

Second International Conference on Agriculture Digitalization and Organic Production ADOP 2022

Conference Programme and Abstracts June 06-08, 2022 St. Petersburg Russia





Organizer

• St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS, St. Petersburg, Russia)

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• Academician Alexander Kostyaev, SPC RAS

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• Andrey Ronzhin, SPC RAS

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- Ivan Ermolov, Russia
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 - Irina Podnozova, SPC RAS
 - Ekaterina Cherskikh, SPC RAS
 - Anna Moreva, SPC RAS
 - Anna Motienko, SPC RAS

Conference at a glance

Monday, June 06, 2022			
09:00-10:00	On-line Registration		
10:00-10:15	Opening Ceremony (room 401) <u>https://us06web.zoom.us/j/87926743169?pwd=Y1RWWGtua1JtWEgyZEZob3ZUNIp</u> <u>4UT09</u>		
	Plenary session 1 (room 401) https://us06web.zoom.us/j/87926743169 4UT09	?pwd=Y1RWWGtua1JtWEgyZEZob3ZUNIp	
	Keynote lecture 1: <i>Oleg Mironenko.</i> Current innovations in the field of organic regulation and their impact on the development of the organic market		
10:15-12:45	Keynote lecture 2: <i>Vasily Sokolov.</i> Digital technologies for analyzing the trajectory of a vessel in relation to the task of determining the fact of fishing and the type of aquatic biological resources		
	Keynote lecture 3: Olga Abramova. Digital technologies as a factor in the		
	Keynote lecture 4: <i>Ksenia Cheban and Evgeny Khrustalev.</i> Fish-breeding technological cadastre as a mechanism for the development of aquaculture in the Kaliningrad region		
	Keynote lecture 5: Elena Semenova. Stimu	llating of the export of organic products	
12:45-13:00	On-line Joint Photography of Conference	Participants	
13:00-14:00	Lunch break	F	
14:00-15:20	Oral Session 1: Robotics in Agriculture (room 401) https://us06web.zoom.us/j/8792674316 9?pwd=Y1RWWGtua1JtWEgyZEZob3ZUN lp4UT09	Oral Session 2: Digital Technologies and Automation in Aquaculture (room 406) https://us06web.zoom.us/j/8412258983 <u>6?pwd=S3RGVHBzN3FWdEdIT3ZsRFF3Z1</u> byZz09	
15:20-15:30	Coffee break	1172205	
15:30-18:00	Oral Session 3: Digital Technologies, Manufacturing and Organic Markets (room 401) https://us06web.zoom.us/j/8792674316 9?pwd=Y1RWWGtua1JtWEgyZEZob3ZUN lp4UT09	Oral Session 4: Organic Agriculture (room 406) https://us06web.zoom.us/j/8412258983 6?pwd=S3RGVHBzN3FWdEdIT3ZsRFF3Z1 hyZz09	
18:00-20:00	Social event		
Tuesday, June	07, 2022		
	Plenary session 2 (room 401) https://us06web.zoom.us/j/87926743169 4UT09	?pwd=Y1RWWGtua1JtWEgyZEZob3ZUNIp	
	Keynote lecture 6: Johannes Egbert. DairyProQ — successful automatic milking with Autorotor — commissioning — experience — optimization		
	Keynote lecture 7: <i>Jeroen Keijzer.</i> Digital Farming. Lely Horizon farm management platform		
10:00-13:00	Keynote lecture 8: <i>Rifat Sadikov</i> . Special approaches of robotic milking with different cow movement systems		
	Keynote lecture 9: Alexander Lebedev. Innovations and digitalization in Gatchina JSC		
	Keynote lecture 10 : <i>Kirill Plemyashov</i> . Digital technologies as a basis for collecting and processing information of economically useful traits in the introduction of genomic breeding of dairy cattle		
	Keynote lecture 11 : <i>Georgy Laptev.</i> Risks their analysis	in animal feeding and digital methods of	

13:00-14:00	Lunch break	
14:00-16:30	Oral Session 5: Digital Technologies and Automation in Animal Husbandry (room 401) https://us06web.zoom.us/j/8792674316 9?pwd=Y1RWWGtua1JtWEgyZEZob3ZUN lp4UT09	Oral Session 6: Digital Technologies and Agriculture Development (room 406) https://us06web.zoom.us/j/8412258983 6?pwd=S3RGVHBzN3FWdEdIT3ZsRFF3Z1 hyZz09
16:30-17:00	Closing Ceremony (room 401) https://us06web.zoom.us/j/879267431697 4UT09	?pwd=Y1RWWGtua1JtWEgyZEZob3ZUNIp
Wednesday, June 08, 2022		
10:00-18:00	Technology demonstration of SPC RAS	

Conference Programme

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	<u>4UT09</u>	
	Chair: Andrey Ronzhin	
	Plenary session 1 (room 401)	
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10:15-12:45	a vessel in relation to the task of determining the fact of fishing and the type of aquatic	
	biological resources	
	Keynote lecture 3: Olga Abramova. Digital technologies as a factor in the	
	development of the agro-industrial complex and rural areas of the Udmurt Republic	
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13:00-14:00	Lunch break	
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	Chair: Anton Saveliev	
	Igor Smirnov, Alexev Kutvrey, Robotic Device for Identifying and Collecting Apple	
	Fruits	
14:00-15:20	Andres Santiago Martinez Leon, Luis Mosquera, Sergey Jatsun, Oksana Emelyanova.	
	UAV Soil Sampling in Andean Highlands for Precision Agriculture	
	Dmitriy Khort, Igor Smirnov. Multifunctional Robotic Platform for Intensive Gardening	
	Boris Gubanov, Valeriia Lebedeva, Igor Lebedev, Marina Astapova. Algorithms and	
	Software for Evaluation of Plant Height in Vertical Farm Using UAVs	
	Natalia Zakharova, Rashid Kurbanov, Alexander Fokin. Pre-flight Preparation of an	
	Unmanned Aerial Vehicle DJI Phantom 4 Pro	
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	<u>2209</u> Chair: Roman Meshchervakov	
	Ling Lagutking Alexander Nevalennyi Victor Kriuchkov Eleng Evarafova Seraei	
	Ponomarey, Organic Aquaculture: Development Trends and Practical Experience	
14:00-15:20	Evaeny Ivashko, FishWeb: a Cloud-based Fish Farm management software	
	Roman Meshchervakov, Gleb Tevvashov, Pavel Ananiev, Anna Anannieva, Konstantin	
	Belyakov, Alexander Nevredinov, Marina Mikhailova. Using the Digital Reef to	
	Monitor and Enhance Biological Resources in Aquaculture	
	Glibko Oksana, Konstantin Okhota. Analysis and Visualization of Geospatial Data of	
	Dynamics of Ecosystems of Lake Ladoga and Reservoirs of its Basin under the	
	Influence of Natural and Anthropogenic Factors	

	Irina Elshaeva, Natalia Lepp, Vera Titova, Anna Pinaeva, Maria Koschman. Influence	
	of Organic Waste from Fishing Production on the Soil-Biotic Complex of Soddy-	
	Podzolis Soil	
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15:30-18:00	Oral Session 3: Digital Technologies, Manufacturing and Organic Markets (room 401) https://us06web.zoom.us/j/87926743169?pwd=Y1RWWGtua1JtWEgyZEZob3ZUNIp 4UT09 Chair: Nina Evdokimova Abramova Olga, Petr Akmarov, Olga Knyazeva, Ekaterina Alipova. Model for Determine the Potential of Digitalization of Agriculture in the Region Vera Mozgovaya. Digital tools in communication with the consumers of agricultural products in a crisis Valentina Kundius, Tatiana Streltsova. Smart Technologies in Bio-Intensive Organic Agriculture Alexander Matveev. Role of Sberbank as a Technology Partner in the Digitalization of Agriculture Mukhtar Kerimov, Viktor Vetushko. Convergent Technologies as a Basis for Processing Secondary Raw Materials in Agropractic Denis Galkin. Towards the Managed Transition to Organic Agriculture: Searching for a Strategic Model Marina Kholodova, Aleksandr Podvesovskii, Ruslan Isaev. Modeling Strategies for State Regulation of the Agri-Food Market Based on the Cognitive Approach Sergey Shirokov, Irina Trushkina, Vardan Aleksanyan, Habas Bekulov. Digitalization Tools in Terms of Food Security and Grain Product Subcomplex Development Natalya Osipova. Mechanisms of Legal Interaction Between Budgetary Institutions and Commercial Enterprises in the Field of Agriculture	
	Mehak Rai Sethi, Vandana Singh. The Catalytic Role of Technology in the Commercialization of Plant Varieties in India: A Critical Analysis	
15:30-18:00	Oral Session 4: Organic Agriculture (room 406) https://us06web.zoom.us/j/84122589836?pwd=S3RGVHBzN3FWdEdlT3ZsRFF3Z1hy Zz09 Chair: Galina Nikonova Vladimir Popov, Vladislav Minin, Dmitry Maksimov, Anton Zakharov. Prospects and Objectives for Organic Agriculture Development in the North-West Russia Galina Nikonova, Alexey Nikonov, Natalia Nikonova. Risk assessment of organic production in modern conditions Roman Nekrasov, Magomed Chabaev, Danil Petrushkin, Aloyna Zelenchenkova, Elena Tsis, Marija Dovydenkova. Use of Organic Selenium Supplementation in the Diet of Lactating Cows under Conditions of Intensive Milk Production Inna Ventsova. Placenta-Based Biologically Active Preparation on the Condition of the LPO-AOP in the Prevention of Obstetric Pathology in Cows Roman Nekrasov, Nadezhda Bogoluybova, Magomed Chabaev, Aloyna Zelenchenkova, Roman Rykov, Anastasiya Semenova, Viktoria Nasonova. Effect of Taxifolin on the Body of Pigs and Product Quality During Fattening under Conditions of Moderate to Severe Heat Stress Alexey Sukhoparov, Boris Sokolov, Alexandr Spesivtsev, Valerii Zakharov. Meaningful and Formal Problem Statement of the Technologies Synthesis and Programs of Grass Feed Production Proactive Management Dmitriy Maksimov, Vladislav Minin, Alexandr Perekopskiy, Sergey Chugunov. Seed Productivity of Common Timothy in Organic CROP Rotation Depending on Fertilizer Application Methods	

	Polina Filippova, Zinaida Kotova. Effect of Fertilizer Systems with Iodine on the Quality	
	and Yield of Solanum Tuberosum L.	
	Jan Puhalsky, Svyatoslav Loskutov, Alexey Mityukov, Galina Nikiticheva, Larisa Gorodnova, Martim Viana, Romeu Santos. Dynamics Regrowth of Lawn Turfgrass in Light-Culture with the Introduction of Various Combinations of Organo-Mineral Additives	
	Maad Al-Rukabi, Vladimir Leunov, Khaled Farawn, Tatiana Tereshonkova. Production of Tomato Hybrids in Soilless Cultivation (Hydroponic System)	
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	Diagnostics of T-2 Broiler Toxicosis with the Use of Biomarker Genes in the	
	Background of the Use of Feed Additives	
	Oral Session 6: Digital Technologies and Agriculture Development	
	(room 406)	
	https://us06web.zoom.us/j/84122589836?pwd=S3RGVHBzN3FWdEdlT3ZsRFF3Z1hy	
	<u>Zz09</u>	
	Chair: Abusupyan Dibirov	
	Alexey Sibirev, Aleksey Dorokhov, Alexander Aksenov. Prototype of an Optical System	
	for Identifying Micro- and Macro-damage to Plant Tissues	
	Mikhail Uzdiaev, Astapova Marina. Statistical Analysis of NDVI of Agricultural Land	
	Cover Aerial Images	
	Kirill Maksimovich, Vladimir Kalichkin, Dmitry Fedorov. Feed Forward Neural Network	
	Modelling for Spring Wheat Crop Forecast	
14:00-16:30	Tatiana Kizimova, Vera Riksen. Neural Network Approach for Solving Inverse	
	Kinematics Problem of Modular Reconfigurable Spring Wheat Yield Forecast Using	
	Machine Learning Methods	
	Vera Riksen, Kirill Maksimovich, Tatyana Kizimova, Dmitry Fedorov, Rufan Galimov.	
	Elements of the Decision Support System in the Agricultural Production Processes	
	Lyubov Vinnichek, Dina Gomboeva. Innovative Activity in Crop Production in the	
	Conditions of Digitalization of the Economy	
	Vera Andryushchenko. Digital Animal Husbandry in Russia: Prospects and	
	Implementation Opportunities	
	Evgenia Rakhimova. Financial Planning as a Tool for Managing a Peasant (Farmer)	
	Economy Based on Digitalization	
	Abusupyan Dibirov. Approaches to modeling the machine and tractor fleet of an	
	agricultural organization in the conditions of digitalization	
	Closing Ceremony (room 401)	
16.30-17.00	https://us06web.zoom.us/j/87926743169?pwd=Y1RWWGtua1JtWEgyZEZob3ZUNIp	
10.30-17.00	<u>4UT09</u>	
	Chair: Andrey Ronzhin	
Wednesday, June 08, 2022		
10:00-18:00	Technology demonstration of SPC RAS	

Abstracts

Plenary session 1 Keynote lecture 1



Oleg Mironenko, Executive Director of National Organic Union of Russia, Moscow, Russia.

Lecture Title: Current innovations in the field of organic regulation and their impact on the development of the organic market.

Abstract: The report analyzes the dynamics of the development of the global organic market in 2020-2021, the changes that have occurred in European legislation, and their impact on the export of organic products from the Russian Federation. The changes that have occurred in the Russian legislation and are planned to be adopted in the near future are presented. The assessment of the development of the Russian organic market in the pandemic period is carried out and the prospects for the development of new directions in the field of organics in the Russian Federation are presented. The prospects for the development of organic agriculture in the countries of the Eurasian Economic Union are presented.

Keynote lecture 2



Vasily Sokolov, Deputy Head of the Federal Agency for Fisheries, Moscow, Russia.

Lecture Title: Digital technologies for analyzing the trajectory of a vessel in relation to the task of determining the fact of fishing and the type of aquatic biological resources.

Abstract: The task of creating a machine learning model based on satellite data on the coordinates, course and speed of vessels to predict the facts of fishing activity before the arrival of a full-fledged vessel report, which ensures the suppression of illegal fishing activities, is considered. An integrated system for assessing the probability of fishing by a specific vessel at time intervals based on incoming monitoring data is presented and works in conjunction with the vessel monitoring system. Based on the accumulated monitoring data on the trajectory of the vessel for a statistically significant period, it is possible to determine with a high degree of accuracy (up to 90%) the type of aquatic biological resource caught.

Keynote lecture 3



Olga Abramova, Deputy Prime Minister of the Udmurt Republic, Russia. **Lecture Title:** Digital technologies as a factor in the development of the agroindustrial complex and rural areas of the Udmurt Republic.

Abstract: Trends in the development of digital technologies are presented, an analysis of the effectiveness of the system of state support for the development of digital technologies in the agroindustrial complex of the Udmurt Republic is given. The experience of mastering digital technologies in the development of the social and production sphere of rural settlements is generalized. The possibilities of using digital technologies as means of strengthening and developing connections in the production and social sphere of the village are considered. Ways of solving the personnel problem in the agrarian sphere and fixing youth in rural areas based on the development of digital technologies are proposed.

Keynote lecture 4





Ksenia Cheban, Head of Planning and Evaluation Procedures Department, Analytical Work and Planning Department, Kaliningrad State Technical University, Kaliningrad, Russia.

Evgeny Khrustalev, Professor of the Department of Aquatic Bioresources and Aquaculture, Kaliningrad State Technical University, Kaliningrad, Russia. **Lecture Title:** Fish-breeding technological cadastre as a mechanism for the development of aquaculture in the Kaliningrad region.

Abstract: Periodically changing programs for the development of aquaculture in the Russian Federation reflect the development strategy of the country's fisheries subsector. However, this strategy is built on the "building blocks", which are regional programs. But, when developing regional programs for the development of aquaculture, more often they use an approach focused on setting directive indicators for the quantitative and qualitative parameters of aquaculture products and attracting potential investors to their implementation. Once developed, a fish breeding technological cadastre will determine the prospects for aquaculture in the region for decades and can be considered as a "road map" for its development. When determining the strategy for the development of aquaculture in the region, it is necessary to consider the potential capacity of the regional consumer market in aquaculture products and the real one, assessed for the period of strategy development, corresponding to the level of income of the population, as well as the possibility of selling aquaculture products in external consumer markets.

Keynote lecture 5



Elena Semenova, Head of the All-Russian Research Institute for the Organization of Production, Labor and Management in Agriculture – Branch of the Federal State Budgetary Research Center for Agrarian Economics and Social Development of Rural Territories of VNIIESH, Moscow, Russia. **Lecture Title:** Stimulating of the export of organic products.

Abstract: The main trends in the development of the export of organic products, including wild plants, are considered. The prospects of Russia in expanding the export of organic products are assessed. The main barriers hindering export supplies and promotion of organic products to foreign markets have been identified. To stimulate exports, mechanisms are proposed for influencing exporters, infrastructure development, programs for promoting organic forest products to foreign markets are substantiated.

Plenary session 2	
Keynote lecture 6	
	Johannes Egbert, Principal Dairy Consultant, GEA Farm Technologies RUS, Moscow, Russia. Lecture Title: DairyProQ — successful automatic milking with Autorotor — commissioning — experience — optimization. Abstract: Robotic rotary milking system "Carousel" as a solution to the problem of productivity and efficiency in large dairy complexes. Experience in the development of rotary milking systems in the world and Russia. Modular organization of industrial processes at the dairy complex. Special requirements for the formation of groups and for the preparation of animals for rotary automated milking. Digital technologies in the management of production processes at a modern dairy complex, types and types of sensors, sensors, capabilities of the herd management system. Qualitatively new requirements for employees, specialists and managers in the transition to automated rotary milking. Step-by-step exploration of the technology that minimizes costs. Prospects for the development of robotic milking systems
Kovnoto losturo 7	minimizes costs. Prospects for the development of robotic miking systems.
	Jeroen Keijzer, General director of Lely Rus. Moscow region, Russia. Lecture Title: Digital Farming. Lely Horizon farm management platform. Abstract: An intelligent robotic farm management platform that brings us one step closer to the big future of dairy automation. First reviews of clients in Russia.
Keynote lecture 8	
	 Rifat Sadikov, Head of Consulting Group of Russia, Central Asia, Trans-Caucasus, DeLaval JSC, Ryazan, Russia. Lecture Title: Special approaches of robotic milking with different cow movement systems. Abstract: The livestock sector is the most important and strategic in the food security of our country. In recent years, there have been many changes in technical and technological methods in the production of livestock products. Systems of robotization of the processes of feeding, milking, collection and processing of raw materials are being introduced. Flawless milk is required for high quality products. The robotization of processes and control systems are becoming more sophisticated and more accessible. The dairy industry is changing dramatically. This is an integrated approach to the rational

to a more efficient level of production organization.

management of the dairy business that allows agricultural enterprises to rise

Keynote lecture 9



Alexander Lebedev, General Director of Gatchinskoe JSC, Leningrad Region, Russia.

Lecture Title: Innovations and digitalization in Gatchina JSC.

Abstract: Practical implementation of innovations and digitalization in an agricultural enterprise in the context of raw milk production, feeding, breeding, and cattle keeping. Results and problems of implementation, prospects and risks.

Keynote lecture 10



Kirill Plemyashov, Acting Rector of St. Petersburg State University of Veterinary Medicine, Corresponding Member of the Russian Academy of Sciences, St. Petersburg, Russia.

Lecture Title: Digital technologies as a basis for collecting and processing information of economically useful traits in the introduction of genomic breeding of dairy cattle.

Abstract: The current state of livestock breeding in Russia and abroad is considered, achievements in breeding dairy cattle of Holstein and other breeds are noted, and ways to solve challenges in livestock breeding and the agro-industrial complex of the country are identified. According to Falconer's theory (1960), genetic progress in animal husbandry consists of a number of factors, the key of which are: the accuracy of selection, the intensity of selection, as well as the generation interval between generations. Modern reproductive and genetic technologies both ensure the intensity of breeding and shorten the generation interval, and the accuracy of breeding should be maintained by strict identification of animals, fixation and collection of phenotypic data. Thus, the collection and digital processing of phenotypic traits based on the BLUP method makes it possible to predict with high accuracy precisely the indicators of the breeding value of animals, which are expressed in the level of genetic potential and its impact on economically useful traits of descendants.

Keynote lecture 11



Georgy Laptev, CEO of BIOTROF LLC, Professor of the Department of Largescale Livestock Breeding, St. Petersburg State Agrarian University, Doctor of Biological Sciences, Saint Petersburg, Russia.

Lecture Title: Risks in animal feeding and digital methods of their analysis. Abstract: The high yielding dairy cows must be fed a balanced and healthy ration (with a high amount of fiber). But, in intensive farming systems, we must load the rumen with more readily available forms of energy (starch and proteins) in order to derive the high milk yields we need to remain profitable in a low-margin industry. The rumen in cattle is organized to transform roughage (high-fiber) material, of naturally low nutritive value, into highvalue products, namely volatile fatty acids (energy). Unbalanced diets cause rumen microbiome dysbiosis, digestive problems, glucose, carbohydrate, energy, protein, lipid and mineral metabolism disorders. It leads to rumen acidosis, ketosis, liver dystrophy, reproductive organ pathologies, decreased immunity, milk yield, fat content of milk, productive longevity decrease. One limitation of rumen microbial community marker-16S gene sequencing is that it does not provide information about the functional composition. Bioinformatics programs such as PICRUSt2 were developed to predict the functional potential of a bacterial community based on marker gene sequencing profiles. We studied the rumen microbiome, its metabolic potential and gene expression affected by various feed factors and in different technological breeding periods.

Oral Session 1: Robotics in Agriculture



Igor Smirnov, Alexey Kutyrev, Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM" (FSAC VIM), Moscow, Russia. **Lecture Title:** Robotic Device for Identifying and Collecting Apple Fruits.

Abstract: The device for identifying and collecting apples is presented. The design of the device and the fruit collection control system have been developed. The developed robotic device has 3 degrees of freedom, the movement of the links is possible both in the horizontal and vertical plane. This is achieved by the following types of movement: the movement of the vertical rack of the manipulator around its axis in the forward and reverse direction, lifting and lowering the boom of the device, moving forward and backward the movable part of the boom of the manipulator with an installed fruit grip. A deep learning neural network has been developed to identify apple fruits on the received frames from cameras. The created algorithms for processing input graphic data and the operation of the computer vision system make it possible to recognize apple fruits with a high degree of accuracy up to 88.39%. Functionally, the control system of the robotic device for collecting fruits is divided into several blocks. These include the stereo pair node, which is the main part, on.



Andres Santiago Martinez Leon, Luis Mosquera, Sergey Jatsun, Oksana Emelyanova, Department of Mechanics, Mechatronics and Robotics, Southwest State University (SWSU), Kursk, Russian Federation.

Lecture Title: UAV Soil Sampling in Andean Highlands for Precision Agriculture Abstract: This paper presents a strategy for performing a continuous monitoring of the soil properties in Andean Highlands by implementing a system for collection of soil samples on an UAV executed on a quadcopter pattern. The motivation for selecting this topic is related to the existing requirements by the agricultural sector in the generation of cost-effective and ecological technologies for automatization of processes in order to perform a timely fertilization and irrigation activities, evaluate changes in soil fertility over time, as well as generate fertilizer application recommendations to prevent acid rain effects, such as foliage burning of agricultural areas and grasslands within larger fields. Due to the geographical characteristics and the presence of external uncertainties generated by the unpredictable behavior of the air environment, an adaptive control strategy based on the implantation of a PID and an MPC controllers has been proposed. The validation of the implemented control algorithms, as well as the proposed hardware/software architecture has been carried out by an experimental test. As the result of the study, theoretical and experimental information are compared, obtaining a permissible functioning range of the system in terms of stabilization and positioning accuracy.



Dmitriy Khort, Igor Smirnov, Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM" (FSAC VIM), Moscow, Russia. **Lecture Title:** Multifunctional Robotic Platform for Intensive Gardening.

Abstract: The main design and technological parameters of a new universal robotic platform for intensive gardening are substantiated. It is characterized by versatility, simplicity of design, ease of adaptation to various working bodies and actuators. Taking into account all production factors when cultivating garden crops, the basic dimensions of the robotic platform are established: the curb weight of the robotic platform should not exceed 450 kilograms, the required transport speed is 3 m/ s, the required speed when performing technological operations is 0.5-1.1 m/s, the slope to be overcome is at least 20 degrees. It was revealed that the parameters providing increased efficiency of the platform are: width - 1840-2080 mm, height - 1600 mm,

	length – 2,800 mm, ground clearance – 1200 mm, coefficient of traction power without track slope – 2.4, electric motor power – 750 W, operating time – 8 hours, operating speed – positional, the maximum speed is 4 m/s. The technical advantages consist in an intelligent motion control system, power plant and electric transmission, which allows the operation of power equipment in three modes: remote control, autonomous mode on electronic terrain maps using GPS signals, as well as in unmanned mode using machine vision modules. The developed control system has a promising application in the technologies of row spacing care: tillage, mowing and automated harvesting in the field.
	Boris Gubanov, Valeriia Lebedeva, Igor Lebedev, Marina Astapova, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia. Lecture Title: Algorithms and Software for Evaluation of Plant Height in Vertical Farm Using UAVs. Abstract: Currently, the number of vertical farms is rapidly increasing, and in the process of their work, all new technologies are used. Automation of plant development monitoring is one of the significant tasks in this direction. With the use of unmanned aerial vehicles (UAVs) it is possible to obtain images of plants for further analysis, which helps to reduce human resources and time costs. The paper proposes a new approach to assessing the dynamics of plant development in vertical farm containers, based on obtaining photographs of vertical farm racks using UAVs to further determine plant growth. Using optical flow and navigation data based on ArUco markers, the UAV moves between the vertical truss racks and takes pictures of objects of interest. The resulting photographs are processed to detect plants and evaluate their development dynamics. At the first stage, all received images that belong to one shelf are stitched together. Then, individual containers with plants are selected from the general photo, after which the average height of the plants in each container is calculated. All calculated parameters are stored in the database. In order to evaluate the dynamics of plant growth in each container, the current measured height values are compared with the previous ones. The developed approach was tested in the Gazebo simulator; the maximum relative error in determining plant height was 4%.
	Natalia Zakharova, Rashid Kurbanov, Alexander Fokin, Federal State
6	VIM" (FSAC VIM), Moscow, Russia. Lecture Title: Pre-flight Preparation of an Unmanned Aerial Vehicle DJI Phantom 4 Pro. Abstract: Unmanned aerial vehicles from DJI company are widely used in monitoring agricultural crops. The DJI Phantom 4 pro quadcopter is one of the

Abstract: Unmanned aerial vehicles from DJI company are widely used in monitoring agricultural crops. The DJI Phantom 4 pro quadcopter is one of the most common serial drones used to monitor the state of soils and plants. The lack of a methodology for pre-flight training of the DJI Phantom 4 pro quadcopter, a ready-made technical solution and specialized programs leads to the collection of poor-quality aerial photography data, disruptions of flight tasks and risks during the flight. The article discusses the main elements of pre-flight training of the DJI Phantom 4 pro drone equipped with a multispectral camera and a special suspension when monitoring crops. The proposed pre-flight preparation of the drone for flight reduces time costs and ensures flight safety.

Oral Session 2: Digital Technologies and Automation in Aquaculture



Lina Lagutkina, Alexander Nevalennyi, Victor Kriuchkov, Astrakhan State Technical University (ASTU), Astrakhan, Russia.

Elena Evgrafova, Volga-Caspian branch of All-Russian Research Institute of Fisheries and Oceanography, Astrakhan, Russia.

Sergei Ponomarev, K.G. Razumovsky Moscow State University of Technologies and Management (MSUTM), Moscow, Russia.

Lecture Title: Organic Aquaculture: Development Trends and Practical Experience.

Abstract: In the report reveals a promising direction of aquaculture, which is a set of technologies and practices for obtaining fish products in an organic way. This direction corresponds to three global trends: the rapid development of the industry, the expansion of organic production in agriculture and the production of environmentally friendly bioproducts. The volume of production in each of these areas has more than doubled in the last decade and is measured in tens of billions of dollars a year. The reason for such dynamic development is that organic aquaculture meets both global and state goals, as well as the needs of an individual. The organic method is a cyclical use of fish ponds in the aqua-crop rotation and can be used as the beginning of the preparation of the transition period for certification of products according to organic standards, as well as a method of increasing the efficiency of restoring bio-productivity in a "natural" way. In the course of the research, a direct de-pendence of the volume of commercial production of organic aquaculture of crustaceans on the conditions created in ponds after growing melons on them in comparison with the pond growing method was established.

Evgeny Ivashko, Karelian Research Centre Russian Academy of Sciences (KarRC RAS), Petrozavodsk, Russia.



Lecture Title: FishWeb: a Cloud-based Fish Farm management software.

Abstract: Aquaculture in Russia shows rapid growth over the last decade. Producing quick expansion, fish farmers are faced with loss of control, risks growth, reducing stability. Modern software solutions can help fish farmers to overcome the listed problems. This paper is devoted to a smart cloudbased fish farm management software system called FishWeb. The software supports fish farmers with comprehensive accounting, intelligent planning, advanced analysis tools, access rights differentiation, and integration with equipment. The user experience shows fast adaptation, increase in productivity and improved fish farms' activity control. The future development is linked to further improvement of intelligent support functions such as development of a decision support module, deep data analysis and predictive/prescriptive analytics.





Roman Meshcheryakov, Gleb Tevyashov, Federal State Budgetary Institution of Science V.A. Trapeznikov Institute of Control Sciences of Russian Academy of Sciences (ICS RAS), Moscow, Russia.

Pavel Ananiev, Anna Anannieva, Center of innovative mining technologies, Moscow, Russia.

Konstantin Belyakov, Tomsk State University, Tomsk, Russia.

Alexander Nevredinov, Eurasian Aquaculture Alliance, Moscow, Russia.

Marina Mikhailova, Institute of Biomedical Chemistry (IBMC), Moscow, Russia.

Lecture Title: Using the Digital Reef to Monitor and Enhance Biological Resources in Aquaculture.

Abstract: The article describes the methods for studying the ecosystem of water bodies, describes technical solutions for creating a digitalized artificial reef and presents a concrete structure of an artificial reef adapted to northern conditions, made using additive technologies to achieve a high value of the active surface, which contributes to the development of biocenosis. The main provisions of artificial reef tests are formulated. The results of testing the system, the development of technical proposals for the modernization of the system are presented.

Glibko Oksana, Konstantin Okhota, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Lecture Title: Analysis and Visualization of Geospatial Data of Dynamics of Ecosystems of Lake Ladoga and Reservoirs of its Basin under the Influence of Natural and Anthropogenic Factors.

Abstract: The results of systematization of geospatial data accumulated during long-term studies of the waters of Lake Ladoga and the reservoirs of its basin are presented. The analysis of the dynamics of lake-river ecosystems was carried out on the basis of the developed thermodynamic, hydrological models, which made it possible to identify the noticeable influence of natural and anthropogenic factors that lead to disturbances in the flow of lake hydrochemical and hydrobiological processes. Based on the generalization of previous works, lineament analysis and morphotectonic modeling, a diagram of the discontinuous tectonics of Lake Ladoga has been compiled. Comprehensive comparative limnological studies of the Sosnovka, Bulatnaya, Losevka rivers and the Tikhij and Shhuchij streams of lake-river systems of the western coast of Ladoga (Vuoksi basin), subject to varying degrees of anthropogenic impact, have been carried out. Visualization of accumulated data and dynamics of ecosystem development is carried out using the platform of the Center for Collective Use of Scientific Equipment "North-Western Center for Monitoring and Forecasting of Territorial Development", http://ckp.spcras.ru/.

Irina Elshaeva, Natalia Lepp, Anna Pinaeva, Maria Koschman, St.Petersburg State Agrarian University (SPSAU), Pushkin, St. Petersburg, Russia.



Vera Titova, Nizhny Novgorod State Agricultural Academy (NSAA), Nizhny Novgorod, Russia.

Lecture Title: Influence of Organic Waste from Fishing Production on the Soil-Biotic Complex of Soddy-Podzolis Soil.

Abstract: A study was conducted on the possibility of using organic waste in the conditions of biologization of agriculture. The objects of the study were waste from a farm for breeding African catfish with a closed water supply. To solve the tasks set, a chemical analysis of the waste was carried out. Under the conditions of a vegetative experiment with the cultivation of perennial grasses, the influence of this fertilizer material on the soil-biotic complex of soddy-podzolic soil was studied. In the experiment, the agrochemical indicators of the soil, the number of microorganisms and the activity of soil enzymes were determined. The impact of fishery waste on the nitrogen level of the soil was assessed. In the experiments, a positive effect was observed from the use of the studied fertilizers. The content of mobile phosphorus increased significantly. To increase the nitrogen level, the application of organic fertilizers in a full dose is effective. The use of fishery waste does not adversely affect the microbiological activity of the soil. The influence of the studied organic fertilizers on the intensity of biochemical processes in the soddy-podzolic soil is noted.

Oral Session 3: Digital Technologies, Manufacturing and Organic Markets







Abramova Olga, Ministry of Agriculture and Food of the Udmurt Republic, Izhevsk, Russia.

Petr Akmarov, Olga Knyazeva, Ekaterina Alipova, Izhevsk State Agricultural Academy, Izhevsk, Russia.

Lecture Title: Model for Determine the Potential of Digitalization of Agriculture in the Region.

Abstract: The article provides information on the development of digitalization in agriculture in Russia in recent years. The structure of innovations in the agricultural sector of the economy by types of application of digital technologies is shown. The problems in the digital transformation of the agricultural sector of the economy and regional features of the development of information and communication technologies in rural areas are highlighted. A model for assessing the development potential of regional agriculture based on the gravitational theory of the attractive force of growth points is presented. An example of calculating the development potential of a region based on the digital transformation of production and management processes is given.

Vera Mozgovaya, director of advertising agency V-Brand, Moscow, Russia. **Lecture Title:** Digital tools in communication with the consumers of agricultural products in a crisis.

Abstract: The report contains trends in the development of digital technologies, methods of their application in marketing and promotion of products of the agricultural sector. The experience of using digital technologies in the development of a new market niche is presented, cases of successful product launch on the shelves due to the introduction of digital tools are considered. The ways of promoting organic and local products using digital tools are proposed.



Valentina Kundius, Tatiana Streltsova, Altai State Agricultural University, Barnaul, Russia.

Lecture Title: Smart Technologies in Bio-Intensive Organic Agriculture.

Abstract: Organic agriculture is a modern and strategic trend in the agricultural economy. The article presents the results of scientific research on the development of organ-ic agriculture in the regions of southern Siberia based on the use of bio-intensive and SMART technologies. The purpose of the study determines its novelty, it is to develop the concept of choosing smart biointensive technologies for organic agri-culture, to develop scientific recommendations for substantiating solutions for organic farming. The method of choosing effective management decisions in the application of intensive technologies in organic agriculture has been proposed. The model composition of the methodology of multi-criteria assessment of technological processes in crop production, principles and advantages of choosing smart technologies in agriculture have been presented.

Alexander Matveev, project Implementation Manager, PJSC Sberbank, Saint Petersburg, Russia.

Lecture Title: Role of Sberbank as a Technology Partner in the Digitalization of Agriculture.

Abstract: The presentation will touch on such hot topics as import substitution of foreign technological and digital solutions for agriculture and the possibilities of Sberbank as a technology partner.



Mukhtar Kerimov, Viktor Vetushko, Saint Petersburg State Agrarian University, St. Petersburg, Russia.

Lecture Title: Convergent Technologies as a Basis for Processing Secondary Raw Materials in Agropractic.

Abstract: The grinding of mineral-organic raw materials is a complex technological process, which intensifies the biological activity of crushed products by intensifying the extraction of useful substances. In powders, biochemical phenomena occur at the atomic and molecular level, ensuring a synergetic technological effect of comminution. Fine grinding technology forms the structure of the final product to ensure its digestibility in the body. Following extensive research, powders can be used for targeted drug delivery to specific areas of living organisms. Precise dosage and mixing of particles on the atomic-molecular level allows diseased cells to be diagnosed and eliminated, leaving healthy cells untouched. The dynamics of a disintegratortype disintegrator containing a cylindrical body with two rotating disc-shaped rotors with percussion elements rotating in opposite directions inside is considered. A methodology for search experiments is presented, which allows studying transformations in the deep layers of substances and microelements. The suggested schematic-technical solutions provide the possibility of controlling the quality of shredding technology functioning with due regard for physical-mechanical, biological and chemical properties of the feedstock.



Denis Galkin, Altai State Agricultural University, Barnaul, Russia. **Lecture Title:** Towards the Managed Transition to Organic Agriculture: Searching for a Strategic Model.

Abstract: The present study is devoted to the analysis of problems and priorities for the de-velopment of organic agriculture in Russia. The purpose of the work is to propose recommendations for ensuring the sustainability of the development of organic agriculture at the macro level of the economy. Using FiBL data, we demonstrate the growing demand for organic products in developed countries and the availa-bility of resources for the production of organic products in some developing countries. Taking into account existing trends, we determine the competitive ad-vantages of Russia in the world market of organic agriculture. The authors present a model of the organic products production as well as priority areas for supporting organic agriculture. More precisely, we propose to take into account creating communities of producers; recognition of community interests by authorities; a state stimulating policy; regulation of relations between organic and traditional agriculture; and elaboration of the market for organic products. As the result, we suggest to make the managed transition to organic agriculture by dis-tributing the functions in the production of organic products between the state, agro-industrial holdings and farmers.



Marina Kholodova, Federal State Budget Scientific Institution "Federal Rostov Agricultural Research Centre" (FSBSI FRARC), Rostov region, Russia. Aleksandr Podvesovskii, Ruslan Isaev, Bryansk State Technical University, Bryansk, Russia.

Lecture Title: Modeling Strategies for State Regulation of the Agri-Food Market Based on the Cognitive Approach.

Abstract: The paper considers possibilities of using digital technologies in the agricultural sector. It is substantiated that, along with the operational tasks of industry management, digital technologies should be aimed, first of all, at solving complex strategic problems. In a difficult and unpredictable situation in the development of the domestic agri-food market, traditional methods and tools of state regulation should be replaced by technologies and methods of artificial intel-ligence. The leading role among intellectual frameworks of the strategic agri-food sector management belongs to cognitive modeling. A conceptual approach to modeling strategies of agri-food market state regulation based on the construction and analysis of a fuzzy cognitive map is proposed. The purpose of strategy modeling was to study the possibilities of stimulating domestic consumer demand for food and imparting sustainable economic dynamics to agricultural production through a system of control actions based on a stabilization pricing instrument. Based on the results of the structural and target and scenario analyses of the con-structed fuzzy cognitive model, the authors' scenarios are proposed that allow substantiating the need, adequacy and efficiency of application of stimulating and regulatory managerial actions through a qualitatively new management tool. Results of such studies can be used in development and implementation of the state agri-food policy.







Sergey Shirokov, Irina Trushkina, St.Petersburg State Agrarian University (SPbSAU), Pushkin, St. Petersburg, Russia.

Vardan Aleksanyan, Armenian National Agrarian University (ANAU), Yerevan, Armenia.

Habas Bekulov, Kabardino-Balkarian State Agrarian University named after V.M. Kokov (Kabardino-Balkarian SAU), Nalchik, Kabardino-Balkarian Republic, Russia.

Lecture Title: Digitalization Tools in Terms of Food Security and Grain Product Subcomplex Development.

Abstract: In the context of the intensification of the processes of increasing investments in the development and dissemination of digital technologies in the agroindustrial complex, an urgent problem is their successful application to form the necessary volume of the grain market. The purpose of the study is to analyze the opportunities for the use of digitalization tools as a factor in the sustainable development of the grain subcomplex. With regard to the prospects for the development of grain production and its role in the formation of food resources in the Russian Federation as a whole, the parameters of self-sufficiency in basic food products, with actual consumption and according to recommended standards, are determined. Taking into account the importance of grain farming for the development of animal husbandry, the coefficients of self-sufficiency of the population of the country for meat and milk are given. The conclusion is made about the constraining factors of digitalization in the grain subcomplex, as well as the presence of large arrays of unstructured information, which requires paying priority attention to big data processing methods. This characterizes the actual state and the necessary requirements for digitalization processes when analyzing the overall parameters of the food security.

Natalya Osipova, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Lecture Title: Mechanisms of Legal Interaction Between Budgetary Institutions and Commercial Enterprises in the Field of Agriculture.

Abstract: The level of ensuring the country's food security depends on the proper and targeted use of agricultural land. Thus, in the Russian Federation, according to the Ministry of Agriculture, the area of unused agricultural land is 44 million hectares, their involvement in turnover and subsequent exploitation is of strategic importance. The article describes examples of the use of agricultural land with the use of digital technologies in foreign countries. Using the example of the activities of budgetary (scientific) institutions in Russia, the author examines the conclusion of civil law contracts as one of the ways of interaction with commercial organizations for the effective, rational use of agricultural land. The positive significance of their application by a budgetary (scientific) institution in accordance with the development programs of the agro-industrial complex and Russian science is noted. Based on the generalized data of judicial practice for each type of contract, recommendations for their conclusion are given, as well as conditions that should be paid special attention to. In the course of the study, a comparative analysis of the contracts under consideration was carried out, where the advantages and risks of conclusion are indicated in the form of a table. According to the author, for the long-term planning of the development of the agro-industrial complex of Russia as a whole, science and the targeted use of agricultural land, the most profitable option for both a budgetary

	(scientific) institution and a commercial organization is the conclusion of a
	contract for research work, while the law does not prohibit the simultaneous
	conclusion of other contracts.
	Mehak Rai Sethi, Vandana Singh, Guru Gobind Singh Indraprastha University
	(GGSIP University), Delhi, India.
	Lecture Title: The Catalytic Role of Technology in the Commercialization of
	Plant Varieties in India: A Critical Analysis.
	Abstract: Technology is an indispensable tool to propel the engine of
	economies of the nations all across the world. However, the access to modern
	technologies is not available to all nations on an equitable basis; hence, the
	categorization between the developed, developing and least developed
	countries. Technology Transfer has been a controversial issue under the
	intellectual Property regime for years now, as without technological
	dignity in the modern period. In fact, due to such disparities, the developed
	countries tend to become more developed, and the least developed tend to
	go further down the surface towards regression. But is the "transfer" a
	matter of concern only amongst countries? Is there no such disparity "within"
	the nations themselves? Are all the resources equitably divided within the
	geographical divisions of each nation? These questions often come up,
	especially when we think of a country as vast and diverse as India. With this
	paper, the authors seek to highlight the loopholes in the Indian law with
	regard to technology transfer generally as well as specifically in one of the
	most important sectors of its economy, i.e., the agricultural sector. It is an
	attempt to open the minds of the readers to view technology transfer as not
	merely a global issue, but also a national one.
Oral Session 4: Organic	merely a global issue, but also a national one. Agriculture
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Galina Nikonova, Alexey Nikonov, Natalia Nikonova, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Institute of Agricultural Economics and Rural Development, Pushkin, St. Petersburg, Russia.

Lecture Title: Risk assessment of organic production in modern conditions. Abstract: The urgency of the problem is determined by the need to regulate the risks of production of any type of agricultural products. Taking into account the development of the organic food market, the purpose of the study was to as-sess the system of risks and factors causing them to develop proposals to re-duce possible losses in the production of organic products. The study is based on the generalization of the results of domestic and foreign authors, as well as statistical analysis of the materials of the Russian Union of Organic Farming and specific agricultural producers. In accordance with the objectives of the study, the theoretical foundations of the concepts of «risk» and «uncertainty» are considered, the approaches of researchers to the classifica-tion and assessment of risks are systematized, the prerequisites and constraining factors for the development of the production of organizational products are determined. The types of risks, their level in the production of organic products in general and depending on specific producers, as well as the structural scheme of risk assessment are shown. To study the motivation for the development of organic production, interviews were conducted with farmers from two regions of Russia. The sample included respondents associated with the production of both organic products and traditional. Based on their assessments, it is concluded that the production risk, which is the cause of its other types, is currently combined with commercial risk due to the shortened shelf life of natural products. Moreover, the existing restrictions of activity are different for farms that are in transition to organic production and are already present on the market. Therefore, in order to create a favorable economic environment and use the significant potential of the organic products market development, it is necessary to implement a system of special measures of state support for commodity producers, especially during the conversion period.

Roman Nekrasov, Magomed Chabaev, Danil Petrushkin, Aloyna Zelenchenkova, Elena Tsis, Marija Dovydenkova, L.K. Ernst Federal Research Center for Animal Husbandry, Podolsk Municipal District, Moscow region, Russia.

Lecture Title: Use of Organic Selenium Supplementation in the Diet of Lactating Cows under Conditions of Intensive Milk Production.

Abstract: 36 clinically healthy lactating Holstein cows of black-motley breed were used for scientific and economic experiments. In the control group (n = 9) of cows (C100) 4.9 mg/head/day of inorganic sodium selenite was fed. Cows in the experimental groups were fed an organic Selenium Supplementation – 2.5 (Group E50, n = 9), 3.7 (Group E75, n = 9) and 4.9 (Group E75, n = 9) mg/head/day. Inclusion of organic Selenium in the diet of cows of the experimental groups increased (p < 0.05) the average daily milk yield, while the number of somatic cells decreased (p < 0.05) in milk. Inorganic and organic Selenium supplements had no effect on fat, milk protein content (p > 0.05). Increased Selenium concentration in milk is noted higher in the E75 group (p < 0.05) and E100 group (p < 0.01). Organic Selenium supplementation induced increase of phagocytic index (p < 0.01) in cows of experimental Group E50. Cows of experimental Groups E50, E75, E100 had the highest accumulation of Selenium in the hair by 49.0, 57.1 and 74.0%

	compared to the control Group C100 receiving inorganic form. The use of
	organic Selenium Supplementation allows the most complete realization of
	the animal's need for an important element of nutrition in the
	implementation of organic livestock production.
	Inna Ventsova, Voronezh State Agrarian University named after Emperor
	Peter the Great, Voronezh, Russia.
	Lecture Title: Placenta-Based Biologically Active Preparation on the Condition
	of the LPO-AOP in the Prevention of Obstetric Pathology in Cows.
E F	Abstract: The study of lipid peroxidation and the system of antioxidant
	protection of dairy cows included red-and-white breed cows that received
	placenta-based biologically active preparation to prevent delivery and post-
	partum complications. The con-trol group of animals did not receive the
	studied preparation (n=14). The animals from the test group (n=30) received
	subcutaneous injections of "Placenta Active Beginning" at the dose of 20 ml a
	month before delivery, 15 days before delivery, and during delivery. As a
	result, in the test group, five days before delivery, the level of
	malondialdehyde decreased by 5.6% in comparison with the baseline and by
	6.7% in comparison with the control group. The level of vitamin E was 25.8%
	higher than the baseline and 26.7% higher than in the control group. A month
	af-ter delivery, the level of maiondialdenyde in the control group was 14.2%
	nigher than cows that received PAB. The level of vitamin E was 15.4% nigher
	in the test group than in the control group, and the activity of glutathone reductase was 12.2% higher catalase 7.0% higher and convolution
	reductase was 13.2% flightly, catalase -7.0% flightly, and certappiasinin -24.6% higher. The rate of obstatric nationalogy in the test animals was 20.0% in
	24.0% Ingrief. The fate of obstetric pathology in the test animals was 20.0% in comparison with 57.5% in the control group. Thus, the application of
	compansion with 57.5% in the control group. Thus, the application of
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Alexey Sukhoparov, Federal Scientific Agroengineering Center VIM, Moscow, Russia.

Boris Sokolov, Alexandr Spesivtsev, Valerii Zakharov, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Lecture Title: Meaningful and Formal Problem Statement of the Technologies Synthesis and Programs of Grass Feed Production Proactive Management.

Abstract: The relevance of modern grass feed production problems is determined by a number of reasons related to the feed quality requirements growth, the dairy productivity growth, the subjectivity of assessments in the organization and control of technological processes, visual control based on personal experience, the growth of requirements for operational adaptation to weather and climatic anomalies of existing technologies, the complexity of logistics schemes in feed production, a variety of technologies and technical means of cultivation and harvesting, types and varieties of fodder crops. To improve the quality and efficiency of the grass feed production process management, the paper proposes a new holistic multi-criteria approach to modeling and optimization of this process. A new substantive and the problem formulation of the technologies synthesis and programs of grass feed production proactive management has been carried out. It is shown that this problem belongs to the class of multicriteria polystructural synthesis problems of the complex organizational and technical object appearance and programs of their proactive management functioning. The analysis is carried out. The ways of the formulated problem solving are determined.

Dmitriy Maksimov, Vladislav Minin, Alexandr Perekopskiy, Sergey Chugunov, Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM" (FSAC VIM), St. Petersburg, Russia.

Lecture Title: Seed Productivity of Common Timothy in Organic CROP Rotation Depending on Fertilizer Application Methods.

Abstract: One way to improve environmental safety of farming is to expand the organic production that demonstrated a recent rapid growth. The main problems in biolo-gized technologies for growing grasses are the weed control and introduction of permitted fertilizers. This article presents the results of experimental studies on technological methods of caring for common timothy seed crop. The study objec-tive was to identify the most effective techniques for cultivating grasses on seeds with local application of organic fertilizers in the organic farming system. The study procedure provided for a control variant and a nitrogen dose of 40 kg ha-1 of the active ingredient. The fertilizer was applied by a pilot machine. Various op-tions for the introduction and incorporating of fertilizers were implemented. The high grass seed yield of 0.038 kg (m2)-1 was registered in the variant with the ferti-liser application dose of 60 kg N ha-1. An increase in the fertiliser application dose from 0 to 60 kg N ha-1 demonstrated a significant positive effect of 40 to 60% yield increase. The study findings will be used to elaborate scientific principles for creation of an intelligent control system for biology-based crop production tech-nologies.



Polina Filippova, Zinaida Kotova, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Institute of Agricultural Economics and Rural Development, Pushkin, St. Petersburg, Russia.

Lecture Title: Effect of Fertilizer Systems with Iodine on the Quality and Yield of Solanum Tuberosum L.

Abstract: The paper presents the results of two microfield experiments conducted to study the effect of various fertilizer systems using iodine on potatoes on sod-podzolic soil. In the first experiment, 9 variants of concentrations from 0 to 0.64% were studied at three levels of mineral nutrition on medium-cultivated sod-podzolic soil. In the second experiment, one, two and three foliar treatments with 0.02% potassium iodide solution were studied on soils with different fertilizer systems. The most optimal for potatoes were iodine concentrations of 0.01 and 0.02%, as well as double treatment of 0.02% KI. Iodine contributed to an increase in yield by 37% in the 1st experiment and by 31% in the 2nd. Also, foliar treatments con-tributed to the accumulation of iodine in potato tubers, increasing the content to 1.63 mg kg-1 with a triple treatment of 0.02% KI. The organic and mineral components of the fertilizer system did not affect the accumulation of iodine. A single treatment with high doses of iodine reduced productivity, which indicates the ex-pediency of interval treatments. Also, small concentrations of iodine had a posi-tive effect on the nutritional value of potatoes, increasing the starch and potassi-um content, and reducing the nitrate content.



Jan Puhalsky, Svyatoslav Loskutov, Alexey Mityukov, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Galina Nikiticheva, Larisa Gorodnova, Pushkin Leningrad State University, Petersburg highway, St. Petersburg, 196605, Russia.

Martim Viana, Romeu Santos, Lumatek Ltd, Junction Business Centre, Sqaq Lourdes, St Julian's, Malta.

Lecture Title: Dynamics Regrowth of Lawn Turfgrass in Light-Culture with the Introduction of Various Combinations of Organo-Mineral Additives.

Abstract: The device of lawns is the simplest and fastest way of gardening of the areas of any free sites. By improving their external aesthetic appearance, we thereby take care of the ecological situation of the region or area in the given territory. In the improvement of megacities, the main role in maintaining the health of the population living in them is assigned to them. When planning recreational zoning of territories or testing new varieties, small model vegetation experiments are first carried out, with the cultivation of lawn grass shoots in the first year of their life in vessels with different nutritional rates or the use of stimulating substances. To conduct such experiments in scientific practice, climatic chambers (phytotrons) or light growboxes are increasingly being used. Modern LED lamps are used as the only source of illumination in this study, the energy-spectral level of insolation of which can also be adjusted depending on the requirements of the crop or the operator needs. Here, as a nutrient substrate, either are used neutral solid substrates liquid suspensions with additions only mineral substrate or organomineral complexes. The article provides general information about the functional properties and features of scientific research on the cultivation of sports-type lawn mixtures in a closed growbox.



Maad Al-Rukabi, Vladimir Leunov, Khaled Farawn, Russian State Agrarian University-Timiryazev, Moscow, Russia.

Tatiana Tereshonkova, All-Russian Research Institute of Vegetable Production, Moscow, Russia.

Lecture Title: Production of Tomato Hybrids in Soilless Cultivation (Hydroponic System).

Abstract: A study was conducted on the productivity of tomato hybrids with different maturation (very early, early, medium, medium early and medium late) in the greenhouse with the hydroponic system (Phytopyramide) at All-Russian Research Institute of Vegetable Production, Moscow region, Russia. Eleven hybrids of tomato and four replicates were used according to the randomized complete block design (RCBD). The results have shown a significant effect of tomato hybrids with different maturation in the hydroponic. On the average of 2 years study, hybrid Elf F1was the best hybrid suitable for the number of marketable fruits (987.49) fruit/m2. Hybrid Ruddy Ball F1 had the highest hybrid suitable for the total weight of single fruit, the total yield of plant, the total production, and the hardness of fruit, (140.11) g, (1936.27) g/plant, (31.37) kg/m2 and (71.33) respectively. The quality of the tomato harvest is influenced by the physiological characteristics of fruits and plant growth. Producers need to look for a modern way to use the space with the largest number of plants to expand vertically instead of horizontally using the "Phytopyramide " hydroponic system.

Oral Session 5: Digital Technologies and Automation in Animal Husbandry



Ivan Perov, DeLaval JSC, Adelaide, South Australia, Australia **Lecture Title:** Milk is energy: comparison of the differences in the lactation curves of robotic dairy farms in Australia with pasture animals.

Abstract: The reliability of the analyzed data is key in the analysis of the dairy industry. The productive longevity of animals (in lactation) is an important economic indicator of the dairy industry. The milk yield of adult animals is higher. The productive longevity of animals on robotic farms is higher than on farms with milking parlors. Feeding of animals plays a crucial role: 21.1 liters per day of lactation (305 days) when feeding on pasture, 38.9 liters per day of lactation (305 days) when feeding with a fully mixed diet.



Yuriy Emelyanov, Molvest JSC, Voronezh, Russia.

Lecture Title: Boluses for cows, for the prevention of ketosis on a dairy farm. The results of the experiment.

Abstract: Recently, boluses with a special preparation have become one of the trends in dairy farming, which are placed in the rumen of a cow and allegedly serve to prevent ketosis and, as a result, also increase the yield.

An experiment was conducted on a group of test cows with injected boluses and observation of a control group without boluses. The results surprised us, a summary with the results and brief conclusions was prepared.



Kirill Trezubov, ITMO University, Petersburg, Russia.

Elena Avksentieva, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Valeriya Luzhnyak, Ilya Shulgin, Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Institute of Agricultural Economics and Rural Development (IAERD).

Lecture Title: Analysis of technologies for visual tracking of physiologi-cal states of cattle.

Abstract: At the moment, devices for monitoring the physiological state of the animal are beginning to play an increasingly important role. These devices and systems allow for operational control and moni-toring of the animal 24 hours a day, 7 days a week, which allows specialists and engineers to make effective decisions on cattle man-agement.

The purpose of the article: the development of models, analy-sis of methods and systems that allow predicting and assessing the physical condition of animals, detecting and preventing diseases in cattle in real time.

As a result of our analysis, we identified 20 promising studies and technologies that tested the accuracy and conditions for im-proving the accuracy of various monitoring devices for dairy herd animals to measure the duration and number of activities under dif-ferent conditions, with different frequency, sampling intervals and editing criteria. This article provides an overview of other popular studies conducted on cattle. The authors define the current state, problems and possible ways of further development of technologies for monitoring the health of dairy cattle and herd management.

Elena Sharikova, Anton Sharikov, National Research University of Electronic Technology, National Research University "Moscow Institute of Electronic Technology" (MIET), Moscow, Russia.

Lecture Title: Positioning System Based on Optoelectronic Means in Robotic Systems of Electric Food Pusher.

Abstract: The article proposes a positioning method for robotic autonomous systems used in a cowshed. The described solution implies the use of matrix sensors located at base stations and fixed permanently as one of the sources of input information. For more accurate positioning, it is proposed to use lidars installed directly on the robot. Data collection and integration is possible at various stages. Such a solution reduces the cost of implementation and allows you to get a fairly accurate system, which is theoretically justified in this article. Several variants of network organization are proposed, the disadvantages and positive aspects of which are described in the study. The amount of data used to obtain the result is minimal and commensurate with the video stream of the required resolution. It is shown that the system has scalability, which will allow it to be used on objects of various sizes and shapes.







Yulia Nikulina, Vladimir Surovtsev, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Lecture Title: Economic Efficiency Factors of Automatic Milking System in Russia: a Case Study.

Abstract: The article analyzes the effectiveness of robotic milking systems in Russian conditions. Data from five enterprises that have piloted robotic milking in their regions have been analyzed. The peculiarity of the studied enterprises is the simultaneous use of several milking systems. This allows us to compare technologies with each other within the same enterprise, that is, with the maximum fulfillment of the condition "other things being equal". Effects of milking robots introduction in the studied enterprises, which manifested themselves most vividly and in a relatively short time, are an increase in labor productivity and a radical improvement in the milk quality and its grade when sold. There is evidence of reduced culling and increased productive life of cows when milking robots are introduced. Analysis of milking systems implementation in the studied enterprises shows the absence of explicit advantages in terms of efficiency indicators in relation to each other of two high-productive technologies - milking robots and milking parlors in the existing economic conditions. The exception is greenfield construction situation. High efficiency of milking robots is achieved when enterprises choose a strategy of step by step modernization. This made it possible to reduce the need for investments and the credit burden.





Larisa Ilina, Valentina Filippova, Ekaterina Ponomareva, Elena Yildirim, Andrew Dubrovin, BIOTROF+ Ltd., Pushkin, St. Petersburg, Russia. Kasim Laishev, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Lecture Title: Metagenomic Analysis of the Reindeer Rumen Microbiota.

Abstract: Reindeer are ruminants that have adapted to difficult arctic conditions, poor diets and low temperatures. We have analyzed the metagenomes of the microbial communities of the reindeer rumen in the Nenets and Yamalo-Nenets Autono-mous Districts. An analysis of the complete genomes of the microbial communi-ties of the reindeer rumen from the Nenets and Yamalo-Nenets Autonomous Re-gions revealed differences between them at the functional levels. Taxonomically, more than 96% of the sequences belonged to the Bacteria domain, 2.18% to the Eukaryota domain, 1.54% to the Archaea domain, and 0.14% of the sequences were viral. In the sample from the Nenets Autonomous District, a trend towards a higher proportion of representatives of the fungal kingdom Neocallimastigomyco-ta was revealed. Large functional differences between rumen microbiomes were found in the analysis of carbohydrate-active enzymes. In the genome of animals from the Yamalo-Nenets Autonomous District. At this level, obvious differences in the spectrum of produced enzymes responsible for the utilization of complex polysaccharides were revealed. Perhaps this is due to the fact that in the rumen of reindeer from the Yamalo-Nenets Autonomous District, a large proportion was occupied by representatives of the phylum Firmicutes, which include the largest number of decomposers of complex polysaccharides.







Nina Evdokimova, Vladimir Surovtsev, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia. **Lecture Title:** The concept of forming an information and analytical management system for an adaptive feed production system based on digital technologies.

Abstract: Perennial grasses are the main source of feed for dairy cattle in the European North of Russia.

The basic condition for competitive milk production is to improve the quality and optimize feed production costs. This requires a radical change in the planning, organization and control of the feed production process.

The information and analytical system will allow you to plan and manage the process of forage production, taking into account complex dependencies on soil and climatic, weather, organizational and economic, production and financial and economic conditions in the farm.

The concept of an information and analytical management system for an adaptive feed production system based on perennial grasses includes: definition of concepts and information about dependencies; algorithm for using the results of field and laboratory research; statistical data; regulations; solution methods and the possibility of using new knowledge based on digital technologies.

The information and analytical system will allow solving complex and targeted tasks for a particular farm: to form the structure of crops of perennial grasses; to design phytocenoses taking into account the relationship of the types of herbs, with the conditions of their cultivation; to develop technological bases for growing perennial grasses taking into account the agro-landscape features of the area; to plan forage harvesting according to the quantity and quality of the green mass of grasses in order to achieve an increase in yield, nutritional value from 1 hectare, and reduce the cost of the cows' diet.

The concept of the information and analytical system provides that in addition to collecting and analyzing relevant, current information, access to information stored in directories will be provided.

Olga Popova, Vladimir Ponamarev, Anatoliy Yashin, Aleksey Prusakov, Federal State Budgetary Educational Institution of Higher Education St. Petersburg State University of Veterinary Medicine, St. Petersburg, Russia. **Lecture Title:** Influence of Modern Probiotics on Morphological Indicators of Pigs' Blood in Toxic Dyspepsia.

Abstract: The goal of the study is to confirm the effectiveness of various doses and combi-nations of the drug based on the aerobic bacterium B. subtilis with sorbents for the normalization of blood parameters in pigs with toxic dyspepsia. Of these, ac-cording to the postulate of conditional analogs, considering age and clinical condi-tion, five groups were formed. The age of the animals will be from 0.5 years to one year. It was found that the management of a probiotic based on the aerobic bacterium B. Subtilis together with a complex of sorbents in the treatment of pig-lets with toxic dyspepsia has a pronounced therapeutic effect. The proposed treatment scheme for animals has a pronounced stimulating effect on hemato-poiesis, which is confirmed by the outcomes of the investigation of the obtained leukograms. Statistical processing of the obtained data was carried out using Mi-crosoft Excel and Statistica 10.0 programs using the Mann-Whitney U-test (non-parametric test of the null hypothesis that, for randomly selected values X and Y from two populations, the probability of X being greater than Y is equal to the probability of Y being greater than X). The results are considered to be statistically significant at p < 0.05.

	Elena Yildirim, Larisa Ilina, Valentina Filippova, Georgiy Laptev, Ekaterina Ponomareva, Andrei Dubrovin, Kseniya Kalitkina, Vitaliy Molotkov, Dmitriy Ahmatchin, Natalya Novikova, Daria Tyurina, BIOTROF+ Ltd., Pushkin, St. Petersburg, Russia. Alena Grozina, Federal Scientific Center "All-Russian Research and Technological Poultry Institute" of Russian Academy of Sciences (FSC ARRTPI RAS), Sergiev Posad, Russia. Vladimir Vertiprakhov, Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Moscow, Russia. Lecture Title: Diagnostics of T-2 Broiler Toxicosis with the Use of Biomarker Genes in the Background of the Use of Feed Additives. Abstract: Mycotoxins can negatively affect the expression of poultry genes. The aim of our study was to evaluate the effect of a 14-day exposure to T-2 toxin on the compo-sition of the broiler chyme microbiome. The experiments were carried out in 2021 in the vivarium of FSC ARRTPI RAS on Smena 8 broilers (33-47 -day aged). The birds were divided into 4 groups: control I (diet without T-2 toxin), II - with f T-2 toxin (200 µg/kg), III - T-2 toxin (200 µg/kg)+ additive Zaslon2+ (Biotrof, Rus-sia), IV -T-2 toxin (200 µg/kg) + Zaslon2+ Axtra PRO (DuPont, USA). T-2 toxin (group II) led to an increase in the expression of the pro-inflammatory genes IL-6 in the tissues of the caecum by 3.89 times and IL-8 in the pancreas by 10.8 times compared with the control. In the tissues of the epithelium of the pancreas, an in-crease in the expression level of the Casp6 gene associated with the apoptosis fac-tor by 9.74 times was observed in response to feeding the complex of the feed additive and the enzyme preparation (in group IV compared to group I). There was also a tendency for an increase in the expression of the β-defensin Gal-9 gene. The developed algorithms were tested on models of manipulator and snake type
	formations with different numbers of links.
Oral Session 6: Digital To	echnologies and Agriculture Development
	 Alexey Sibirev, Aleksey Dorokhov, Alexander Aksenov, Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM" (FGBNU FNATS VIM), Moscow, Russia. Lecture Title: Prototype of an Optical System for Identifying Micro- and Macro-damage to Plant Tissues. Abstract: The optical identification system is used in a set of devices for post- harvest processing of potato tubers and apple fruits, consisting of a receiving hopper connected to a transfer conveyor, a spiral heap cleaner and a conveyor sorting device with two modular conveyor belts. The scientific novelty of the prototype of the optical system for identifying micro- and macro-damages of plant tissues is the algorithm for recognizing potato tubers and apple fruits in the progressive sorting motion. The optical identification system should capture the entire surface of the object under study in various possible assembly options: one lens using a system of mirrors to take an image from the opposite side of the location of the biological object; two lenses located on opposite sides of the location of the biological object.





Mikhail Uzdiaev, Astapova Marina, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia. **Lecture Title:** Statistical Analysis of NDVI of Agricultural Land Cover Aerial Images.

Abstract: Monitoring the state of agricultural land using aerial photography is an urgent problem. Monitoring includes such tasks as classification, segmentation, regression analysis, etc. All these tasks are related to the field of machine learning. However, machine learning methods require large representative datasets to perform effectively. The key issue in collecting of the representative datasets is to determine appropriate significant features that represent relevant objects. One of such features is Normalized Difference Vegetation Index (NDVI). To determine significant features, it is necessary to identify the statistically significant differences in these features between integral land cover surface classes. Nevertheless, in modern scientific literature, insufficient attention has been paid to this problem. This paper presents such a study on a large and representative Agricultural Vision Dataset, which contains images with the following classes of agricultural land cover surfaces: Double Plant, Drydown, Endrow, Nutrient Deficiency, Planter Skip, Water, Waterway, Weed Cluster. To test for differences in NDVI values across classes, Kruskal-Wallis and Mann-Whitney U tests were used, which showed statistically significant differences (p < 0.001). The results obtained in the course of the study allow us to conclude that the considered indices are significant as features of classes in the Agricultural Vision Dataset.

Kirill Maksimovich, Vladimir Kalichkin, Siberian Federal Scientific Centre of Agro-BioTechnologies of the Russian Academy of Sciences, Krasnoobsk, Russia.

Dmitry Fedorov, Novosibirsk State Technical University, Novosibirsk, Russia. **Lecture Title:** Feed Forward Neural Network Modelling for Spring Wheat Crop Forecast.

Abstract: A possibility of spring wheat crop forecasting based on the feed forward neural network (FFNN) is examined in the article. The research incorporates the materials of long-term field experiments of Siberian Research Institute of Soil Management and Chemicalization of Agriculture structural subdivision of Siberian Federal Scientific Centre of Agro-BioTechnologies of the Russian Academy of Sciences, conducted in the foreststeppe of Novosibirsk region and data on meteorological parameters of Novosibirsk meteorological observation post for the years 2001-2018. Qualitative factors (tillage system, application of intensification, placement of crop after fallow) and meteorological parameters (average ten-day air temper-atures and precipitation amounts) determining crop yields in the study area were identified as the predictors used. To forecast spring wheat crop value for the future vegetation period, three models were built, depending on the given parameters. The models' coefficients of determination were 0.90, 0.92 and 0.93. The average absolute error varied within 0.05±0.03, which is a sufficiently high accuracy result for such models under changing (uncertain) conditions and abiotic factors. The obtained results can be used in the development of decision support systems for risk assessment of agricultural production.



Tatiana Kizimova, Vera Riksen, Siberian Federal Scientific Centre of Agro-BioTechnologies of the Russian Academy of Sciences, Krasnoobsk, Russia.

Lecture Title: Neural Network Approach for Solving Inverse Kinematics Problem of Modular Reconfigurable Spring Wheat Yield Forecast Using Machine Learning Methods.

Abstract: This paper presents the possibility and feasibility of using the Bayesian network method and multinomial logistic regression to predict the yield of spring wheat. To build and train the model the data of a long-term multifactorial stationary field experiment of the Siberian Research Institute of Husbandry and Chemicalization of Agriculture (SRIHCA) of the Siberian Federal Scientific Centre of Agro-BioTechnologies (SFSCA) of the Russian Academy of Sciences (RAS) for the time period of 2004-2018 were used. During the analysis of the data sample, the main predictors of the model affecting the spring wheat yield were identified. The predictors are represented by qualitative and quantitative parameters of the work-ing area: predecessor, tillage, HTC (weather conditions), pesticides, yield by appropriate gradations (events). As a result, models were built and tested that were able to predict the yield of spring wheat, depending on the prevailing condi-tions. To assess the predictive ability of the models were tested on the original sample. In BN the total share of correct forecasts for all categories of spring wheat yields is 81%. The total share of correct forecasts obtained by implement-ing the multinomial regression model is 83%. The constructed models make it possible to predict with acceptable reliability



Vera Riksen, Kirill Maksimovich, Tatyana Kizimova, Dmitry Fedorov, Rufan Galimov, Siberian Federal Scientific Centre of Agro-BioTechnologies of the Russian Academy of Sciences, Krasnoobsk, Russia.

Lecture Title: Elements of the Decision Support System in the Agricultural Production Processes.

Abstract: Today, the effective and sustainable operation of agricultural production requires the deployment of information systems using a set of digital technologies. Predictive analytics in these systems shall take the dominant position since it is difficult or almost impossible to make a correct decision on its management without forecasting the transformation of conditions, objects and processes occurring in agriculture. The paper deals with a decision support system for use by specialists in crop production. The guidelines of farm management on the basis of key nodes of production decision-making are high-lighted over the entire period of agronomic work. The structure includes 12 key nodes, 28 models, 1 database and 415 agricultural indicators available to the user. The system issues a document with a recommendation to the producer for each node. On the basis of forecast models of agrometeorological resource and spring wheat yield, planned models are built. They allow calculating the time, analyzing the economic performance and interaction of machinery in various agromechanical activities throughout the agricultural season. Databases of crop varieties (hybrids), pesticides and fertilizers relevant to the territory of the Russian Federation have been developed. Models and methods were tested on one of experimental farms of Novosibirsk region.

Lyubov Vinnichek, Dina Gomboeva, St. Petersburg State Agrarian University, St. Petersburg, Russia.

Lecture Title: Innovative Activity in Crop Production in the Conditions of Digitalization of the Economy.

Abstract: The purpose of this article is to identify the main problems and prospects of innovative activity in crop production in the conditions of digitalization of the economy. An important element of the system of effective development of the agro-industrial complex of the Russian Federation is the transition to innovation. Recently, important measures have been taken to radically improve innovation activities. The necessary steps should also be taken in crop production, digitalization of processes in crop production, contributes to the innovative development of the industry and obtaining competitive products.

Vera Andryushchenko, Matritsa JSC, Belgorod, Russia.

Lecture Title: Digital Animal Husbandry in Russia: Prospects and Implementation Opportunities.

Abstract: The more animals there are on the farm, the more quality accounting and control is needed. Accounting of animals, agricultural products, feed, drugs, documents for monthly and annual closing of accounts, the formation of accounting entries and much, much more. One of the programs for accounting and working with cattle is the system "1C: Breeding in animal husbandry. CATTLE" from the company "MATRIX". The accounting program is designed to conduct zootechnical and breeding work with the functions of forming regulatory, internal and managerial reporting. The composition of the solution includes: quantitative and weight accounting, milk accounting, feed accounting, breeding accounting, livestock reproduction accounting and veterinary accounting. The implementation of the program allows the farm to increase productivity by reducing the time for data entry, improving the quality of primary information, and automatic reporting. Digitalization of the livestock industry will allow to raise the technical and economic parameters of production to a new level, to obtain a system of technical service of machines, to reduce the unit cost of resources due to the ability to relatively quickly identify the problem and eliminate the error. This is especially true at the stage of product quality control. As can be seen in the future, digital technologies will continue to expand their influence. Therefore, it is already important to think about the introduction of analysis and accounting systems, building appropriate business processes in the economy, allowing you not to break away from your main work.

Evgenia Rakhimova, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia.

Lecture Title: Financial Planning as a Tool for Managing a Peasant (Farmer) Economy Based on Digitalization.

Abstract: The features of digitalization of management processes in farms are considered, the experience of domestic and foreign scientists in the field of financial modeling and planning of economic activities of organizations, which can be applied in peasant (farm) economy (P(F)E), is studied. A scheme has been developed that reflects the algorithm for constructing a predictive model of financial and eco-nomic activity in a farm, the necessary calculations have been made on the example of a P(F)E for fattening purchased calves purchased with credit funds in three scenarios: pessimistic, most probable and optimistic.

The main risks of the model were identified, including difficulties with the sale of meat, the supply of animal feed, livestock diseases. Ways to minimize these



phenomena are proposed, including cooperation with conscientious partners, the availability of a stock of feed, the development of cooperative ties. Based on the most probable scenario, an annual financial plan for the activity of a P(F)E was developed, taking into account the indicators of its main activity, while forecast management reporting was formed, the main indicators of which are presented graphically. This approach can be used to solve management problems at the farm level, it does not require expensive software, but a qualified specialist is needed to make calculations and interpret them.
Abusupyan Dibirov, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), St. Petersburg, Russia. Lecture Title: Approaches to modeling the machine and tractor fleet of an agricultural organization in the conditions of digitalization. Abstract: In recent years, large agricultural organizations and agricultural holdings have increasingly used field digitization systems, telemetry, information methods of fleet management, elements of precision farming. However, the pace of development of digital technologies in most medium and small forms of management in the industry remains low. The study was conducted in order to study the state of digitalization of the machine and tractor fleet of an agricultural enterprise and assess the prospects for its development, identify problems and develop incentive measures taking into account the introduction of digital technologies. The use of digital developments for the machine and tractor fleet allows management to obtain real-time information about the performance of technological operations, resource costs, and with the help of objective independent control, allows continuously recording the main parameters of the technological process and transmitting them to the place of demand, which increases the operational efficiency of management. In order to accelerate the process of introducing digital technologies, it is necessary to stimulate the training of specialists in digital technologies, increase state funding for research on this issue, subsidize investments aimed at developing the infrastructure of digitalization of the agricultural sector.

Format of the Conference

Due to measures for prevention of the spread of coronavirus infection on the territory of the Russian Federation, the Second International Conference on Agriculture Digitalization of and Organic Production (ADOP 2022) will be held in a hybrid format: face-to-face participation taking place on the basis of St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS) (14th line VO, 39, St. Petersburg) and an on-line video conference. The conference programme with link on video conference is available on the website too: <u>http://adop.nw.ru/documents/ADOP-2022 Programme+Abstracts_EN.pdf</u>.

The time of the video conference is specified in the time zone of St. Petersburg / Moscow (UTC + 3): <u>https://www.worldtimebuddy.com/utc-to-russia-moscow.</u> One link for video conference for Opening ceremony, Plenary sessions, Oral sessions, Closing ceremony for participants and listeners is: <u>https://us06web.zoom.us/j/87926743169?pwd=Y</u> <u>1RWWGtua1JtWEgyZEZob3ZUNIp4UT09</u>

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