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Fourth International Conference on

Agriculture Digitalization and Organic Production

ADOP 2024

Conference Programme and Abstracts

June 5–8, 2024

Minsk, Republic of Belarus

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- Republican Unitary Enterprise "Scientific and Practical Center of the National Academy of Sciences of Belarus on Agricultural Mechanization" (RUE SPC of the NAS of Belarus for Agricultural Mechanization, Minsk, Republic of Belarus)
- St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS, St. Petersburg, Russia)

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Thursday, June 6, 2024	
09:00-13:00	**Oral Session 3: Digitalization and Organic Animal Husbandry: Poultry Farming, Dairy Production and Aquaculture** **https://us06web.zoom.us/j/88319865873?pwd=sVQzdjNgs397bfd8KBrWAPVL7DbnIn.1** **Cochairs: Vladimir Surovtsev, Evgeniy Zhilich**
	Roman Nekrasov, Evgenia Tuaeva, Magomed Chabaev, and Nadezhda Bogoluybova. Use of Hermetia Illucens Larvae Fat in Feeding of Calves
	Vladimir Surovtsev, Yulia Nikulina, Alexandra Zaytseva, and Sergey Kuleshov. Evaluation Model for Digital Technology Efficiency: the Example of Intelligent Digital Video Monitoring of Early Disease Diagnosis and Physiological Cows Condition
	Konstantin Ostrenko, Anastasia Ovcharova, Nadezhda Belova, Ivan Kutyin, Kirill Koltsov, Vyacheslav Rastashansky, and Natalia Nevkrytaya. The Effect of an Emulsion Based on Coriander (Coriándrum Sátivum) and Fennel (Foenículum Vulgáre) on the Expression of Genes Forming the Immune Status of Dairy Calves
	Elena Yildirim, Larisa Ilina, Georgi Laptev, Daria Tyurina, Valentina Filippova, Andrei Dubrovin, Natalia Novikova, Kseniya Kalitkina, Ogulgerek Djepbarova, Ekaterina Ponomareva, Alisa Dubrovina, Irina Klyuchnikova, Natalya Patyukova, Darren Griffin, and Michael Romanov. The Search for Sources of Enterobacteria and Clostridia Endotoxins in Russian Dairy Farms: Possible Transfer of Endotoxins through the Feed-Cow-Milk Chain
	Anastasia Ovcharova, Konstantin Ostrenko, and Andrey Gavrikov. The Effect of Lactobacillus Reuteri Probiotic Strains on Productivity and Basic Physiological Parameters of Laying Hens
	Victar Lemeshevsky. Provision of Substrates for Energy Processes in Bulls at Different Levels of Metabolizable Protein
	Vitaly Javakhia. Antiviral and Antifungal Protective Activity of a Cold-Shock Protein fFrom Bacillus Thuringiensis
	Nadezhda Bogolyubova. The use of Melanin in the Nutrition of Broilers to Preserve the Health of Birds and Obtain High-Quality Poultry Products
	Georgi Laptev, Daria Tyurina, Elena Yildirim, Elena Gorfunkel, Larisa Ilina, Valentina Filippova, Andrei Dubrovin, Alisa Dubrovina, Natalia Novikova, Veronika Melikidi, Kseniya Kalitkina, Ekaterina Ponomareva, Vasiliy Zaikin, Irina Klyuchnikova, Darren Griffin, and Michael Romanov. Effects of Glyphosate and Antibiotics on the Expression of Genes Related to Performance, Antioxidant Protection and Histological Barrier in the Cecum of Broilers
	Georgi Laptev, Daria Tyurina, Valentina Filippova, Elena Yildirim, Larisa Ilina, Elena Gorfunkel, Veronika Melikidi, Andrei Dubrovin, Kseniya Kalitkina, Ekaterina Ponomareva, Vasiliy Zaikin, Irina Klyuchnikova, Alisa Dubrovina, Ogulgerek Jepbarova, and Jie Zhu. The Influence of Glyphosate in Combination with Antibiotics on the Microbial Community of Broiler's Cecum According to Whole Genome Sequencing
	Roman Meshcheryakov, Gleb Tevyashov, and Konstantin Rusakov. Automatic Determination of Sturgeon Size Using Deep Learning Technologies
	Evgeniy Ivashko. Mathematical Model of a Cage Fish Farm
	Marina Solovey, Alexey Snytnikov, Aleksandr Tristanov, and Pavel Chernyshkov. Forecasting the SAM Index Value Using Fourier Series and Neural Networks
09:00-13:00	**Online Oral Session 4: Digital Technologies and Robotics in Crop and Livestock Production** **https://us06web.zoom.us/j/88319865873?pwd=sVQzdjNgs397bfd8KBrWAPVL7DbnIn.1** **Cochairs: Anton Saveliev, Igor Pylilo**
	Artem Popov, Ivan Blekanov, Mikhail Arkhipov, and Olga Mitrofanova. Improving the Quality of X-Ray Images of Seeds in Smart Farming Using Deep Learning

	dose of 1.42 mg / kg of live weight (LM) of poultry. At the age of 26 days, there was a significant decrease in glucose levels in the blood of chickens treated with melanin (by 14.58% at $p<0.05$), an increase in Ca/P ratio ($p<0.05$), a decrease in phosphorus levels (by 11.94% at $p<0.05$), magnesium (by 13.04% at $p<0.05$), an increase in chloride levels (by 1.05% at $p<0.05$). At 45 days of age, glucose levels in the blood of poultry of the experimental group decreased by 13.81% ($p<0.05$), cholesterol by 20.57% ($p<0.001$), calcium by 7.41% ($p<0.001$), phosphorus by 9.27% ($p<0.01$), magnesium by 17.61% ($p<0.001$), chlorides by 7.79% ($p<0.001$). The antioxidant properties of melanin were most pronounced in the middle and at the final stage of fattening. When melanin was fed in the blood of broilers at 26 days of age, an increase in the level of TAWSA by 9.5% ($p<0.05$) and SOD activity by 14.7% ($p<0.05$) was observed compared with the control. At 45 days of age, the use of melanin led to a significant increase in the total antioxidant status (TAS) by 11.9% ($p<0.05$). The study of the relative expression of AOS genes and immunity confirms the data obtained. The addition of melanin to the diet contributed to an increase in the content of antioxidants in meat in the breast by 18.75% ($p<0.0001$), in the thigh by 5.6%, reduced glutathione by 20.25%, glutathione peroxidase by 10.43%, catalase 17.35% in the breast compared with the control. The inclusion of melanin in broiler diets helps to increase the moisture content in muscles and enrich meat with antioxidants. The average daily increase over the entire period of the experiment in the experimental group was 67.16 g versus 66.74 g in the control, which confirms the beneficial effect of melanin on the bird's body. The results obtained open up new prospects for the use of melanin in the diets of broiler chickens, especially during the period of exposure to stresses of various etiologies.
 	**Georgi Laptev, Daria Tyurina, Elena Gorfunkel, Valentina Filippova, Andrei Dubrovin, Alisa Dubrovina, Natalia Novikova, Veronika Melikidi, Ekaterina Ponomareva, Vasiliy Zaikin, Irina Klyuchnikova,** BIOTROF+ Ltd, Pushkin, St Petersburg, Russia. **Elena Yildirim, Larisa Ilina, Valentina Filippova, Kseniya Kalitkina**, BIOTROF+ Ltd; Federal State Budgetary Educational Institution of Higher Education "St. Petersburg State Agrarian University", Pushkin, St Petersburg, Russia. **Darren Griffin**, School of Biosciences, University of Kent, Canterbury, Kent, UK. **Michael Romanov**, School of Biosciences, University of Kent, Canterbury, Kent, UK; L.K. Ernst Federal Research Center for Animal Husbandry, Podolsk, Russia. **Lecture Title:** Effects of Glyphosate and Antibiotics on the Expression of Genes Related to Performance, Antioxidant Protection and Histological Barrier in the Cecum of Broilers **Abstract:** In conditions of intensive poultry farming, significant amounts of xenobiotics enter the bird's body. To investigate this, four groups of Ross 308 broiler chickens were formed: 1, control group fed the basic diet (BD); 2, experimental group fed BD supplemented with glyphosate; 3, experimental group fed BD along with combination of glyphosate and two antibiotics, enrofloxacin and colistin methanesulfonate. Analysis of the expression of genes for performance (IGF1, IGF2, MYOG, MYOZ2, SLC2A1, SLC2A2, SLC5A1, MSTN and TGFB1), antioxidant defense (CAT, SOD1, PRDX6 and HMOX1) and histological barrier function (MUC2, OCLN and CLDN1) in cecal tissues of birds were carried out using quantitative RT-PCR using a DTlight thermal cycler (DNA-Technology, Russia) and the SsoAdvancedTM Universal SYBR® Green Supermix kit (Bio-Rad, USA). The results showed that glyphosate alone (Group 2) inhibited the expression of a number of genes associated with productivity (IGF1, IGF2, SLC5A1, and MSTN) up to 4.1 times as compared with Group 1 ($p < 0.05$). In Groups 2 and 3, there was a decrease in almost all cases in the mRNA production of the MUC2, OCLN and CLDN1 genes in intestinal tissues from 1.3 to 2.2 times as compared to the control ($p < 0.05$).





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Jie Zhu, Zhejiang A and F University, Lin'an District, Zhejiang, China.

Lecture Title: The Influence of Glyphosate in Combination with Antibiotics on the Microbial Community of Broiler's Cecum According to Whole Genome Sequencing

Abstract: To evaluate the effects of antibiotics and glyphosate, an experiment was conducted on 260 broilers. Four experimental groups were formed: I – control group, which received the basic diet (BD), II experimental group – BD with the addition of glyphosate; III experimental – OR with the addition of glyphosate and veterinary antibiotics enrofloxacin and colistin methanesulfonate; IV experimental – OR with the addition of glyphosate and ammonium maduramicin. Glyphosate and antibiotics combined with a herbicide altered the microbial community in broiler's cecum. Genome-wide analysis made it possible to estimate the increase in the proportion of eukaryotic microorganisms and viruses under the influence of antibiotics. In the group of prokaryotic microorganisms, under the influence of glyphosate and antibiotics, significant changes were noted associated with a decrease in the proportion of bacteria, such as Faecalibacterium sp., Lawsonibacter sp., Lachnoclostridium sp. and Subdoligranulum sp., capable of producing butyrate and other short-chain fatty acids. These results indicate the negative impact of glyphosate in combination with antibiotics on the health and productivity of poultry, since these acids have a wide range of positive properties, for example, bacteriostatic, anti-inflammatory and proliferative effects.





Roman Meshcheryakov, Gleb Tevyashov, Konstantin Rusakov, V.A. Trapeznikov Institute of Control Sciences of Russian Academy of Sciences, Moscow, Russia.

Lecture Title: Automatic Determination of Sturgeon Size Using Deep Learning Technologies.

Abstract: Fish resources play a crucial role in Russia's economy, especially given its extensive coastline, vast water areas, and rich marine and freshwater resources. Addressing the decline and restoration of fish populations, a consequence of farming practices, illegal fishing, and environmental catastrophes, stands as a critical issue in today's world. In Russia in recent years, there has been active construction and development of fish farms, fisheries and biological laboratories, partly due to economic difficulties. One of the most valuable fish species is sturgeon, which requires special conditions of confinement compared to, for example, catfish. Production personnel monitor compliance with the conditions and observe the growth and activity of these fish. This paper analyzes the different existing methods of weighing fish in production facilities. Nowadays, there is a trend towards digitization of production and implementation of cyber physical systems to improve the efficiency of production. Visual inspection, complemented by neural network analysis, is emerging as a valuable approach for addressing the challenge of fish weight estimation. The study suggests a viable technique for automatically measuring sturgeon sizes at various developmental phases using YoLo9 and highlights potential areas for future research.