industry from mare's milk in Russia is koumiss. However, koumiss is an alcohol-containing product. There is a problem of processing of mare's milk on functional fermented milk products. The most popular fermented milk product, among the population, is yogurt. We developed compoundings of two types of yogurt with use of mare's milk, the patent application is submitted No. 2017117840 RU for one of them of 22.05.2017 "Fermented milk product". The purpose of work is a research of fatty acids and amino acid structure of new yogurts with use of mare's milk. For studying two samples of yogurts were made. As raw materials mare's milk of the Bashkir breed was used. Production and researches of prototypes of yogurt were conducted on the basis of "Bashkir State Agrarian University"(Ufa), the accredited laboratory center

FGBUN "FITs food and biotechnologies" (Moscow). The analysis of fatty acids composition of samples of yogurts showed that they have high content olein, γ-linolenic, α-linolenic and arakhidonovy acids. Data on the content of amino acids in yogurts with use of mare's milk show that they are characterized by the high content of the irreplaceable amino acids proving the high biological value of ready-made products. The research is executed with financial support FBSI "Fund of Assistance to Development of Small Forms of the Enterprises in the Scientific and Technical Sphere" within state. contract No. 1202GS1/21741 of 05.05.2016.

The efficiency of cyproconazole and fludioxonil for plant protection against the phytopathogenic fungus Botrytis cinerea

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Abstract. The effect of two active ingredients of fungicides on pure culture of *Botrytis cinerea* Pers was assessed. The analysis was carried out for 16 possible combinations of cyproconazole and fludioxanil, one of which was a control one. According to the results of measurements of the dry weight of mycelium in an accumulative culture, a diagram was constructed and two-factor analysis of variance was given. It has been established that the combined effect of these fungicides has a significant effect on the growth of mycelium. The following combinations had significant effect: fludioxonil at maximum concentration (0:10), 1 part of cyproconazole and 10 parts of fludioxonil (1:10), 5 parts of cyproconazole and parts of 10 fludioxonil (5:10), 10 parts of cyproconazole and 5 parts of fludioxonil (10:5), and the maximum concentrations of two substances (10:10).

Effectiveness of natural antioxidants on oxidizing processes at storage of the raw materials containing collagen of bird processing

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Abstract. The purpose of researches is comparative assessment of effectiveness of effect of natural antioxidants at storage of raw materials of the poultry processing industry. For achievement of a goal addition of antioxidants is provided in control specimens. The experimental data are obtained as a result of carrying out laboratory researches on definition of acid and peroxide numbers in raw materials of the poultry processing industry in 7, 14, 21 and 28 days of storage. Antioxidants with various effectiveness promoted decrease in extent of their oxidizing decay. Addition of antioxidants in test pieces of raw materials promoted essential braking of its oxidizing decay. At reproduction vitamin introduction, acid number in 28 days of storage turned out less on average on 0,84 mg KOH /g, at addition of redoxon, Rutinum and dihydroquercetinum, respectively, on 1.27; 3.52 and 3.61 mg KOH /g - in comparison with a control specimen. So, at tocopherol addition this index in test pieces was 1.3 times less, in comparison with monitoring. As a result, in 28 days of storage of test pieces, acid number reached smaller values on average for 29%, and peroxide – by 1.5÷1.7 times, concerning control specimen. The received results convince of high performance of use of dihydroquercetin as the fissile antioxidant that provides a possibility of its use along with the available analogs.

Duration of economic use of lithuanian heavy draft stud mares

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Abstract. The development of milk horse breeding in Russia contributes to the high genetic potential of heavy draft stud mares. The Republic of Mari El has been breeding heavy draft horses to produce koumiss since 1977. The efficiency of heavy draft horse breeding depends on the intensity of use of the breeding stock. At the same time the duration of economic use of animals is of great importance as the duration of the use of horses provides not only economic benefits but also the breeding progress of the herd. The studies on duration of economic use of Lithuanian heavy draft stud mares and their lifetime productivity were conducted on the Koumiss farm of ZAO PZ "Semenovsky" of the Medvedevsky region of the Mari El Republic. The studies have shown that the duration of economic use of Lithuanian heavy draft stud mares on the farm is 4,195 days or 11.5 years on the average. The study of the lifetime productivity revealed that the Lithuanian heavy draft stud mares had a high lifetime milk yield. As a result of the research the significant positive correlation between the duration of use of the mares and their lifetime milk yield was found out. There is a small positive correlation between the duration of economic use and 1-day milk yield of the economic use and 1-day lactation. The analysis of duration of economic use of Lithuanian heavy draft stud mares depending on their father's genotype has showed that the longest lactation in the herd was among the daughters of stallion Sunkumas 32 – 15 years. Thus, when conducting selection and breeding work, the farms have great possibilities to increase the period of economic use of horses on this farm and increase their lifetime productivity.

Wine tourism and the introduction of new technologies in winemaking and viticulture

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Abstract. This paper, provided by the authors, focuses on the prospects for the development of wine tourism in the southern regions of the Russian Federation. Unlike a beach holiday, for obvious reasons unpopular in winter, wine tourism is a year-round phenomenon. The most important factor in the successful development of this type of business is familiarizing tourists with the latest technologies in winemaking and viticulture. These technologies are based on digitization of agriculture, the introduction of elements of precision farming, digital mapping and yield planning, parallel driving systems, Internet of Things (IoT), the use of unmanned tractors (combines) and robotics.

The study of the parent material of spring triticale

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Abstract. New varieties of spring triticale were taken an assessment in the conditions of the Republic of Chuvashia. It’s elicited that Saur variety is characterized by the biggest number of productive footstalks with kernel weight per spike and thousand-kernel weight. Variety Rovnya had the least number of productive footstalks. This variety showed minimal number of spikelets in a spike. At the same time, Rovnya had the biggest amount of grains. Variety Ulyana was inferior to all other varieties in kernel weight per spike and thousand-kernel weight. Variety Khaikar true of fact exceeded the standard in the number of productive footstalks, kernel weight per spike and thousand-kernel weight but in the number of spikelets and seeds in a spike was equal to Ulyana. The varieties Saur and Khaikar exceeded the standard in crop yields. Field germination rate turned to be rather low. In fact, Ulyana’s seeding rate has not affected the index. It fluctuated from 56,0-56,5%. Seeding density depended on both seed application rate and the variety itself. Number of seedlings with seeding rate growth increased of Ulyana variety from 225 to 339 and 276-372 pcs /m² of Khaikar. However, with increase of the seeding rate the survival capacity and viability of plants decreased. Especially sharp decline was common to the seeding rate of 6 ml of germinating seeds. Optimal seeding rate of triticale varieties in Chuvashia is 5 ml per 1 ha.

Diversification issues and prospects of agribusiness development in the Baikal Region

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Abstract. Currently, there is an urgent need for targeted development of rural areas. A comprehensive strategy for sustainable rural development includes diversification of economic activities. Development of agribusiness by measures strengthening regional competitiveness is the most important socio-economic tasks for the national economy. The government is designing the concept of “a global village”. The possibilities of diversified agribusiness development are considered on the example of the Baikal Region. Its territorial marketing products are well known but they should be considered from a strategic perspective. The article deals with the marketing products of the Irkutsk district municipalities belonging to three groups of territories: agricultural, agro-industrial, tourist and recreational. The issues and prospects analyzing agribusiness development are presented. The used marketing tools could be applied to the other rural territories designing strategies for agribusiness development.

The effectiveness of short-term preheating of "Kobb 500" hatching eggs during their long-term storage

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Abstract. Creation of highly productive cross-countries, transition to nonconventional power supplies of a bird, sharp restriction of its vital space, constant accumulation of egg and meat efficiency has led to very essential changes in a structure and physical and chemical properties of eggs. It forces scientists and practicians to make certain changes to requirements for quality of incubatory eggs, the modes of their storage and incubation. Influence of preincubatory storage of eggs on deductibility is a subject of long-term researches, but the modern theory doesn't offer any explanation of contradictory information which we have now. Bird's egg quickly loses the initial properties therefore can't maintain long-term having rummaged in development (the latent period) and in several days of storage becomes of little use for an incubation. The researches confirmed that creating conditions close to the natural process occurring in the nest due to the application of short-term heating of eggs during the storage period, can contribute to maintaining high hatchability at its longer storage. In conditions of forced storage, the short-term preheating of hatching egg to the optimum temperature allows to increase chick hatchability by reducing embryonic death and reducing the incubation time.

Evaluation of the age and anatomical areas impact on the properties of canine adipose-derived multipotent mesenchymal stromal cells

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Abstract. Multipotent mesenchymal stem cells (MMSCs) are potentially promising cells for non-pharmacological therapy. We have carried out a comparative analysis of MMSCs populations isolated from different anatomical areas of canine adipose-derived tissue (subcutaneous and visceral adipose tissue) with different age (one year and ten years) characterized by immunophenotype CD44 + / CD90 + / CD105 + / CD45-. Histochemical analysis revealed that the number of cells in per unit volume of canine adipose tissue decreases with age. The number of cells derived of stromal-vascular fraction by filtration method (filters 80 microns) also revealed the dependence on the age and anatomical location of the collected adipose tissue. In dogs of one year age, the number of cells in this population was 2.4 ≥ times more than in the experimental groups of 10 years. The necessity of collection adipose tissue from dogs of 10 years for further isolation of MMSCs has been justified, compared with dogs aged one year.

Analysis of the state of forest shelter belts of the agroclimatic zone III in the South of Russia on the example of agro-enterprise

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Abstract. The article considers the current state of forest shelter belts on the territory of an agricultural enterprise in Petrovsky district. The main species of the breed-containing composition are indicated, the location of forest belts on the farm is revealed, and the age composition is also indicated. A number of specialized measures were proposed that ensure the assessment of the status of forest belts, aimed at their rational use, reproduction and protection, increasing their productivity and sustainability.

Possible use of oil-degrading microorganisms for protection of plants growing under conditions of oil pollution

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Abstract. When entering soil, oil-degrading microorganisms come into contact with plants growing in polluted areas. We have studied the protective effect of oil-degrading microorganisms on plants growing under the conditions of model oil pollution. It has been shown that the treatment of the studied plants' seeds with a suspension of Rhodococcus at a concentration of 10^7 CFU eliminates the negative effect of oil and restores germination and morphological parameters of their seedlings. The content of chlorophyll a and b as well as carotenoids increased in plants treated with a suspension of Rhodococcus cells. That indicates the ability of Rhodococcus strain obtained to synthesize substances similar to cytokinins.

Hydroecological monitoring of the quality of river waters of the Amudarya river basin within Uzbekistan

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Abstract. The article discusses the quality problems of irrigation waters in Central Asia through hydroecological monitoring, suggests components of a hydroecological monitoring system using which the hydroecological status of the basins of the Surkhandarya, Kashkadarya, Khorezm oasis and irrigated areas of the Republic of Karakalpakstan was assessed, and also proposed practical recommendations solving these problems. When conducting hydroecological monitoring, it is necessary to take into account not only the influence of physiographic factors (geological structure, soil cover, climate, hydrological regime of rivers and other factors), but it is very important to assess the influence of anthropogenic factors: discharge into irrigated fields, influence industrial wastewater, hydrotechnical and land reclamation activities. Particular attention should also be paid to assessing changes in the magnitude of salinity and chemical composition of water along the length of the rivers under consideration.