

MODELING THE WORK OF POSITIONING AND ORIENTING-DOSING DEVICE FOR MAIZE EARS OF VARIETY AND HYBRID MAIZE

Bakharev D.N., Volvak S.F.

FSBEI HE Belgorod SAU

308503, Belgorod region , Belgorod district, Maisky v., Vavilova st., 1;
tel. +7 4722 39-12-33, e-mail: baharevdn_82@mail.ru.

Keywords: *maize ears, positioning and dosing loading device, capture, movement, degree of freedom, probability, positioning, modeling.*

The article presents theoretical studies on the process of transferring corn cobs from any to a strictly defined position when they are conveyed by an orienting-dosing loading device to the working bodies of an axial-rotary thresher. Maize ears, loaded into the storage hopper of orienting-dosing loading device, form a chaotic hill, so they need to be individually picked up, oriented in space parallel to the thresher rotor axis and conveyed to the threshing chamber in this position. This allows to increase threshing efficiency of cobs of variety and hybrid corn. Logical criteria for evaluating design features of existing devices capable of orienting corn cobs in space are proposed. According to these criteria, an appropriate analysis was carried out, an effective Pareto border was constructed, and elevator type device was chosen as the most promising. Design of a new orienting-dosing loading device is proposed. A flowchart describing the principle of operation of orienting-dosing loading device was developed, including both the sequence of operations performed and the factors affecting the quality of their performance. It is suggested to determine the probability of cob orientation in space as a product of probabilities: preliminary orientation in the bunker, primary orientation of the long side along the base blade and secondary orientation using the mounting surface of the resetting plate. The conditions of preliminary orientation of cobs in the storage bin are considered. An assumption is made about the necessity of applying a force action from the side of the grasping blade in the space located between the support points of its long side. It is proved that the magnitude of reactions at the support points is proportional to the distance from the concentrated force to the supports. It is revealed that the probability of orientation of the cob in the storage bin by the required side in relation to the grasping blade is the quotient from dividing the solid angle of the hopper neck cone to the larger solid angle of the cob.

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RESULTS OF STUDY OF MINERAL OILS ON THE CONTENT OF WEAR PRODUCTS

Zamaldinov M.M.¹, Yakovlev S.A.¹, Zamaldinova Yu.M.²

¹ FSBEI HE Ulyanovsk State Agrarian University
432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel .: 8 (8422) 55-95-94;
e-mail: zamaldinov.marat@mail.ru

² FSBEI HE Ulyanovsk SPU
432071, Ulyanovsk, Lenin Square, 4/5; tel .: 8 (8422) 44-30-66,
e-mail: zamaldinova17@gmail.com

Keywords: *oil, service characteristics, additive, impulse, content of active metals. The change of oil state preconditioned by three main factors: the flow of wear products into the oil; gradual accumulation of oxidative polymerization products in oil; penetration of harmful impurities from the external environment. It all leads to oil aging, loss of performance properties and sending it for recycling. The content of wear products and metals of active additives in mineral motor and transmission oils is determined with a diffraction-free analyzer of X-ray spectral BARS-3. Calibration of the device BARS-3 is carried out by introducing into the base oil of DS-11 the components of salt of cyclohexane-butyric acid of barium $C_{20}H_{34}BaO_4$ in strictly determined percentage quantities. During the operation of engine and transmission oils, there is a process of accumulation of insoluble impurities in them and the consumption of these oils increases for various reasons. The article presents a universal differential equation for the accumulation of insoluble impurities in mineral oils. Substituting various quantities, one can obtain the corresponding equations describing the patterns of accumulation of various products in mineral oil. In the process of research, samples of engine and transmission oils from the KamAZ-55102 vehicle under study are taken at regular intervals of mileage and the content of insoluble impurities is determined by sample numbers by centrifugation. Then the samples are put on the filters, from which they take the readings of the pulses through the "iron" channel. A specific amount of impulses corresponds to a certain content of insoluble impurities, the more products of wear and metals of active additives there are in the oil, the higher the impulse amount. Based on the data from the study of oil samples, a polynomial dependence of the impulses through the "iron" channel on the mass content of insoluble impurities in the engine and transmission oils is constructed. The resulting dependence of the number of impulses through the "iron" channel on the mass content of insoluble impurities in the oil allows to determine the content of wear products and active additive metals in waste mineral oils, which makes it possible to evaluate the suitability of the oil for its further use.*

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IMPROVEMENT OF DIGGING DOWN PROCESS OF THE TUBER LAYER AND CONSTRUCTIVE-TECHNOLOGICAL PARAMETERS OF DIGGING DOWN WORKING BODIES

Kamaletdinov R.R., Farkhutdinov I.M.

FSBEI HE Bashkir SAU

Ufa, 50th anniversary of October st., 34. tel. 89279579237, E-mail: krr53@mail.ru

Keywords: *plowshare, undercutting of potatoes, ridge pattern, copying, day surface, object-oriented model.*

The aim of the research is to substantiate the constructive-technological parameters of the master-slave plowshare based on elaboration and analysis of an object-oriented model of undercutting process of the tuber layer. The analysis results of the density of the lower compacted soil layers are presented. The data of hardness isolines and ridge profiles are presented. The influence correlation between the influence of the depth of movement of the digging plowshares and the content of non-tillaged soil lumps in the initial pile is derived; which also has impact on the efficiency of the separating organs of the potato machines Grimme and KPK-2. The results of the construction and analysis of this model were obtained using the systems of engineering analysis and computer-aided design of Mathcad, Compass-3D and MSC Adams (Automatic Dynamic Analysis of Mechanical Systems). Based on the systems of engineering analysis and computer-aided design, a virtual model has been developed in the graphic editor ADAMS / View to simulate the operation of a double-circuit copying share of a potato harvester. The copying plowshare construction is developed and its parameters are substantiated. The suitable stiffness parameters for a horizontal spring are determined: $c_h = 25 \text{ kN / m}$, sloping - $c_s = 45 \text{ kN / m}$. By analyzing the developed design of copying plowshares on a computer and conducting experimental studies, it has been established that the use of the developed plowshare design increases the purity of the gathering heap by an average of 28% with a single-circuit design and by 46% with a double-circuit one. It is established that the contact load on the plowshare with single-circuit mounting compared with hard one is lower by 20 %, double-circuit mounting - by 40 %. Appropriate results were achieved when the speed of the unit was 1.2 ... 1.4 m / s.

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PARAMETER JUSTIFICATION OF A DEVICE FOR GIVING HEATED WATER TO COWS

Katkov A.A., Lukmanov R. L., Kovalev P. V.

FSBEI HE Bashkir SAU

450001, Ufa, 50 years of October st., 34; tel.: 8 (347) 252-72-52;

e-mail: gpet1@yandex.ru

Key words: *giving water to cows, auto-drinker, water heating, heat loss, water temperature, circulating pump.*

To obtain high productivity of cows, it is necessary to ensure free access of all animals to drinkers, especially after feeding and milking. We have developed a device for uninterrupted supply of water of appropriate temperature to animals. The device includes a circulating pump, a flow electric heater, temperature sensors, a control station, a water supply system for supplying water to automatic drinking machines, and a water measuring device with an electronic unit that transmits data to a computer once a second. Comfortable drinking water temperature is maintained with the help of temperature sensors. At night, when the animals have rest and practically do not consume water, a lower water temperature is established to save electricity. A mathematical model of heated flow in the water pipe for the

steady process has been constructed. It is revealed that the influence of heat conduction in the water flow can be neglected. Analysis of the obtained equations showed that the power of heat losses along the entire length of the pipe monotonously decreases with decreasing of water velocity, that is, with decreasing of circulating pump performance. However, the water temperature decreases more intensively. With appropriate performance of the circulation pump, the water temperature at the end of the water supply should be equal to the minimum comfortable temperature for cow drinking. It was revealed that the performance of the circulating pump depends on the air temperature in the barn, the length of the water supply system and the thermal characteristics of the water supply system.

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RESEARCH OF CONTACT GRAIN DRYER WITH VIBRATING TRANSPORTING WORKING BODY

Kurdyumov V.I., Pavlushin A.A., Karpenko G.V.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi venets Boulevard, 1; Tel: 89050359200; e-mail: andrejpavlu@yandex.ru.

Keywords: *critical temperature of grain heating, energy efficiency, contact heating.*

Modern trends in development of agricultural organizations in the Russian Federation have identified prospects for design of small-sized equipment. Thus, the use of mini-dryers in existing farms can improve the efficiency of post-harvest grain handling. The authors proposed a patented design of a contact grain dryer. On the basis of experimental studies, it was revealed that a prospective direction for improving the quality of drying in contact grain dryers is the use of an appropriate working body. Its type enables to meet the requirements for the drying process in contact heat supply. Devised and tested device for drying grain includes a casing of rectangular cross section, the surface of which is covered with a layer of insulating material, a loading hopper, a discharge window and a transporting body installed inside the casing. There are heating elements under the transporting working body. Transporting working body is made in the form of a box and is installed with the possibility of transmitting vibrations to this body. The upper surface of the box is stepped, made of heat-conducting material. Oscillatory vibration to the transporting working body is transmitted by a drive. As a result of theoretical studies, the basic equations have been formulated that reveal the nature of the thermal regime during contact drying of triticale grains. As a result of the analysis of the obtained mathematical models of grain drying process, the appropriate values of the main independent factors have been revealed, specific heat consumption for evaporation of moisture from triticale grains is $q_{d,opt} = 4.68 \text{ kJ / kmoist}$; average temperature of the heating surface $t_{gr, sr, opt} = 132 \text{ }^\circ \text{C}$, grain drying time $t_{opt} = 8 \text{ s}$, grain speed $v_s = 0.22 \text{ m / s}$. The capacity of the device is 132 kg / h . When using the devised device for drying grain per 1 ton of dried grain, the economic effect was 798.9 rubles, the annual economic effect was 79896.6 rubles.

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ELECTROMECHANICAL HARDENING OF WORK SURFACES OF PLOUGHSHARES

Morozov A.V., Fedotov G.D., Shamukov N.I.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyy Venets Boulevard, 1; tel.: 8 (8422) 55-95-97,

e-mail: alvi.mor@mail.ru

Key words: *agricultural tools, working bodies, plowshares, wear, electromechanical hardening, microstructure, hardness.*

The paper analyzes the factors which affect wear of plowshares. The mechanism of soil impact on the plowshare during plowing is considered. The effect of the material hardness of the plowshare on its service life is theoretically justified. The analysis of ways to restore and harden the working surfaces of the plowshare was carried out. An alternative method of hardening the working surfaces of plowshares using electromechanical hardening (EMP) is proposed. Laboratory studies on the effect of current rate and the tool speed of movement during an EMP on the change in microstructure and hardness of the working surfaces of plow plowshares were carried out. It has been established that the hardness of the working surfaces of the plowshare after the EMR is 6 Rockwell units higher than the hardness of the plowshare strengthened by bulk quenching. The regression equations are obtained that establish the influence of the technological factors of the EMR on the surface hardness of the plowshare.

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MODELING PNEUMATIC DISTRIBUTION SYSTEMS OF GRAIN SEED SOWING-MACHINES BY METHODS OF TWO-PHASE FLOWS

Mударisov S.G., Rakhimov Z.S., Gareev R.T.

FSBEI HE Bashkir SAU,

450001, Ufa, The 50th anniversary of October st., 34;

tel.: 8-347-228-91-66, e-mail: salavam@gmail.com

Keywords: *sowing machine, pneumatic distribution system, modeling of technological process, two-phase flow.*

The aim of the research is to substantiate the parameters of two-phase heterogeneous gas-particle flows (air-seeds) by means of mathematical modeling of technological process of operation of pneumatic systems of grain seeders. For a theoretical description of technological process of formation, movement and distribution of solid particles in pneumatic systems it is proposed to use methods of two-phase gas-particle mechanics. The possibility of applying the methods of "two-phase flows" in relation to grain seeders with pneumatic distribution systems has been established. The flow regimes of the air-seed mixture determined by the Reynolds number and the bulk concentration of particles are determined. A method is presented for determining the speed of airflow and seeds of various crops, volume concentration of seeds, Reynolds number and seed resistance coefficient, which are necessary for the implementation of mathematical models of the technological process of operation of pneumatic systems of grain seeders using the methods of two-phase flows.

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FEATURES OF SCREW RIPPER AND SOIL INTERACTION

Mukhametshin I. S., Valiev A. R., Aleshkin A. V., Ibyatov R. I.

FSBEI HE Kazan SAU

420015, Kazan, Karl Marx st., 65 e-mail: ilshat858@gmail.com

Key words: *tillage, deformation, screw ripper, coherence, moment of reaction forces, axial reaction force.*

The main criteria of tillage effectiveness are appropriate conditions for development of crops, weed destruction and the prevention of soil degradation due to erosion. For the most effective impact on the soil, a significant change in its composition, various means and methods of tillage are used. An essential condition for development of effective working bodies that ensure high quality tillage with the lowest possible energy intensity is the search for suitable design and technological parameters of the soil-cultivating working body. For simple flat soil rippers, which the majority of tillage machines have, this problem is successfully solved. At the same time, a significant proportion of the working bodies of agricultural machines have relatively complex working bodies, which, along with direct movement, perform rotational motion around their own axis. This article describes the process of interaction of the working body with the soil, which is presented by a helical conical ripper-subsoiler on bearings. The ripper has the ability to freely rotate around its own axis. The surface of the ripper-subsoiler is described by the equation of the helical surface restricted by a circular cone. The external impact on the ripper body is characterized by normal and tangential to the screw surface pressure forces from the soil, as well as normal reactions and friction forces in bearings mounted on the rotation axis. Theoretical dependences are obtained for specification of the force acting from the soil on the screw surface of the ripper, which arises in the process of deformation of the soil flow until its structure is destroyed. The dependences obtained allow us to

investigate the influence of the constructive and technological parameters of the screw working organ on the tillage process and justify their rational values.

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RESEARCH OF PERSPECTIVE METHOD OF BLOWING LINEN FLAX STEMS, IMPLEMENTED IN AN INNOVATIVE DRYING MACHINE FOR FLAX-FIBER PROCESSING PLANTS

Novikov E. V., Altukhova I.N., Bezbabchenko A.V.

FSBSI "All-Russian Scientific Research Institute of Flax Breeding Mechanization",
170041, Tver, Komsomolsky Ave., 17/56, e-mail: vniiml1@mail.ru.,
Vniim44@mail.ru.

Keywords: *linen flax, flax trust, flax-fiber processing plants, convective drying, drying agent, speed field, speed and air flow, uniformity.*

A constructive-technological scheme of an innovative energy-saving drying machine for flax plants and an experimental installation for its research is presented, the velocity field in the drying chamber of the installation is analyzed for various blowing modes, parametres that should be used in the design and operation of convective drying machines are obtained. The actual speeds and air flow rates in the drying chamber are determined at different rotational speeds of the circulation fan rotors in the proposed innovative energy-saving design and technological scheme of a convective drying machine, which have slight differences of the tops, stem bases and flax tops, it allows the air velocities to be evenly distributed along the length and the width of the drying chamber, which means that the stems will be uniformly dried. The proposed scheme for blowing the stalks of flax and the design-technological scheme of the drying machine allows,

with a relatively small consumption of the drying agent, to ensure its high speed of at least 6-7 m / s, which has not been achieved until now in any design of the drying chamber. The obtained characteristics of the process of convective drying of flax stems must be used both in the design and operation of an innovative drying machine.

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PRODUCTION POTENTIAL OF GRAIN SORGHUM IN THE NORTHERN ZONE OF SORGHUM PLANTING

Antimonov A.K., Syrkina L.F., Antimonova O.N.

Federal State Budgetary Scientific Institution "Volga Research Institute of Selection and Seed Production named after P.N. Konstantinov"

446442, Samara region, Kinel town, Ust-Kinelsky v., Shosseynaya st. 7;

tel. : 8846 (63) 46-2-43, e-mail: antimonov.63@mail.ru

Keywords: *sorghum, variety, testing, yield, grain, seeding amount.*

The aim of the research is informational activity based on the results of introduction into production of sorghum grain varieties for targeted use. In 2005, Premiera variety passed production testing in Vasilina farm in Bolshechernigovsky district on an area of 10 hectares. The grain yield was 1.94 t / ha in 2009, the sorghum variety Slavyanka was sown in OOO "Yug Povolzhiya" on an area of 8 hectares. 0.75 t / ha was obtained compared to barley yield of 0.30 t / ha. In 2010, the Slavyanka variety was sown on 175 hectares, formed a grain yield of 1.35 t / ha, as for barley yield, it was 0.2 t / ha. Slavyanka variety was planted in 2009 on 20 hectares in "Chance" farm of Borsky district, in 2010 – on 30 hectares. We received grain yields of 1.43 t / ha in 2009 and 1.24 t / ha in 2010, compared to an average barley yield of 0.97 and 0.52 t / ha, respectively. Slavyanka variety was sown in 2013 on the area of 700 hectares on 'Progress' farm of Bogatovsky district. The grain yield was -1.52 t / ha with an average yield of barley in the farm of 0.50 t / ha. In 2016, the sorghum variety Ros was sown in "KFKh Kamanin N.M." in Neftegorsky district on 100 hectares. The grain yield was 2.0 t / ha, with an average yield of barley on the farm of 1.7 t / ha. The yield of sorghum of Ros variety (1100 hectares) was 1.3 t / ha, barley - 0.9 t / ha in " Agricultural Production Cooperative named after Lenin " in Belyavsky District in the same year. We believe that the introduction of grain sorghum in production will allow to consistently receive feed grain in any arid and extremely arid weather conditions.

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PROTEIN-PROTEASIC GRAIN COMPLEX IN WINTER WHEAT AGROTECHNOLOGY IN CASE OF APPLICATION OF MINERAL AND ORGANIC FERTILIZERS

Bakaeva N.P.

FSBEI HE "Samara State Agricultural Academy"

446442, Ust-Kinelsky town, Uchebnaya st, 2; Tel: 89276023266;

e-mail: bakaevanp@mail.ru

Key words: *winter wheat, tillage, mineral fertilizers, organic fertilizers, manure, protein content, proteases, baking assessment.*

We studied the effect of mineral fertilizers: ammonium nitrate, ammonium sulfate and urea, as well as new organic fertilizers and manure in various soil tillage systems, on content of total protein and protein of gluten fractions, activity of proteolytic enzymes in winter wheat grain of Svetoch variety. Grain protein content depended on the applied fertilizers in our studies. Thus, dry and liquid organic fertilizers, in an equivalent amount of 40 t / ha, compared with the control, gave an increase in protein content, on average, by 1.8 and 1.9%, respectively. A higher protein content, an average, by 2.1%, was observed in case of application of mineral fertilizers, in combination with surface tillage. The highest value of protein content was 15.6%, when using manure in the amount of 40 t / ha during 20-22 cm plowing, which was higher by 2.2%, compared to the control. Fertilizers are a significant factor of improving the quality of wheat grain in terms of protein content. The protein content in prolamin under the influence of fertilizers in all variants of the experiment gave an increase by 1%, glutelin - only by 0.2%. Obviously, the glutelin fraction, which is less in absolute content than prolamin, is less dependent on fertilizers. Higher protein content in the grain corresponds to slightly lower activity of proteolytic enzymes. According to assessment of wheat baking qualities, the obtained research results allow to characterize the baking advantages of flour as very high and high in all variants of agrotechnology.

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DYNAMIC PARAMETERS OF CROP FORMATION OF EARLY SOYBEAN VARIETIES IN THE CONDITIONS OF CENTRAL NON BLACK SOIL

Belyshkina M. Ye.

FSBEI HE "Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev "

127550, Moscow, Timiryazevskaya st., 49; tel .: (499) 976-07-48; e-mail: mbelyshkina@rgau-msha.ru

Key words: *soybeans, early varieties, Kasatka, USKhI 6, growth and development, periods of crop formation, photosynthetic activity, seed yield.*

Dynamic characteristics of the production process, variability and connection to seed yield are determined in the experiments on formation of early soybean varieties such as Kasatka and USKhI 6 in the conditions of the Central Non-Black Soil Region. The expediency of considering the agrocenosis of leguminous crops as a complex dynamic photosynthesizing system with segregation of ontogenesis periods as subsystems with certain input and output parameters has been substantiated. Four periods during active photosynthetic activity are distinguished: I - from germination to the beginning of flowering; II - flowering and fruit formation; III - fruit growth; IV - plumpness of seeds. The studies revealed the duration of individual periods, the growing season as a whole and their variability due to changes in meteorological conditions. The patterns of photosynthetic activity and the production process, as well as features associated with the genotype and meteorological factors are identified. Sowing of leguminous crops as a photosynthetic system most effectively functions during the II and III periods. During this time, taking about 40% of the vegetation, more than 70% of dry aboveground biomass is synthesized. The vegetation length and individual periods were significantly longer for USKhI 6 variety. This variety, by the R5 phase, formed 10% more of dry weight, but the crop growth rate of this variety was 9% less. As a result, the seed yield of the varieties did not differ significantly. However, the plumpness and ripening of USKhI 6 variety happened at a later period, when the average daily temperature was below the biological minimum in some years and the seeds did not ripen. In the conditions of the Central Non-Black Soil Region, the limiting factor for realization of biological potential of early soybean varieties is the periods of seed plumpness and ripening, when the average daily temperature may be below 14 ° C. Kasatka variety better corresponds to the possible variability of thermal resources in this region as compared with the variety of USKhI 6.

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INFLUENCE OF HYDROTHERMAL CONDITIONS ON PRODUCTIVITY AND TECHNOLOGICAL QUALITIES OF *HORDEUM SATIVUM DISTICHUM* (BARLEY) IN THE CONDITIONS OF IRKUTSK REGION

Grebenshchikov V. Yu.¹, Verkhoturov V. V.², Kopylov V. S.³

¹Irkutsk State Agrarian University named after A.A. Ezhevsky

²FSBEI HE Irkutsk National Research Technical University

3Irkutsk Interregional Veterinary Laboratory

1664038, Irkutsk Region, Irkutsk District, Molodezhnyi v.; tel.: + 7 (3952) 405981,
e-mail: agroviktor@mail.ru

2 664074, Irkutsk, Lermontova st., 83; e-mail: biovervv@mail.ru

3664005, Irkutsk, Botkina st., 4; tel. : 89149475526

Key words: *zoned varieties, hydrothermal coefficient, barley quality, nature, barley cereal*

*The results of cultivation and evaluation of technological qualities of zoned varieties of common barley (*Hordeum sativum distichum*) in Irkutsk region are presented. Hydrothermal coefficient according to Selyaninov was calculated in the main phases of barley growth and development in Cis-Sayans conditions. Crop and grain quality are subject to change over the years due to changes in the heat and moisture supply of plants. Over the years of research, the varieties Acha, Biom and Abalak have realized their potential for productivity in different ways. Depending on the hydrothermal conditions of the first half of the growing season and, especially during the period of sprouting - tillering, the yield varied from 43 to 68 centners per hectare. Analysis of the data showed that, depending on the hydrothermal conditions, the yield in different years varied from 43 to 68 centners per hectare. The length of the growing season is determined by the hydrothermal conditions of the first half of barley growing season. Depending on the hydrothermal conditions of the first half of the growing season from seedling to flowering, the yield varied from 43 to 68 centners per hectare. The length of the growing season with a lack of atmospheric moisture is reduced. In case of insufficient atmospheric moistening, the weight of 1000 grains, harvest of barley and its technological qualities decrease. Excessive moisture during the formation and maturation of the grain leads to a decrease of grain nature of and its protein content. In terms of nature, all grains meet the requirements of State Standard 28672-90. The quality of cereals in all varieties is rated as "excellent", but in terms of uniformity, cereal yield and protein content in Biom grain was the best. Thus, the grain quality of grain obtained in the region, determines the usage prospects of these varieties in food industry.*

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INFLUENCE OF GROWTH REGULATORS ON PHOTOSYNTHETIC ACTIVITY OF SPRING BARLEY CROPS

Evdokimova M.A., Maryina-Chermnykh O.G.

FSBEI HE "Mari State University"

4240000, Republic of Mari El, Yoshkar-Ola, Lenin sq., 1;

tel. 89877246289, e-mail: myrar@mail.ru

Key words: *barley, plant growth regulators, leaf surface area, photosynthetic activity, photosynthetic potential, net photosynthesis productivity.*

The use of growth regulators in crop production, along with other agrotechnical methods of intensive and biologized technologies of cultivation, is one of the most appropriate and promising methods of increasing the productivity of crops. In this regard, the purpose of our research was to study the effect of growth regulators used at tillering stage on the photosynthetic activity of spring barley crops in the taiga-forest zone. To achieve this goal it was necessary to solve the following tasks: to determine the duration of the main phases of development and the growing season of spring barley; determine the leaf area of crops, the accumulation of dry matter, calculate parameters of photosynthetic potential and net productivity of photosynthesis of crops during the main phases of development. Investigations were carried out in the Republic of Mari El on sod-podzolic soil by field trial and laboratory analysis using appropriate methods. Spring barley plants they were sprayed with Epin-Extra, Zircon and Polistin at the tillering stage. As a result of the research, it was established that spraying of crops in the tillering stage with the growth regulators Epin-Extra, Zircon and Polistin shortens the vegetation period by 2-4 days in the taiga-forest zone in cultivation of spring barley on sod-podzolic soil; the growth regulators Epin-Extra and Polistin increase assimilation surface of crop leaves by 8,5 and 11,1 %, respectively, the photosynthetic potential - by 5,7 % and the net productivity of photosynthesis by 3 and 10 %; Zircon growth regulator does not have a positive effect on photosynthetic activity of spring barley crops in the soil and climatic conditions of the Republic of Mari El.

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COMPLEX APPLICATION OF INSECTICIDAL AND FUNGICIDAL CHEMICALS ON GRAIN CULTURES

Zargaryan N.Yu., Kekalo A.Yu., Nemchenko V.V.

FSBSI "Ural Federal Agrarian Research Center of the Ural Branch of the Russian Academy of Sciences",

620142, Sverdlovsk region, Ekaterinburg, Belinsky st., 112 a, e-mail: natashazarg@yandex.ru. Tel. 8 (35231) 57-3-89; 57-3-54.

Key words: *plant insects, insecticides, plant diseases.*

The studies were carried out in Kurgan SRIA - a branch of the Federal State Budgetary Institution Ural Federal Agrarian Research Center of the Ural Branch of the Russian Academy of Sciences on varieties of spring soft wheat Omskaya 36 and spring barley Preria in 2014-2016. Insecticides were used to protect crops from grain flea and root rot (Tabu 0.4 l / t, Cruiser 0.5 l / t, BI-58 new 1.0 l / t and 1.0 l / ha, Tanrek 0.2 l / ha, Ephoria 0.2 l / ha) as well as fungicides (Vial Trust 0.4 l / t, Certikor 1.0 l / t), and insect-fungicide Celeste Top 1.2 l / t. It was found that pre-sowing treatment of spring barley seeds against barley flea beetle with insecticidal chemicals was more effective than spraying crops in the germination phase. High biological efficiency was observed on Tabu variant of 0.4 l / t and Cruiser of 0.5 l / t (78 % - 79 %), which contributed to productivity increase up to 3.7 c / ha - 4.7 c / ha, or 10.8 - 13.7 %. The effectiveness against grain flea of insect-fungicide Celeste Top on barley was at the level of 71.3 %, root rot - at the level of 72.6 %. The chemical provided productivity increase by 11.4% due double seed treatment. Wheat seed treatment with Cruiser in the dose of 0.5 l / t and Tabu of 0.4 l / t contributed to a decrease in the number of grain flea by 76.8-83.4 %, ensuring productivity increase by 2.3 - 2.5 c / ha. Application of tank mixtures of fungicidal and insecticidal seed disinfectants of Vial Trust 0.4 l / t + Tabu 0.4 l / t and Certikor 0.9 l / t + Cruiser 0.5 l / t ensured high effectiveness in insect control (83.4 - 80.8 %) and phytopathogene control (71.5 - 87.9 %, respectively). As a result, an increase of wheat productivity by 5.0-5.1 c / ha was obtained on variants of complex protection.

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FLORISTIC COMPOSITION AND WEED NUMBER DYNAMICS OF AGROPHYTOCENOSIS IN CROP ROTATION OF THE FOREST-STEPPE ZONE OF THE VOLGA REGION

Morozov V.I., Toygildin A.L., Podsevalov M.I.

FSBEI HE Ulyanovsk SAU

432017 Ulyanovsk, Novyi Venets Boulevard, 1; tel: 8 (8422) 55-95-75 e-mail: zemledelugsha@yandex.ru

Key words: *weeds, species composition, weed numbers, crop rotation, tillage.*

The effect of shift of crops and tillage on the species composition and number of weeds of agrophytocenoses in field crop rotations was studied in the conditions of the forest-steppe zone of the Volga region. The study of the dynamics of weed infestation was carried out on the basis of a stationary long-term field trial, where 6-field grain-and-fallow and grain-grass crop rotations are studied, each of which uses two primary tillage types (1 - combining dump and nonmouldboard cultivation with elements of minimization and 2 - minimum). Studies have shown that few-annual weeds predominate in grain-and-fallow and grain-grass crop rotations in agrophytocenoses, they are represented by early spring, late spring, wintering and single perennial weeds, forming a few-annual soboliferous type of weed contamination. Perennial grasses and winter wheat are the most competitive in relation to the weed component, which is explained by their rapid growth of the ground vegetative mass, whereas spring wheat and grain legumes (peas, vetch, lupine) had little competition with weeds. There was a decrease of infestation of agrophytocenoses (by 50.0-55.7 %) from the first to the second rotation especially in grain grass crop rotation, which indicates the phytocenotic and environment-forming functions of crop rotations in biologization conditions. It was revealed that the efficiency of combined in crop rotation primary tillage for suppressing weeds is significantly higher compared to the minimum one, as indicated by the

dynamics of weed numbers, which was 26.0 % lower (by mass - 29.0 %) in this variant during two rotations.

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PARAMETRES OF TISSUE METABOLISM OF ANIMALS IN CASE OF APPLICATION OF CITRATE ZEOLITE ADDITIVE

Akhmetova V.V., Mukhitov A.Z., Pulcherovskaya L.P.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel .: 8 (8422) 55-23-75;

e-mail: verenka1111@mail.ru

Key words: *metabolism, liver, muscle, animal, feed additive, zeolite.*

The purpose of this work was to study the parameters of tissue metabolism of young pigs in case of application of zeolite in combination with organic acids. The experiment was conducted in the pig breeding farm of Ulyanovsk district in Ulyanovsk region. Analogues were selected for the experiment in accordance with breed, body weight, physiological state, age and productivity among young pigs aged up to 210 days. The scheme of feed supplements was that the first group of animals received only the main ration, this group was the control. The second group of piglets was fed with natural zeolite taken from deposits of Ulyanovsk region "Mainit" at a dose of 2% of the dry matter together with the main ration. The third group of young pigs was added to their basic ration citrate-zeolite

complex once a day, which included 2% of zeolite from the dry matter of the ration and 40 mg / kg of citric acid. It is proved that the introduction of zeolite additives into the diet of piglets (separately and in combination with organic acids) affects the metabolism processes in the body tissues of productive animals. Activation of enzyme systems, synthesis of tissue protein in the liver and muscle tissue of young pigs occurs under the influence of catalytic and ion-exchange properties of the additives of the zeolite and citrate-zeolite complex, it contributes to an increase in their growth energy. A decrease of detoxification stress of pigs' liver when introducing zeolite additives and a complex based on zeolite and organic acids has been established.

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PARAMETRES OF CARBOHYDRATE METABOLISM WHEN CORRECTING MINERAL AND ENERGY NUTRITION OF PIGS

Akhmetova V.V., Lyubin N.A., Dezhatkin M.E.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyy Venets Boulevard, 1; tel .: 8 (8422) 55-23-75;

e-mail: verenka1111@mail.ru

Key words: *pig, ration, feed additive, metabolism, enzymes.*

The purpose of the work is to study parametres of pig carbohydrate metabolism of different ages and physiological conditions when improving their ration with an unconventional supplement based on natural zeolite and a combination of zeolites with organic acids. The object of the study was piglets of large white breed of a farm in Ulyanovsk region. Based on analogue principle, groups were formed: the 1st was the control, the 2nd and the 3rd - test ones (14 pigs in each). The young pigs of the 1st group were given only the basic ration. The 2nd group piglets were additionally given zeolite from Ulyanovsk region deposit (2% of the dry matter of the ration). And the 3rd group animals were fed with the main ration in combination with citrate-zeolite complex according to the following scheme: young pigs aged 60 ... 150 days were given 2% of zeolite of the dry matter of the ration and 20 mg / kg of citric acid; piglets aged 105 ... 120 days - 2% of zeolite of the dry matter of the ration and 40 mg / kg of citric acid. Biochemical parameters were determined on a Stat Fax 1904 Plus analyzer. It was established that feeding piglets of the test groups with non-traditional supplements contributed to accumulation of glycogen in their liver by 10.6 and 15.9% ($P < 0.05$), pyruvate by 8.7 and 15.9% ($P < 0, 05$) with reducing the level of lactate by 18.7 and 14.4% ($P < 0.05$) compared with the control. The activation of enzymatic processes in the muscle tissue of pigs when feeding them with studied additives is noted. Addition of supplements based on natural zeolite and the combination of zeolites with organic

acids stimulates carbohydrate and energy metabolism, including the process of glycolysis, accumulation of glycogen in the liver.

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ABOUT THE BIOLOGICAL ROLE AND THE INFLUENCE OF CHORIONIC GONADOTROPIN ON THE STRUCTURAL AND FUNCTIONAL PARAMETRES OF ANIMAL BODY

Bogdanov I. I., Khlynov D.N., Ayugin N.P.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel.: 8 (8422) 55-95-83, e-mail: nicugsha@yandex.ru

Key words: *chorionic gonadotropin, placenta, pregnancy, cattle, hormones.*

The article reviews the influence of chorionic gonadotropin on structural and functional parameters of the body of animals, its biological role of the pregnant, and also presents medications based on chorionic gonadotropin and their proposed clinical use. A sufficient amount of scientific evidence has been accumulated about the significant participation of CG in human life and its use as a hormone and immune regulator, but the biological role of this hormone in animals is still insufficiently studied. The main function of CG is to protect pregnancy of humans and animals, it has a luteotropic effect, and the subsequent development of the corpus luteum during pregnancy. In the veterinary practice, chorionic gonadotropin and serum gonadotropin, as well as gonadotropin-based medications such as Chorulon (Intervet, Holland), Ovulin (VetImporttrade, Russia), Follutein (Solvay, USA) are used for various pathological conditions or as stimulants of reproductive function. Gonadotropin preparations are prescribed to stimulate ovulation, increase fertility, prevent embryonic mortality, treat ovarian follicular cysts, anestrus, prolonged rutting period, and nymphomania. The information presented in the article indicates a certain biological role played by chorionic gonadotropin and its effect on the organism of animals when administered parenterally, however, the issues of the effect of the hormone on biochemical processes, immune status, cell reproduction and the state of parenchymal organs require a more detailed study. The obtained data can be used in the development of methods of hormonal therapy of animals for the normalization of structural and functional pathology in the organs and tissues of mammals.

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MORPHOLOGICAL STRUCTURE OF DOE RABBIT OVARIES DURING RUTTING PERIOD

Bogdanova M. A., Khokhlova S. N., Bogdanov I.I.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel .: 8 (84231) 55-95-83, e-mail: bm2474@mail.ru

Keywords: *rabbits, ovary, morphological structure, follicle, corpus luteum, atresic follicle.*

The paper presents results of morphometric and histological study of the ovary structure of a sexually mature doe-rabbit during the rutting period. A number of works is devoted to the study of morphology of reproductive organs of the rabbit, where one can find material on structural features and vascularization of the ovaries and uterus in postnatal ontogenesis, changes in reproductive organs of the rabbit during pregnancy and pathological conditions, as well as morphofunctional characteristics of the ovary under the influence of selenium medications. At the same time, the issue of studying morphological features of rabbit ovary during the rut, when this organ undergoes a significant restructuring, is not studied enough. It has been established that the general structural principle of the ovary and its histostructure is preserved. The surface of the ovary is covered with flat epithelium, the protein membrane thickens, the blood vessels are well developed. There is a large number of primordial follicles in the cortex, as well as single growing secondary follicles with an ovocyte of the first order, some of them also have a tertiary follicle. There was a small number of atretic follicles and a diffusive proliferation of the corpus luteum, which is not entirely typical for normal state and is most likely explained by the hormonal effect that occurs in females during the rut. The results of the morphometric and histological study of ovary structure of a sexually mature doe-rabbit during the rutting period allow to expand the available scientific knowledge on this issue, which is necessary for understanding the course of physiological processes.

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QUALITATIVE COMPOSITION OF MILK PROTEINS OF HOLSTEINIZED COWS OF VARIOUS GENOTYPES

Velmatov A. P., Neyaskin N. N., Tishkina T. N.

Agrarian Institute,

FSBEI HE National Research Mordovia State University named after N.P. Ogarev
430005, Saransk, Bolshevistskaya st., 68; tel .: (8-342) -25-40-02

E-mail: kafedra_tpppz@agro.mrsu.ru

Key words: *Simmental, Holstein breed, milk, fat, protein, amino acid, genotype*
Simmental cows are characterized by high protein content of milk; their milk contains 3.41% of milk protein, the first generation of hybrids has 3.35%, the second has 3.29% and the third has 3.22%. The largest number of essential amino acids - 1.44% is found in the milk protein of milk of Simmental cows, which is slightly lower than in first generation animals - 1.41%, with an increase in the proportion of Holstein heredity, the content of essential amino acids decreases to 1.29% in the third generation hybrid animals . When determining the content of some essential amino acids in the milk of experimental animals, it was established that the largest percentage is accounted for leucine 0.28-0.31%, lysine 0.23-0.27%, valine 0.18-0.20%. The content of the remaining amino acids ranged from 0.10% (histidine) to 0.16% (phenylalanine). The study of the structure of amino acid composition of milk proteins showed that the largest proportion of milk proteins, depending on the genotype, is glutamic acid (21.5-22.7%), leucine (9.5-9.7%), proline (9, 4-9.5%), and the lowest is cystine (0.93-1.10%). Milk protein synthesized by Simmental cows is characterized by a higher biological value ($i = 0.818$ and $i1 = 0.450$) than synthesized by hybrid cows ($i = 0.810-0.777$ and $i1 = 0.448-0.437$). The index of the biological value of milk of crossbred animals as the Holstein blood was enriched, decreased in the first variant of calculations (i) by 0.008-0.041 units and in the second ($i1$) - by 0.0020.013 units. Among crossbred animals, the milk of first generation crossbred animals is considered the most biologically valuable. As the Holstein blood is enriched, the biological value of milk decreases.

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INTRASTRAIN BREEDING AND LINE CROSS FOR BREEDING HERDS IN DAIRY CATTLE

Gavrilenko V.P., Bushov A.V., Prokofyev A.N.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel.: 8 (8422) 44-30-62;

e-mail: ulbiotech@yandex.ru

Key words: *Holstein breed, line, intrastrain selection, line cross, inbreeding, compatibility.*

The purpose of this work is to study the intraline selection and line cross in Holstein and Black-Spotted breeds of cattle in the conditions of the breeding plant OOO PBC Krasnaya Zvezda, as well as the compatibility of the genealogical lines

of Holstein breed. As a result of the research, a definite difference was found in milk productivity of first-calf cows between the genealogical lines of Holstein breed. First-calf cows of the following lines: Montvik Chieftain 95679, Vis Beck Ideal 1013415 and Reflection Sovering 198998, have a significant milk yield advantage to contemporaries from Siling Traydzhun Rokita 252 803 line - by 1114 ... 587 kg of milk, $P < 0.001$, and as for milk fat mass fraction they are inferior to it by 0.09%, $P < 0.05$... 0.08%. In case of intrastrain selection, the first heifers of the Vis Beck Ideal line were distinguished by the best milk yield - 5499 kg and Reflection Sovering lines - 5403 kg of milk. Their superiority over the peers of the Siling Traydzhun Rokita line was 1390 ... 1204 kg of milk, with $P < 0.001$. At the same time, in terms of milk fat mass fraction, the first calf heifers of these lines were worse than the latter by 0.19% ($P < 0.01$) and 0.13%. An analysis of the Vis Beck Ideal 1013415 cross lines with other lines of Holstein breed showed some superiority of VBI 1013415 \times RS 198998 (+112 kg of milk) compared to the intralinear selection with insignificant difference. The cross lines of STR 252803 with the lines of VBI, RS and MC turned out to be more efficient than the intralinear selection. The difference in the milk yield of first-calf cows from such crosses ranged from +1211 ($P < 0.01$) kg of milk (STR \times RS cross) to + 456 ... + 225 kg of milk, Crosses STR \times MC and STR \times VBI, $P > 0.05$, respectively. It was also established that between direct and reverse cross lines of the Holstein breed there are differences in milk productivity of first-calf cows. Thus, first-calf cows, received with direct crosses VBI \times STR, VBI \times RS and STR \times RS are superior in terms of their yield over peers from reverse crosses STR \times VBI, RS \times VBI and RS \times STR, respectively, by 432, 176 and 571 kg of milk, although this difference is not significant. In other crosses, on the contrary, first calf heifers from VBI \times MC crosses, STR \times MC and RS \times MC crosses are inferior by 320... 1026 kg of milk to their peers of reverse crosses, while the difference in 1026 kg of milk is significant ($P < 0.05$). In terms of the mass fraction of fat in the milk of cows, a significant difference of + 0.12% and + 0.305% ($P < 0.05$) was in favor of the first heifers obtained from the direct crosses of VBI \times RS and STR \times MC.

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IMPORT SUBSTITUTION IN THE FOOD COMPLEX OF RUSSIA

Goncharov V. D.¹, Balakirev N. A.², Selina M. V.²,

¹ All-Russian Institute of Agrarian Problems and Informatics named after A.A. Nikonov - a branch of Federal State Budgetary Research Institution "Federal Scientific Center Of Agrarian Economy And Social Development Of Rural Territories - All-Russian Research Institute For Agricultural Economy "

² FSBEI HE Moscow State Academy of Veterinary Medicine and Biotechnology - MVA named after K.I. Scriabin "

¹107078, Moscow, Bolshoy Kharitonievsky av., 21, building 1; tel. : 8 (495) 6281067, e-mail: viapi@mail.ru

²109472, Moscow, Academician Scriabin st., 23; tel. : 8 (495) 3763018, e-mail: selina.marinav@gmail.com

Key words: *food complex, import, exchange rate, price, cattle, pork, poultry meat, butter, cheese, cottage cheese, dairy cattle, vegetable oil.*

The article assesses the import substitution in the food complex of the country and suggests measures to reduce imports of agricultural products in the future. After introduction of the sanctions by the United States, the EU and several other countries, the situation with the provision of food in the country has become aggravated. In this regard, the federal authorities set the task for the workers of the agro-industrial complex to increase the production of food products for the

purpose of import substitution. Already in 2015, the threshold values of the Doctrine of Food Security of the Russian Federation were exceeded for meat and meat products by 2.4% (87.4%), as for the share of domestic milk and dairy products among total resources, it is still below the threshold values of the Doctrine. To reduce the import of meat and meat products in the Russian Federation, it is necessary first of all to foster efforts to strengthening the feed supply of animal breeding. For successful development of pig and poultry breeding in the country, it is necessary to increase the production of appropriate compound feeds. In order to reduce the import of milk and dairy products in the future, it is necessary first of all to focus on increasing the productivity and longevity of cows' use. To continue positive dynamics of livestock development in Russia, it is necessary to create conditions for technological improvement and increase of investment attractiveness in animal breeding, the creation of logistics centers, enterprises for production of domestic feed, feed additives, effective veterinary remedies. It's important to accelerate the solution of social problems of the village by creating the necessary level of infrastructure development in the village in order to attract and retain qualified personnel. It's necessary to continue to increase the level of state support for effective work of animal breeding. To implement import substitution, the transition of the country's agro-industrial complex to the innovative path of its development must be carried out.

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INFLUENCE OF HOLSTEIN SERVICING BULLS ON PHYSICAL, CHEMICAL AND TECHNOLOGICAL MILK PROPERTIES OF DAUGHTERS

Efimova L.V., Frolova O.A., Zaznobina T.V.

Krasnoyarsk Research Institute of Animal Husbandry - a separate division of the Federal Research Center. "Krasnoyarsk Scientific Center. Siberian Branch of the Russian Academy of Sciences
660049, Krasnoyarsk, Mira Ave., 66; tel .: 8 (391) 227-15-89; e-mail: krasnptig75@yandex.ru.

Key words: cow, servicing bull, milk, physical and chemical properties, heat resistance, red-and-white breed, Krasnoyarsk Territory.

In dairy cattle breeding, there is a problem of raising milk quality along with the problem of increasing the quantity of milk products. The dairy industry has increasingly high demands for quality characteristics of milk. In this regard, the purpose of the work was to assess the physical, chemical and technological properties of milk of daughters of Holstein bulls. Scientific studies were carried out at ZAO Iskra, Uzhursky district of Krasnoyarsk region, cows were of Red-Spotted breed at the age of the first and the second lactation. For each age, two similar groups of cows were formed - daughters of bulls of Holstein breeds: Flagman 3401 and Fiat 1004. The physicochemical parameters of milk were measured on a Lactoscan milk analyzer, active acidity was determined using a pH meter, and heat resistance was measured using an alcohol test. It was established that the milk of cow-daughters of Bulls Flagman 3401 and Fiat 1004 met the requirements of State Standard 31449-2013: the fat content was 3.16 ... 4.31%, protein - 2.96 ... 4.53%, nonfat milk solids - 8.60 ... 9, 15%, density - 1.01 ... 1.08 g / cm³. In terms of freezing temperature, it was higher by 0.15–0.70 ° C. There was no statistically significant difference in the main physical and chemical properties of milk between the daughters of the two bulls. A reliable relationship has been established between daily milk yield for the second lactation and fat, protein and lactose content of milk of Fiat's daughters.

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TO THE QUESTION OF PAINT DETERMINATION OF ORLOV TROTTER BREED

Zadorova N.N., Khabarova V.A.

FSBEI of HE "Chuvash State Agricultural Academy"

Cheboksary, Chuvash Republic, Russia, 428004

Karl Marx st., 29, tel. +7 (8352) 62-23-34; E-mail: x949an21@yandex.ru).

Key words: *Oryol trotter breed, horse paint, population, inheritance, determination, phenotype, genealogy, genetics.*

Genealogical structure and gene pool of Orlov trotter are deteriorating, but the genetic diversity of paints remains. The display of the paint depends on spread of descendants of certain prominent animals in the population. The main paints are black ($23 \pm 5.6\%$), gray ($37 \pm 1.6\%$), bay ($28 \pm 2.6\%$), less often - red ($5 \pm 0.3\%$), black-brown ($1.75 \pm 1.01\%$). The gray paint is epistatic. The number of bay horses increases (+9.1%) and the number of black horses decreases (-19.2%) with a general reduction of breeding stock. Black-brown paint becomes rare, the population of rare light-bay and cream-coloured livestock increases, especially in the Ukrainian population. The horse color is determined by the complementary influence of the genes of two loci: Extension (MC1R) and Agouti (ASIP). The

clarifier gene “Z” (Silver) is responsible for silver shade and “apples”, it is inherited from the silver-gray stud horse Smetanka, via Bars I. The genealogical source of rare red, brown and liver-chestnut paints in the breed is the maternal side of Bars I’s son (Lebed I) and his descendant - brown Dobryi II. In the middle of the 19th century, this paint was genetically fixed in the breed by inbreeding on Dobryi II. Light-bay, cream-coloured, and Isabelline suits are determined from the grandmother of Bars I, a cream-colored mare from Denmark, which introduced the gene clarifier Cr (Cremello) into the breed. These paints often appear in the Ukrainian population in Boltik line. The flecked paint is determined by the dominant modifier gene “Rn” (Roan) linked to the Extension and Tobiano loci. Piebald Orlov trotters are born in genealogical line of Bychok, via Koreshok’s son - Ukhvat.

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INFLUENCE OF NON-TRADITIONAL FEEDS OF VEGETABLE AND ANIMAL ORIGIN ON MEAT PRODUCTIVITY OF BROILER CHICKENS

Koshchaev I.A., Ryadinskaya A.A.

FSBEI HE Belgorod SAU, Vavilova st., 1., Maisky v., Belgorod district, Belgorod region, Russia, 308503, e-mail: koshchaev@yandex.ru, tel.: 8-952-422-80-15.

Key words: *broiler chickens, dry beet pulp, protein concentrate, meat yield, meat quality, chemical composition.*

The article presents results of the use of unconventional raw materials of plant and animal origin of dried pulp and protein concentrate in broiler rations, which have a positive effect on physiological parameters of poultry and meat quality parameters. Studies were conducted on the basis of educational and scientific poultry farm of Belgorod SAU. As a result, chemical analysis of muscles has established that introduction of dry pulp into the ration improves the chemical composition of meat, contributes to a reduced fat content and the highest amino acids content. In case of introduction of 2.0% of pulp in the diet, the best parameters were found in the 1st experimental group. In case of introduction of 4.0 and 5.0% of pulp in the diet, 1 and 2 test showed good results, however, the fat content in the pectoral muscles was the lowest. The inclusion of protein concentrate from raw materials of animal origin into the broiler ration contributes to the greatest intensification of the synthesizing processes in muscles as compared with the introduction of dry whey into the diet. Research has shown that by the end of fattening, broilers that received protein concentrate had a larger mass by 17%, besides broiler meat contained more protein and fat.

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BIOLOGICAL PREPARATIONS FOR ENSILAGE OF MEADOW CLOVER

Kuchin N.N., Mansurov A.P., Zhirnov V.A.

Nizhny Novgorod State University of Engineering and Economics
606340 Nizhny Novgorod Region, Knyaginino town, Ochyabrskaya st,
d. 22a; tel. 8831 (66) 4-15-50; E-mail: kuchin53@mail.ru

Key words: *meadow clover, wilting, ensilage, cellulolytic bacteria, fermentation quality*

To ensure maximum concentration of energy and nutrients in bulk feed for highly productive livestock grass should be removed in the early stages of development. However, technological properties of such raw materials leave much to be desired: it dries slowly and is poorly silaged. A compromise solution to this problem is ensiling such raw materials in the dried form. But light drying can not guarantee a reliable result in the ensiling of perennial leguminous grasses, and a deeper one (up to 40% and more of dry matter content) is associated with an increase of loss of nutritional value and a decrease of acidification of food that does not provide reliable preservation. Better preservation can ensure the preservation of such raw materials by chemical and biological agents. The aim of our study was to test biological products with cellulolytic properties, such as Bacillus species, Alicyclobacillus acidocaldaris and Aeromonas species, to expand the sugar sources for silage microflora and improve the quality of fermentation of meadow clover. Short-term (three-day) exploring experiment showed a positive effect of the biological preparations used on fermentation results. They stimulated an increase of total acid formation, including the synthesis of lactic acid by 1.4-1.5 times, and acidification of the mass to the suitable limits (pH = 4.0-4.2). When ensiling raw materials, such abilities were shown by A. species, as for wilted ones - all biological products. In the medium term (three months) experiment, the positive effect of biological products on the quality of fermentation was confirmed. Silage obtained with these preparations had an increase of absolute and relative amount of lactic acid, butyric acid was either not detected or contained in insignificant quantities, the content of ammonia nitrogen decreased. Studies have shown the usefulness of light wilting and the usage of biological preparations for obtaining stable silage from meadow clover.

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**PRODUCTIVITY OF ENDOGENOUS AND EXOGENOUS USE OF THE
PROBIOTIC SPOROTHERMIN AT DIFFERENT ONTOGENESIS
STAGES OF AFRICAN SHARPTOOTH CATFISH**

Lyubomirova V.N., Romanov V.V., Rakova L. Yu.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1, tel .: 8 (8422) 55-95-38

e-mail: nvaselina@yandex.ru

Key words: *aquaculture, African catfish, probiotics, hematology, biochemistry, biomass, survivability.*

One of the modern directions of research in fish farming is the use of probiotics, their use increases the efficiency of aquaculture. The aim of our work was a comparative evaluation of various methods of introducing probiotic Sporothermin into the body of fish in order to increase the intensity of growth and survivability of African catfish young fish. The tasks of the work included: a study of the growth and fish-bearing parameters of juvenile catfish when bred in the conditions of pool culture with endogenous and exogenous administration of the probiotic Sporothermin; assessment of the effect of probiotics on the hematological parameters of the blood of juvenile catfish in case of different administration of probiotics; substantiation of the most effective method of administration of probiotic Sporothermin when breeding juvenile catfish. The results of our research have shown that endogenous and exogenous administration of probiotic Sporothermin has a positive effect on hemoglobin level, ESR, lymphocyte count, carbohydrate and protein metabolism, enzyme activity, and ultimately on survivability, growth characteristics of fish and the rate of biomass growth. The most pronounced positive effect of Sporothermin on the body of fish was observed in the group with combined endogenous and exogenous administration of probiotics. Our

results allow us to recommend probiotic Sporothermin as a probiotic additive, which can reasonably be included in fish feed. Also, in the conditions of industrial aquaculture, the introduction of Sporothermin into the water can be recommended in order to ensure the fullest realization of the genetic potential of fish productivity.

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INFLUENCE OF HUMIVAL ON PELTS QUALITY OF YOUNG ARCTIC FOX BRED IN THE CONDITIONS OF CAGE HOUSING

Melchakova E.A.¹, Kokorina A.E. ¹, Bespyatykh O. Yu.²,

FSBSI "All-Russian Research Institute of Hunting and Animal Farming named after prof. B.M. Zhitkov" ¹

610000, Kirov, Preobrazhenskaya st., 79; Tel. 8 (8332) 642770,

e-mail: bio.vniioz@mail.ru

FSBEI HE "Vyatka State University" ²

610000, Kirov, Moskovskaya st., 36, Tel. +79226626820,

E-mail: b__oleg@mail.ru

Key words: *Humival, Arctic fox, skin quality.*

The influence of different doses of Humival on the quality of the pelts of young Arctic fox (*Alopex lagopus*, L., 1758) was studied in OOO fur farm Vyatka (Kirov region). Four groups were formed on the principle of group analogs among 2 month-old animals (beginning of July): the control group and three test ones (in each group $n = 40$). Unlike the control group, the animals of the test groups were given Humival in addition to the main ration during the first 10 days of each month (July-November) at the rate of: first group - 10 mg / kg, second group - 25 mg / kg, third group - 40 mg / kg of body weight. After formation of winter hair, animals were slaughtered (November) and the quality of their skins was evaluated. The application of Humival helped to increase the size of the skins. In comparison to the control group, larger skins were obtained in the test groups: more than 20% - of the largest size (26.5 dm²), from 35 to 75% - of the next smaller size (25 dm²). Also, about 90% of the highest quality skins were recorded in the test groups of males regardless of the medication dose, compared with 48% in the control group. Tears, seams, defects of overhair and underfur are found on the skins of experimental groups less frequently than in the control group. The test value of the skins (the total index of the size of the skin and the its defects) of males of the 3rd test group was 21% higher ($p < 0.05$), females of the 2nd and 3rd test groups - by 20% ($p < 0.05$) and 21% ($p < 0.01$), respectively, compared to the control group. Thus, Humival in different doses contributes to an increase in size, a decrease of defectiveness and an increase in the test value of the pelts of young Arctic fox by

21%. The best quality of skin products was found in animals that received Humival in the dose of 40 mg / kg of body weight.

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CYTOLOGICAL AND HISTOLOGICAL STUDIES OF GONADA OF CLARIUM CATFISH BRED WITH PROBIOTICS, ADAPTOGENES AND WITHOUT THEM

Mukhitova M.E., Romanova E.M., Romanov V.V.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyy Venets Boulevard, 1, tel .: 8 (8422) 55-95-38, email: vvr-emr@yandex.ru

Key words: *aquaculture, African catfish, adaptogens, probiotics*

The work is devoted to cytological and histological studies of the genital system of catfish bred in the environment with and without probiotics, adaptogens. The aim of the work was to study the qualitative and quantitative characteristics of genital products of females and males, the development processes of fertilized eggs and emergence of yolk sac larva in case of the usage of probiotics and adaptogens. The tasks included: cytological study of gonads, the study of oocyte and sperm cell maturation, the calculation of fertility indexes of females and males of African catfish; evaluation of in vitro fertilization effectiveness in case of application of adaptogens and probiotics. Comparative studies of the quality of genital products, and then of the offspring obtained from males and females bred in the environment with adaptogens and probiotics, showed that the hatching of yolk sac larva was high and amounted to 75%. The survival rate of yolk sac larva of the African catfish in the environment with probiotic and adaptogen was at the level of 99%. Developmental differences were clearly visualized in the control at the first stages of cultivation of fertilized eggs. The number of dead (whitened) eggs was significantly higher when there were no probiotics and adaptogens in the total mass of caviar. It was found that the rate of hatching of yolk sac larva in the control was lower by 30-40%, compared with fertilized eggs, incubated in the environment with probiotics and an adaptogens. The survival rate of the larvae obtained from females and males bred without probiotics and adaptogens, was lower by 50%. The complex application of the adaptogen "Irkutin" and the probiotic "Sporothermin" increased the natural immunity and had a healthy effect on the body of fish during the cultivation of fertilized eggs at the initial stages of embryonic and postembryonic ontogenesis.

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ORTHOPEDIC MORBITABILITY OF HOLSTEINIZED COWS IN THE CONDITIONS OF LOOSE HOUSING

Nenashev I.V.¹, Maryin E. M.², Maryina O. N.²

¹ FSBEI HE Samara State Agricultural Academy, 446442 Samara Region, Ust-Kinelsky v., Kinelsky District, Sportivnaya st., 7A; e-mail: nenashev1974@inbox.ru

² Ulyanovsk State Agrarian University, 432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel. : (8422) 55-95-981; e-mail: evgenimari@yandex.ru

Key words: *hoof diseases, cow, morbidity, loose housing, monitoring, nosology.*

The article presents results of orthopedic examination of dairy livestock of Black-Spotted Holsteinized breed in the State Unitary Enterprise Usinskoye of Syzran district in Samara region. In total, 595 milking cows under the age of 7 years old with an average weight of 550 ... 650 kg were examined. Blood of clinically healthy animals and sick cows (with orthopedic diseases) was taken in the morning from the jugular vein. The content of erythrocytes, hemoglobin, hematocrit, erythrocyte indexes, leukocyte count, total protein, albumin and globulin fractions were determined in the blood. Animals suffering from purulent-necrotic lesions in the digit area were subjected to complex treatment, followed by a control study 14 days after the start of treatment. It was established that diseases in the digit area were found in 154 animals, which is 25.9% of all the animals studied. The most frequently observed diseases were Rustergolts ulcer, purulent Pododermatitis and ulcerative lesions of the soft tissues in the hooves. It was also established that animals with diseases of the distal limb had a reduced content of hemoglobin, hematocrit, average red blood cell volume, total protein, albumin fraction, β -globulin and γ -globulin and an increased level of leukocytes. The therapeutic measures undertaken during the period of clinical and orthopedic medical examination of dairy cows of Black-Spotted Holsteinized breed bred in loose housing conditions showed high efficiency.

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CHANGE OF HEMATOLOGICAL PARAMETRES AFTER OSTEOINTEGRATION OF TITANIUM PERCUTANEOUS IMPLANTS OF RABBITS

Osipova E.V., Shipitsyna I.V., Emanov A.A.

Federal State Budgetary Institution "Russian Research Center" Restorative Traumatology and Orthopedics "named after academician A.A. Ilizarov" of the Ministry of Health of the Russian Federation.

640014, Russia, Kurgan, M. Ulyanova st., 6; tel .: 8 (3522) 41-52-27; e-mail: A_Eman@list.ru

Key words: *percutaneous osseointegration, titanium implants, rabbits, leukoformula, erythrocytes, hemoglobin*

The article presents results of a study of the parameters of the peripheral blood of rabbits after osseointegration of titanium percutaneous implants. The experiments were performed on 10 clinically healthy rabbits of Chinchilla breed aged from 6 to 10 months, with an average weight of 3.4 ± 0.2 kg. The control group ($n = 30$) consisted of animals aged from 6 to 10 months and weighing 3.2 ± 0.4 kg. Blood tests were performed before surgery, on 21st and 84th days, and 5 months after surgery. The blood picture of animals of the experimental group was characterized by moderate erythrocytopenia and leukocytosis, a decrease in concentration of hemoglobin and an increase in the concentration of platelets. The increase of the number of stab neutrophils observed in white blood and emergence of young forms (metamyelocytes) indicated a regenerative form of the nuclear shift. When analyzing the red blood parameters of all animals after 21 days of the experiment, a significant decrease in the number of erythrocytes was observed, which persisted

up to 84 days compared with the control group and pre-surgery values. Reduction of the number of red blood cells led to a significant decrease in concentration of hemoglobin and hematocrit. At the same time, the size of erythrocytes was slightly changed, the width of their distribution by volume increased. A tendency to decrease is also noted in the content (MCH) and concentration (MCHC) of average cell hemoglobin in the erythrocyte. Recovery of blood parameters in relation to the presurgery and control values occurred after 5 months of the experiment. The results of the study showed that the inflammatory process did not go beyond the extremities of the general adaptation syndrome that develops after surgery in case using osseointegrated percutaneous implants.

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PROTEIN EXCHANGE AND QUALITY OF MEAT OF PIGS IN CASE OF BREEDING THEM WITH APPLICATION OF SORBING PROBIOTIC ADDITIVE "BISOLBI" IN THE RATIONS

Semenova Yu. V. ¹, Desyatov O.A.¹, Aritkin A. D. ²

¹ FSBEI HE Ulyanovsk State Agrarian University, Ulyanovsk, Novyi Venets Boulevard, 1,

8 (422) 44-30-62, E-mail: kormlen@yandex.ru

² OOO Sileks-Agro, 433030, Ulyanovsk region, Inzensky district, Inza, Sovetskaya Street, 36, +7 (84241) 2-58-55, E-mail: info@silex-agro.ru

Key words: pigs, feed additive, blood serum, total protein, albumin, globulins, live weight, productivity.

The influence of the sorbing probiotic feed additive “Bisolbi” in rations of fattening pigs on the state of protein metabolism and meat quality was studied in the conditions of Agricultural Production Cooperative pig farm complex named after N.K. Krupskaya of Melekessky district in Ulyanovsk region. The feed additive "Bisolbi" consists of a filler of mineral-silicious powder diatomite and probiotic bacteria *Bacillus subtilis*. Its usage in the diets of fattening pigs at doses of 0.5 and 1.0% of weight of combined feed causes a change in the direction of nitrogen metabolism in the direction of improving protein synthesis in the body. Thus, the content of total protein (by 3.07 ... 10.24%) and its albumin (by 4.92 ... 16.91%) and immune cells carrying γ -globulin fractions (by 2,08 ... 6.44%) ($P < 0.05-0.01$) increase in the blood serum of pigs, which indicates more intensive redox processes in their bodies, metabolism and energy, protein-forming and albumin-synthesizing functions of the liver, it led to an increase in the average daily gain by 4.94 and 9.19%, the earliness of pigs when they reach a live weight of 100 kg by 8 and 19.9 days and reduces feed consumption by 1 kg of gain by 0.8 and 1.48 energetic feed unit. Application of the studied feed additive had an impact not only on the quantitative parameters of meat productivity and feed conversion,

but also affected the qualitative composition of pork, indicated by a decrease in the amount of moisture and fat, and an increase in the amount of protein. At the same time, more pronounced changes in these parameters were noticed in pigs which received a biological product at a dose of 1.0% of feed weight.

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MILK PRODUCTIVITY AND BLOOD PARAMETRES OF COWS IN CASE APPLICATION OF PINE NUT SHELL IN THE RATION

Tereshchenko V.A., Ivanov E.A., Ivanova O.V.

Krasnoyarsk Research Institute of Animal Breeding - separate subdivision of Federal Research Center "Krasnoyarsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences,

660049, Krasnoyarsk, Mira Ave., 66; tel. (391) -227-15-89, e-mail: krasnptig75@yandex.ru

Key words: *cattle, cows, ration, feeding, pine nut shell, milk productivity.*

An important factor in increasing the productivity of dairy cattle is to ensure appropriate ration by improving the quality of feed and enriching it with a complex of additives from alternative sources, in particular, from forest resources. Scientific and economic experiment on the study of the effect of different dosages of crushed pine nut shell on milk productivity and blood parameters of cows was carried out in 2018 in the conditions of OOO Taezhnyi

Breeding Farm in Sukhobuzimskoe district of Krasnoyarsk Territory. For carrying out the experiment, 3 groups of dairy cows of the Black-Spotted breed of the second calving were formed on the analog principle (5 heads in each group). The duration of the experiment was 100 days. According to the research scheme, the control group received the basic ration, the 1st test group, in addition to the basic ration, received crushed pine nut shell at a dose of 25 g / head / day, the 2nd test group received crushed pine nut shell at a dose of 50 g / head / day. Research and data processing were carried out by generally accepted methods. As a result of the study, the positive effect of the pine nut shell on milk production and biochemical blood parameters of cows was established. Analysis of the obtained data allowed to determine the most effective dose of the feed additive - 50 g per head per day, which contributed to an increase of milk yield during 100 days of lactation by 4.5%, the amount of milk fat by 18.5%, the amount of milk protein by 4.8 %, the amount and size of milk fat globules - by 11.3% and 0.38 microns, respectively, and also an increase in concentration of calcium in blood - by 24.5%, the concentration of iron - by 7.2%.

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IMPROVEMENT OF THE REPRODUCTIVE CAPABILITY OF SOWS IN STRESS CONDITIONS OF INDUSTRIAL COMPLEXES

Ulitko V.E., Kornienko A.V., Savina E.A.

FSBEI HE Ulyanovsk SAU

432017 Ulyanovsk, Novyi Venets Boulevard, 1

tel. 8 (8422) 44-30-58, kormlen @ yandex.ru

Key words: *sow, free radicals, antioxidant, carotenoids, resistance, reproduction, large-fetus, pregnant, lactating period.*

The article reveals a way to increase the level of realization of genetic potential of sow productivity in the conditions of technological and feed stress factors by enhancing their adaptive potential through usage of antioxidant vitamin-containing compound of new generation "Cartsesel" in the rations during the production cycle, it contains such important corrective links of improvement of antioxidant status as β -carotene, vitamin E, C, and selenium. This compound, as part of the diet of sows, reduces the effects of free radicals on the body, which results in improvement in metabolism efficiency, it is evident from the increase of sows' body weight and a decrease in its loss in the lactation period. At the same time, sows are characterized by better fecundity, large- fetus litter. They significantly reduce the number of stillborn piglets and improve the composition of colostrum and milk, which has a positive effect on postembryonic development and survivability of the litter. Data on the productivity of sows and their litter correlate with the morpho-biochemical parameters of their blood. The application of β -carotene selenium-containing compound at a dose of 1 ml per 1 kg of feed in the diet of pregnant and lactating sows provides 9.54 rubles of profit.

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RESULTS OF PROTEOMIC ANALYSIS OF BACILLUS CEREUS FBC - 28 UGSKHA BACTERIOPHAGE Feoktistova N. A., Merchina S. V., Mastilenko A. V.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1; 8 (8422) 55-95-47

e-mail: feokna@yandex.ru

Key words: *Bacillus cereus*, bacteriophage, proteome, molecular weight, protein, isoelectric point

The article presents results of the proteomic analysis of Bacillus cereus FBc – 28 UGSKhA bacteriophage (study of the quantitative composition, isoelectric point of proteins, molecular weight) isolated from environmental objects (soil test), which is of interest as a component of an experimental phage biological compound for food treatment to reduce quantitative parameters of microbial contamination. The resources of SnapGeneViewerv.4.1.7 and ExPasy (<https://web.expasy.org>). were used in the experiments. As a result of the research, data of proteomic analysis were obtained on the basis of a previously performed sequence. It was established that the qualitative composition of the proteins of FBc – 28 UGSKhA bacteriophage corresponds to those of the annotated analogs, has a clear homology of the nucleotide and amino acid sets. When analyzing the proteome of FBc – 28 UGSKhA bacteriophage and, accordingly, the sequencing of its nucleic acid, 60 proteins with molecular masses from 5.7 to 132.3 kDa were detected. The histogram of the distribution of the protein composition of Bacillus cereus of FBc – 28 UGSKhA at the isoelectric point (pI) captures the values in a wide range of 4.2 - 12.1. The obtained data on the proteome of FBc – 28 UGSKhA bacteriophage specific for Bacillus cereus brings us closer to the development of phage preparations of a new generation intended to decontaminate food raw materials, which have high specificity and a wide range of lytic action within the bacterial species, and complying with biosafety standards.

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EFFECT OF PROBIOTICS ON THE LEUCOGRAM OF AFRICAN SHARPTOOTH CATFISH IN THE CONDITIONS OF INDUSTRIAL AQUACULTURES

Shlenkina T.M., Romanova E.M., Mukhitova M.E.

FSBEI HE Ulyanovsk SAU

432017, Ulyanovsk, Novyi Venets Boulevard, 1; tel .: 8 (8422) 55-23-75; e-mail: t-shlenkina@yandex.ru

Key words: *aquaculture, African catfish, probiotics, Sporothermin, immunity, leucogram.*

*The article deals with the problem of using the probiotic Sporothermin when breeding African catfish. In particular, the effect of probiotics on the quantitative and qualitative composition of white blood cells is being studied. The problem of probiotics influence on composition of leucogram is relevant, since the cells of the white blood row are responsible for the immune defense of the body. The working hypothesis was based on the fact that probiotics improve the microbiocenosis of fish habitats, have a positive effect on the immune system of fish. The aim of the research was to investigate the effect of probiotic Sporothermin on blood cells of fish that are responsible for immunity. The percentage correlation of various types of leukocytes in the leucoformula reflects the physiological state of fish organism and their cellular immunity. In the course of research, it was established that catfish is a typical representative of the lymphoid type of leukoformula. The proportion of lymphocytes accounted to about 78.33% in the leukoformula of the catfish population bred without probiotics. The number of lymphocytes is 4.5% higher among fish bred with probiotics. The population of fish bred in the environment with probiotics did not have any diseases during the entire breeding period. It can be assumed that among fish receiving probiotics, anaerobic bacteria *Bacillus subtilis* and *Bacillus licheniformis* perform part of the body's protective function, suppressing a wide range of gram-positive and gram-negative bacteria. In case of application of probiotics, the proportion of polymorphonuclear form elements has also increased due to a decrease in the proportion of monocytes and neutrophils. Probiotics are pathogenic and conditionally pathogenic microbiota, have a positive effect on the body, improving its microbiocenosis, and are an alternative to antibiotics. Unlike antibiotics, probiotics are safe for humans. Live and fresh fish bred with probiotics is a healthy product for people, containing vital components for human body.*

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IDENTIFICATION OF ENTEROBACTER SPP STRAIN AND SPECIFIC TO IT E7 PHAGE BY COMPARATIVE GENOME AND PHYLOGENETIC ANALYSIS

Suldina E.V., Vasiliev D.A., Feoktistova N.A.

FSBEI HE Ulyanovsk SAU

432017. Ulyanovsk, Novyi Venets Boulevard, 1; 89374545651

e-mail: e.suldina2006@yandex.ru

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The article presents results of studies on the comparative genome and phylogenetic analysis of the Enterobacter spp strain and its homologous phage E7 of the UGSKhA series. The phage strains and bacteria were isolated from environmental and sanitary objects and selected by the authors in 2017. The bacterial strain Enterobacter was identified by our biological properties as Enterobacter cloacae. A characteristic of bacteriophage on the basic biological properties was given. The results of a comparative analysis of ribosomal sequence of the 16S rRNA genes (1313 nucleotides) of Enterobacter spp strain with known 16S rRNA gene sequences in the GeneBank database using the BLASTN program showed identity of the isolated strain with the Enterobacter cloacae strain AR complete sequence of which is presented in the NCBI database. Using the data obtained, a rootless phylogenetic tree of Enterobacter cloacae 1 strain was constructed. Comparison of the sequence of UGSKhA phage E7 specific for Enterobacter spp was performed based on the terminase gene sequence (793 nucleotides) and DNA polymerase (201 nucleotides) with known gene sequences in the GeneBank database in BLASTN program. Bioinformatics analysis of the nucleotide sequences of the genome fragments of the phage under study showed that bacteriophage E7 has an identity for the phage Cronobacter phage vB. Based on the data obtained, rootless phylogenetic trees were constructed from the nucleotide sequences of the TERS genes and the DNA polymerase of phage E7 and homologous phages presented in the NCBI database.

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