

JUSTIFICATION OF HEAT AND ENERGY PARAMETERS OF CONTACT DRYING PROCESS OF GRAIN

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Key words: heat balance, contact heat transfer, regime parameters, heating surface temperature, moisture exchange.

The purpose of the research is to identify factors that directly affect the thermophysical characteristics of the developed means for grain contact drying. In case of system analysis, this goal is achieved by widespread usage of modeling, which allows to substantiate not only the parameters of the appropriate process mode, but also to choose the most suitable way to control the drying process under production conditions. The conditions for heat transfer from the heating surface to the grain depend on the heat given off by the heating surface of the drying chamber, W ; heat transfer coefficient $W/(m^2 \text{ } ^\circ\text{C})$, temperature of the heating surface and the grain at the outlet from the drying chamber, $^\circ\text{C}$; heating surface area, m^2 . In addition, in case of contact heat transfer, the problem of grain heating is linear ($t_{gr2} = f(z, \tau)$), where z is the distance from the grain to the heating surface, m ; τ - time from the drying process start, s . It was found that the heating temperature limit of the surface of the drying chamber (made in the form of a cylinder, with a screw transporting working body) should not exceed $61 \text{ } ^\circ\text{C}$ to ensure the grain temperature at the chamber outlet of $39 \text{ } ^\circ\text{C}$. In case of using a belt conveyor in the drying chamber and if it is in the form of a rectangular parallelepiped, the temperature limit of the chamber surface heating is $69 \text{ } ^\circ\text{C}$. When the drying chamber is made in the form of a stepped surface enclosed in a box with vibration induction of grain movement, the heating temperature of this surface can be increased to $129 \text{ } ^\circ\text{C}$ without harm to the

dried grain quality. It also allows to increase the throughput of the device compared to the first version of the drying chamber: from 0.2 t/h to 0.4 t/h.

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**THEORETICAL RESEARCH ON HARVEST QUALITY IMPROVEMENT
OF ROOT CROPS AND POTATOES WITH A SEPARATING SYSTEM
USING THE HEAT OF EXHAUST GASES**

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Keywords: theoretical studies, root crops, potatoes, exhaust gases, separation system, design parameters

Improvement of technologies and development of appropriate technical means for cultivating all types of agricultural products is one of the energy-consuming segments of production. In addition, due to difference in biological characteristics of agricultural plants, energy costs for harvesting of surface and underground crops, the main representatives of which are mostly vegetable and some types of technical crops, prevail in favor of the latter. To improve the quality of sugar beet root harvesting in conditions of high moisture, it is proposed to use a separating system in the harvester design, which ensures energy efficiency of work with the possibility of simultaneous operations of digging, separating of root crops from soil and plant impurities and blowing of the separating surface with hot exhaust gases from the power plant of the harvesting machine. The aim of the study is to substantiate theoretically the technological and operational parameters of the separating system of harvesters using the heat of exhaust gases to improve the quality of root crop and potato harvesting in the conditions of high soil moisture. The object of the research is technological process carried out by the separating system of the harvester, which is represented by a cleaning star with installed deflectors for blowing on working surface of the separator with the exhaust gases of the power plant. Consistent patterns that allow to determine the design and technological parameters of the

proposed separating system are presented. The results of the theoretical studies indicate the prospects for further experimental work to improve individual design elements of the proposed separating system.

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**DISTRIBUTION OF ELECTRIC POTENTIAL DURING
ELECTROMECHANICAL TREATMENT OF CYLINDRICAL PARTS WITH
THREE ELECTRODE TOOLS**

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Keywords: cylindrical part, electromechanical treatment, potential, voltage, electrode-tool, current strength

Further productivity increase and energy consumption reduction during electromechanical treatment (EMT) of machine parts is possible due to development and application of a three-tool impact on the treated surfaces. In this regard, power equipment for EMT, operating on linear voltage of the electrical power supply, should be used. Taking into account practical zero lag of the electric field associated with low frequency of the current in the active circuit of the EMT, we solved the problem of distributing electrical potentials in a cylindrical part along the radius of the cylinder, on the basis of the Laplace equation, as well as the deviation angle of the desired point from the initial position and the position of the electrode-tool along the axis of the cylinder. The obtained dependences were confirmed by practical experiments, which allowed to construct the surfaces of potential response of a cylindrical part during EMT, depending on the current radius values and cylindrical part length, as well as the deviation angle in the transverse plane of the desired point from the initial coordinate. Thereupon, it is possible to determine the features of heat release in the part during EMT with three tool electrodes. It allows to evaluate the nature of heat distribution over the volume of cylindrical parts during EMT, determine the parameters of the required current source, select the suitable treatment modes, and determine the nature of temperature changes in the workpiece, including in the area of its contact with the tool electrode.

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**SPECIFICATION OF PARAMETERS OF RANDOM INTERACTION OF SOLID PARTICLES AND SUSPENSION
DROPS IN A CHAMBER FOR SEED PROCESSING WITH BIOLOGICAL PRODUCTS**

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Key words: pneumomechanical treating machine, biological product, microorganisms, fluidization, seed soaring, plant protection.

The article observes a new pneumomechanical seed treating machine, adapted to work with biological products, the main components of which are the treatment chamber and the sprayer of working composition. The design and operation principle of the treatment chamber, the sprayer of the working composition of the biological product, the hydraulic and pneumatic systems of the device are described. A wide range of spraying pressure adjustment, as well as a gentle pneumatic method of applying the working preparation onto seeds allows the use of biological products for preparing seeds for sowing. Theoretical studies are given to determine the distribution uniformity of liquid droplets on seeds at first contact, depending on the porosity of the fluidized bed, the angle of the nozzle, the infill degree of the treatment chamber and its geometric parameters. The probability of a drop absorption by a caryopsis is substantiated, taking into account the fact that the drop is much smaller in size than the seed. An algorithm for numerical computation of wetted seeds is proposed, as well as variational distribution range (frequency polygon), average value, mean-square deviation and variation coefficient of drops on a caryopsis. According to the above algorithm, an application for Windows was developed in the C# language and in VisualStudio environment - a program that implements a numerical experiment and its statistical processing. Appropriate nozzle installation angle $\gamma=0^{\circ}$ and the height of the fluidized bed $h_{z1}=0.07$ m were determined.

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**DYNAMIC PARAMETERS OF PRODUCTIONAL PROCESS OF EARLY
RIPENING SOYBEAN VARIETIES DEPENDING ON MOISTURE
CONDITIONS OF THE VEGETATION PERIOD**

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Key words: Glycine max (L.) Merr., varieties, production process, Central Non-Black Soil Region, agro-climatic conditions.

Due to change of temperature and moisture regime and the shift of the isotherm of the sum of active temperatures from north to south in the Central region of Non-Black Soil zone, it became possible to expand the areas occupied by soybean crops and introduce new crops to more northern regions. In this regard, it became necessary to analyze the change of dynamic parameters of development of early-ripening soybean varieties of different origin - the northern ecotype, southern and Far Eastern ones in the conditions of the Central region of the Non-lack Soil zone with sufficient moisture supply as well as arid conditions during the growing season. The studied soybean varieties had differences in the growing season duration and the sum of active temperatures. The growing season of varieties of the northern ecotype was 85–100 days, the sum of active temperatures was 1700–1900°C; as for the southern ones: 90–105 days and 1900–2200°C; and the Far Eastern varieties: 95–105 days and 2000–2300°C. The maximum dry biomass averaged 5400–5700 kg/ha under conditions of favorable hydrothermal regime of the growing season, and did not exceed 3400 kg/ha under dry conditions. It was found that in case of sufficient moisture supply ($HTC = 1–1.5$), the southern varieties are more consistent with the possible variability of thermal resources in the Central region of the Non-Black Soil zone in terms of development than the Far Eastern ones and, along with the varieties of the northern ecotype, can be recommended for cultivation in the region. As far as arid conditions ($HTC < 1$) is concerned, no fundamental differences between the groups of varieties in terms of production process characteristics were revealed. The duration of the growing season correlated with the temperature and moisture regime

of the growing season. The growing season was reduced by 5–8 days on average for varieties in dry years ($HTC < 1$), in wet years ($HTC > 1.6$) it increased by 6–10 days.

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APPROPRIATE SOWING AMOUNT FOR HARD WHEAT VARIETIES UNDER THE CONDITIONS OF THE CHUVASH REPUBLIC

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The article dwells upon the results of three-year experimental data on growth, development and yield of spring hard wheat varieties such as Bezenchukskaya Niva and Bezenchukskaya Zolotistaya under the conditions of the Chuvash Republic. It was established that in case of reduction of seeding amount of viable seeds from 7 to 3 million pcs. per 1 ha, the vegetation duration of the studied varieties of spring hard wheat decreases by 6-7 days. Sowing of 5 million of viable seeds per 1 ha ensured the maximum density of spike-bearing stems due to better parameters of total and productive tillering capacity. The formation of large main wheat head with a high content of grains in Bezenchukskaya Niva variety was noted at seeding amount of viable seeds from 3 to 5 million per 1 ha. Increase of the seeding amount of more than 5 million seeds led to a decrease of main wheat head parameters. The crop structure analysis of Bezenchukskaya Zolotistaya variety did not reveal clear patterns of change in length and grain content parameters of the main wheat head from the

seeding amount. However, the highest parameter of 50.4 grams of weight of 1000 grains was obtained in the variant with a seeding amount of 6 million of viable seeds. The maximum yield increase of Bezenchukskaya Niva variety was 2.54 t/ha on average for 3 years, which was obtained on the variant with a seeding amount of 5 million of viable seeds per 1 ha. The highest yield of Bezenchukskaya Zolotistaya variety was 2.23 t/ha on average for 3 years, it was obtained at a seeding rate of 6 million of viable seeds per 1 ha.

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**INFLUENCE OF KEY FACTORS AND SOIL PROCESSES ON BARLEY
PRODUCTIVITY IN CROP ROTATIONS ON BLACK SOILS OF THE CIS-
URAL REGION**

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*Key words: crop rotation, barley, microorganisms, nitrates, phosphorus,
potassium, productivity.*

The article shows the results of studying the influence of soil moisture, cellulose-decomposing activity of microorganisms and the amount of nutrients on barley productivity in crop rotations and monocrops in the central zone of Orenburg region. The purpose of the experiment is to identify the effect of moisture, soil cellulolytic activity and macronutrients (nitrates, phosphorus, potassium) on barley productivity increase in crop rotations and in monocrop cultivation. The following research methods were used: field, thermostatic-weight, application-weight, ionometric and Machigin methods. There was a yield increase of barley feed and energy units up to 2.10, 1.63 and 1.24, 0.96 t/ha in the second and fourth variants of the experiment on a fertilized background on average for 2002-2020. The increase of feed unit yield occurs due to productive moisture utilization by the plant during the growing season of 32.3, 32.2 mm, nitrates - 4.20, 1.91 mg, phosphorus - 1.76, 0.50 and potassium - 2.47, 1.01 mg/100 g of soil in case of cellulose- decomposing activity of microorganisms - 7.93 and 10.37%. As far as other variants of the experiment is concerned, the range of soil moisture on nutritional background is from 17.4 to 41.7 mm during sowing and 3.5-10.5 mm during harvesting; the degree of linen decomposition - 4.05-9.37%, the content of digestible nitrates - 0.05-1.11 mg, mobile phosphorus - 0.04-0.29 mg, exchangeable potassium - 0.05-0.95 mg /100 g, feed units - 1.16-1.44 t, energy units - 0.68-0.85 t per 1 ha. As a result of the study, the influence of moisture, activity of microorganisms, nutrients on barley productivity growth was determined as a result of the aftereffects of millet and peas in crop rotations after application of mineral fertilizers at a dose of 40: 80: 40 kg (N: P: K) of the active substance per 1 ha. The yield dependence of barley energy feed units in a crop rotation with millet on the content of used nitrates in the arable soil layer was found.

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INFLUENCE OF SOWING TIME AND FERTILIZER DOSAGE ON WEEDINESS AND YIELD OF SWEET SORGHUM

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Key words: sweet sorghum, weeds, productivity, growing season.

The studies were carried out in order to determine the appropriate period of sowing and doses of mineral fertilizers for sweet sorghum in 2018-2020 on leached medium-thick, heavy loamy black soil of Zakamie of the Republic of Tatarstan. Humus content was 6.0-6.2% (according to Tyurin), alkaline hydrolysable nitrogen - 81-84 mg/kg, mobile forms of phosphorus - 167-170 mg, exchangeable potassium - 172-173 mg/kg of soil (according to Chirikov); the sum of the absorbed bases is 40.3-40.8 mg-eq per 100 g of soil, hydrolytic acidity - 3.42-3.50, pH of the salt extract - 5.6-5.7. The seeding amount was 300,000 pcs/ha of viable seeds, the depth of seed placement was 5–6 cm. Mineral fertilizers were applied after harvesting the previous crop, before main tillage. The main tillage type was 22 - 24 cm depth plowing. The forecrop was annual grasses for haylage. High weediness was observed in sorghum crops of the first term (10 May). Moreover, the doses of applied fertilizers significantly increased the weed infestation, their number was 58 pcs/m² on an unfertilized background in the full shoots phase, whereas, their number was 69 pcs/m² on the background of N₆₀P₆₀K₆₀, and 76 pcs/m² on the background of N₈₀P₈₀K₈₀. The above trend persisted throughout the growing season of the agrophytocenosis. The sowing time and the mineral nutrition background influenced both the growing season duration and crop formation: N₆₀P₆₀K₆₀, the duration of the growing season averaged 113 days over three years, which is 9 days more compared to the control. The variant of the mineral background up to N₈₀P₈₀K₈₀ increased the vegetation period by 15 days compared to the unfertilized variant of the experiment. The mineral nutrition background of N₆₀P₆₀K₆₀ in the second term of sorghum sowing allowed to obtain a yield increase of feed mass from 6.6 to 8.0 t/ha. The application of mineral fertilizers at a dose of N₈₀P₈₀K₈₀ provided a yield increase from 10.8 to 15.4 t/ha.

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**INFLUENCE OF GROWTH-REGULATING PRODUCTS ON
PRODUCTIVITY OF SPRING BARLEY**

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Key words: growth-regulating products, spring barley.

The vector of biologization in agriculture of the Russian Federation and its focus on organic agriculture emphasize the relevance of the conducted research. It reflects the results of the experiment in 2016-2020 and the results of 2021 of the

effect of growth-regulating products on the elements of spring barley crop structure on common black soil in the conditions of Rostov region. The studied products are: Biodux; Trainer; Artafit; Obereg; Fulvohumate. The control is water treatment. Barley agrocenoses were sprayed according to the recommendations: 1st - in the tillering phase, 2nd - in the heading phase. The barley forecrop is sunflower. The area of the experimental plot is 600 m². The placement of variants is sequential on 25 m² in a 4-fold repetition. As for Leon variety, it was found that barley field germination in field conditions was 88%. Double treatment of the agrocenoses with growth-regulating product contributed to better plant survival by harvesting time (more than 80%), in particular, with Biodux and Obereg (86 and 87%, respectively). Formation and growth of productive stems up to 1.28-1.33 was observed after the first spraying in the tillering phase. The second spraying in the stalk-shooting phase contributed to formation of heavy grain, Obereg impact was especially outstanding, where the mass of a thousand of grains exceeded the control by 2.9 g. The application of growth-regulating biological products increased the number of grains per head (on average, 1 pc more than in the control). It can be concluded that there is yield increase under the influence of growth-regulating products due to all elements of barley productivity, especially under the influence of Obereg and Biodux.

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THE CONDITIONS OF SOYBEAN MINERAL NUTRITION IN CROP ROTATIONS IN CASE OF DIFFERENT METHODS AND SYSTEMS OF PRIMARY SOIL TILLAGE IN THE FOREST-STEPPE OF THE CENTRE OF RUSSIA

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Key words: crop rotation, soybean, methods and systems of primary tillage, content of mineral nitrogen in soil, mobile phosphorus, exchangeable potassium.

In order to increase soybean yield, methods and systems of primary tillage are of vital importance, their usage doesn't only allow to improve many soil properties and phytosanitary state of crops, but it also improves mineral nutrition conditions. The influence of various methods and systems of autumn tillage on the content in the layers of 0-20 and 20-40 cm of available forms of nitrogen, phosphorus and potassium in the forest-steppe conditions of the Central Federal District of Russia was studied on soybean crops in a stationary field experiment in the years of the first rotation (2015-2018) of crop rotation (soybean, winter wheat, spring rapeseed and barley). The soil type of the experimental plot is leached heavy loamy black soil. The

name of the studied four systems of the main tillage was contingent: plowing, deep subsurface loosening, shallow and surface tillage were carried out directly for soybeans. On average, over the years of the first rotation, the studied methods and systems of the main tillage had an unequal effect on the conditions of the mineral nutrition of soybeans in the phase of 2-3 trifoliolate leaves. It was revealed that in case of plowing and the moldboard-surface tillage, the supply of mineral nitrogen, mobile phosphorus and exchangeable potassium in the analyzed layers did not differ significantly. In case of usage of non-moldboard methods in soybean cultivation and the systems of autumn tillage, the content of available forms of nitrogen, phosphorus and potassium increased in the upper soil layer of 0-20 cm, and decreased in the layer of 20-40 cm.

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MILLET PRODUCTIVITY AS A MONOCULTURE AND IN CROP ROTATIONS ON TWO AGRICULTURAL BACKGROUNDS DURING A LONG-TERM STUDY IN A REGION WITH UNSTABLE MOISTURE CONDITIONS

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Key words: monoculture, crop rotation, forecrop, fertilizer, productivity, millet, green manure fallow, sown fallow.

The article dwells upon the aftereffect influence of forecrops and crop rotations on millet productivity on two agricultural backgrounds, also, its long-term cultivation as monoculture in a region with unstable moisture conditions. The aim of the study was the influence of two agrocenoses on millet yield in the aftereffect of various forecrops, in the conditions of the steppe zone of the Southern Urals. Long-term (31 years) experiments were carried out in dry conditions of Orenburg region. As a result of the experiment, the influence of forecrop impact and aftereffect, nutritional background and meteorological factors of the growing season on formation of millet yields in crop rotations and as monocrop was revealed. The influence of precipitation of two summer months (June and July) on the millet yield level was discovered. Abundant precipitation in June and July contributes to growth of millet yields on two nutritional backgrounds. No effect from mineral fertilizer application was noted. Millet yield rise on an unfertilized background in the second, fourth and fifth rotation of crop rotations amounted to 0.01 tons, in the third - 0.09

tons per 1 ha. Millet cultivation in crop rotation with green manure fallow leads to yield increase in wet years on average up to 3.20 tons on a fertilized background, 3.12 tons per 1 ha on an unfertilized background. Millet productivity as monoculture decreased in comparison with cultivation in crop rotations in all years of a long-term experiment.

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RESEARCH ON THE INFLUENCE OF ORGANIC AND MINERAL FERTILIZERS ON RAPESEED YIELD AND ASH COMPOSITION OF ITS OIL SEEDS

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Key words: spring rapeseed, microelements, productivity, seeds, quality.

The article presents results of a field experiment with application of mineral (NPK and zeolite) and organic fertilizers in the technology of spring rapeseed cultivation, as well as a comparative analysis of the ash composition of rape seeds of Rif variety, depending on the variants of the research. Six variants were studied: growing plants without fertilization (control); mineral fertilizer N₆₀: P₆₀: K₆₀ alone and in combination with zeolite (5 t/ha); pure zeolite (5 t/ha); chicken manure (5 t/ha) alone and in combination with zeolite (5 t/ha). Accumulation of nine main elements (wt., %) contained in the ash of spring rapeseed seeds was studied by the method of energy dispersive spectrometry (X-Ray-analysis). The order of element accumulation was determined: P ≈ K > Mg ≥ Ca > Mo > S > Zn > Mn > Fe. The proportion of P is from 10.852 to 11.855 wt. %; the proportion of K is from 9.933 to 12.343 wt.%; Mg, Ca and Mo are present in rape seeds in similar concentrations within 4.0 -5.8 wt.%. Mutual usage of zeolite and organic fertilizer provided an increase of mineral accumulation in the seeds. Correlations between the elements were established. Higher level of macro- and microelements in seeds, necessary for humans, brings about good perspectives to create functional products based on the studied rape seeds for food enrichment. Positive effect of combined organo-mineral fertilizers on accumulation of mineral substances in rape seeds was established.

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BIOLOGICAL ACTIVITY OF RHIZOSPHERE OF GRAIN FORAGE CROPS IN CASE OF APPLICATION OF BACTERIAL PRODUCTS

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Key words: biological activity, soil microorganisms, bacterial fertilizers, rhizosphere, barley, oats.

The studies were carried out in field experiments of Federal State Budgetary Scientific Institution "Omsk Agrarian Research Center" in the southern forest-steppe of Western Siberia. The aim of the research is to study the effect of application of biological products of associative diazotrophs on biological properties of the

rhizosphere of grain forage crops of varieties of Omsk selection. The tests were carried out on varieties of spring barley for grain forage and brewing purposes bred at Omsk agrarian scientific centre (FSBSI "SibSRIA"): Omsky 95, Sasha, Omsky hulless 1, Omsky 90, Omsky 91, Omsky 101 and oats for cereal purposes - Siberian Hercules. Preparations of complex action produced at All-Russian Research Institute of Agricultural Microbiology (FSBSI All-Russian Research Institute of Agricultural Microbiology:, St. Petersburg, Pushkin) Rizoagrin (Agrobacterium radiobacter), Azorizin (Azospirillum), Mizorin (Arthrobacter mysorens), Flavobacterin (Flavobacterium) were used for inoculation of seeds. The soil of the experimental plot is meadow-black soil, medium-thick, medium-humus, heavy loamy with a humus content of 6.5%, water pH - 6.5. It was found that the microflora population of the rhizosphere of agricultural crops reacted dubiously to application of biological products and depended on genotypic characteristics of the varieties. The greatest positive effect of seed inoculation on the total number of microorganisms was noted in the rhizosphere of barley variety Omsky 95, the increase was 35% when the seeds were treated with Azorizin, with Rizoagrin -70% in relation to the control. The inoculation of oat seeds of Siberian Hercules variety with the bioproduct Flavobacterin contributed to an increase of the total number of microorganisms in the rhizosphere up to 27% compared to the control. The processes of nitrogen immobilization ($K_{immob.}>1$) prevailed in the soil under crops of grain forage crops in the years of the research. The highest coefficient of organic matter (potentially mineralizing) transformation was noted in the rhizosphere of grain-forage barley Omsk hulless 1 when seeds were treated with Rizoagrin - 148 units (109 units in the control) and in the rhizosphere of cereal oat Siberian Hercules when seeds were treated with Mizorin - 91.5 units . (55.8 units in the control).

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PHENOMENON OF TRANSGRESSION VARIABILITY IN POPULATIONS OF VARIOUS TYPES OF HEMP INTERVARIETAL HYBRIDS

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Key words: hemp, monoecious, heterosis, selection, father, mother, variety, hybrid.

The article deals with the issues of the phenomenon of transgression variability in populations of various types of hemp intervarietal hybrids. The study of the first generation of various types of intervarietal hemp hybrids showed that transgression trait is observed in most traits available for study. Studies showed that the height of intervarietal hemp hybrid plants transgresses within a fairly wide range, depending on the types of crossing. Concurrently, the genotypes of parental components have a great influence on the degree and frequency of tall and short-stemmed plants. So, in case of direct crossing of forms close in plant height (Glukhovskaya-10 and Odnodomnaya-2, YUS-9 and Poltavskaya-3), a population with biotypes exceeding the best parent by 18-19% is created in the offspring. The occurrence of such plants in this case is significant (12-16%). Crossing of components that differ greatly in plant height (YUS-9 and Odnodomnaya-2, Glukhovskaya-10 and Poltavskaya-3) shows a degree of transgression of 13-14% and a frequency of 9-10%. There is a transgression of some productivity elements in populations of various types of intervarietal hemp hybrids. The highest rates of transgression are revealed by the stem weight of one plant. The splitting nature of the first generation of simple intervarietal hybrids depends on the genotypes of the parental forms. Thus, when

crossing Glukhovskaya-10 and Odnodomnaya-2 varieties, which are identical in stem weight, a population of biotypes, exceeding the best parent by 25% is created. The occurrence of such plants in this case is significant (24%). When crossing forms of YUS-9 and Odnodomnaya-2, contrasting in stem weight, the degree of transgression is 18%, and the frequency is 15%. Transgression practically does not occur in the offspring of backcross hybrids. Therefore, the best biotypes in terms of a complex of traits, isolated in the offspring of first-generation hybrids, should be used to obtain complex hybrid populations. Complex hybrid populations are a valuable source material and can be the parent of a variety.

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BACTERIOPHAGE GENOME AND PROTEOME STUDY OF PHYTOPATHOGENIC PSEUDOMONAS SYRINGAE BACTERIA

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Keywords: Pseudomonas syringae, bacteriophage, capsid proteins, molecular weight, amino acids, proteome, DNA

The article describes results of the study of genomic and proteomic characteristics of the production-promising Ps.s-27 bacteriophage of the Ural State Agrarian University, specific for phytopathogenic Pseudomonas syringae bacteria. The sequencing results allowed to determine the DNA size of the studied bacteriophage, which amounted to 24690 bp. These data correspond to the results obtained during electrophoresis (relative error $\delta = \delta = 0.0383$). Analysis of correspondence of sequence data to annotated proteomes in GeneMark Prokaryotic V 3.26. identified 28 open reading frames. The localization analysis of the studied

proteins was carried out and it was determined that capsid proteins accounted for 61.2% for Ps.s-27 of UlGAU bacteriophage. Data which characterize 28 proteins of the studied bacteriophage were systematized, these data generalize information on the number of amino acids, molecular weight, isoelectric point and gross formula. When performing analysis for Ps.s-27 UlGAU, three dimers were revealed (gene_3, gene_17, and gene_23) with molecular weights of 45.0, 49.1, and 40.9 kDa, which may indicate their potential role in the capsid structure of the studied phage. The obtained data allow us to continue compiling a passport of biological properties of the production-promising Ps.s-27 UlGAU bacteriophage, which is a part of a biopreparation with direct effect.

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BATATA PRODUCTIVITY DEPENDING ON CULTIVATING CONDITIONS IN THE UDMURT REPUBLIC

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Key words: batata, introduction, yield, productivity, small-plot experiment, sum of active temperatures, sum of effective temperatures.

*One of the important issues of crop production in the context of global warming is introduction of vegetable plants. Batata (*Ipomoea batatas* (L.) Lam.) is a promising vegetable crop for introduction under the conditions of climate change. Analysis of temperature data from the Izhevsk weather station showed a steady increase of average annual and average temperature for April-September, which is a significant factor for cultivation of heat-requiring plants such as batata in an annual crop in the Middle Urals. The purpose of our research was to study the influence of shelter methods and temperature on productivity of batata in the collection of the Department of Introduction and Acclimatization of Udmurt Federal Research Center of the Ural Branch of the Russian Academy of Sciences. Studies on temperature effect on batata productivity were carried out for a number of years on the territory of the*

Udmurt Republic in two agro-climatic regions. Experiment on studying of shelter methods was laid in 2017 in the central agro-climatic region of Udmurtia. A close relationship between productivity and the sum of active and effective temperatures was revealed. The highest dependence was found on the sum of effective temperatures above 15 °C (correlation coefficient 0.95). Grocery-ware tubers were obtained in variants with application of temporary film shelters and a combination of shelters with polyethylene film mulching. Significant increase of the mass of tubers per plant (by 311.17 g) and yield (by 1.25 kg/m²) is noted in the variant of temporary film shelters in combination with transparent polyethylene film mulching. It is proved that it is necessary to use temporary film shelters or a combination of shelter and mulching in order to obtain high yields and grocery-ware tubers in the conditions of insufficient heat supply.

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**INFLUENCE OF SUBSTRATE TYPES AND WAYS TO ADJUST THEIR
AGROCHEMICAL PROPERTIES FOR BIOMETRIC PARAMETERS OF
SWEET PEPPER SEEDLINGS**

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Key words: sweet pepper seedlings, vermiculite; peat, nutrient solution acidification, substrate phosphating, biometric parameters, biomass.

There are some problems of growing plants on pure vermiculite and mineral wool substrates in sheltered ground. It is suggested that the problems arise due to alkalization of substrates. The article presents results of the studies on the influence of preparation methods of peat and vermiculite substrates on biometric parameters of sweet pepper seedlings. The research was carried out in a vegetative experiment established in 2017–2019 in the scientific laboratory of Agrarian Institute of Mordovian State University named after N. P. Ogaryov. Two substrates and four ways of adjustment to their agrochemical properties were studied: 1) watering with a nutrient solution with 5.0 pH; 2) preliminary phosphating of the substrate, followed by watering with a nutrient solution with a pH of 5.0; 3) watering with a nutrient solution with a pH of 4.0; 4) application of nutrients into the soil in reserve, followed by irrigation with tap water with a pH of 5.0. Seedlings were grown in a vegetation chamber with adjustable parameters: daytime air temperature +24...+26, at night +18...+20 degrees Celsius, illumination - 7 klx. A hydroponic solution was used

(modified medium for tomatoes according to Aliev E.A.). Watering was carried out by the method of drainage flooding. It was found that the peat substrate provided the best development of seedlings - the plants were characterized by a greater wet weight (+4.91 g), height (+14 cm), leaf area (+148.1 square centimeters). High alkalization of vermiculite substrate from pH 5.95 to 8.14 was revealed. Better growth of sweet pepper seedlings was ensured by constant acidification of the nutrient solution to 4.0 pH, as well as preliminary phosphating of the substrate and subsequent cultivation at 5.0 pH of the nutrient solution. Preliminary phosphating of the vermiculite substrate resulted in an increase of leaf area by 115.5 square cm, wet biomass - by 5.38 g. Acidifying of the nutrient solution to 4.0 pH had a similar beneficial effect on pepper seedling growth.

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DIAGNOSTIC SIGNIFICANCE OF COAGULOGRAM PARAMETERS FOR ASSESSMENT OF STRESS CONDITIONS IN EXPERIMENTAL STRESS MODEL CONDITIONS OF CARP (CYPRINUS CARPIO) AND TILAPIA (OREOCHROMIS NILOTICUS)

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Keywords: carps, tilapia, corticosteroids, hemostasis, stress, diagnostics

*The paper presents research results of reaction of some parameters of secondary hemostasis of commercial fish - carp *Cyprinus carpio* and tilapia *Oreochromis niloticus* to stress of various durations induced by corticosteroids (dexamethasone and betamethasone). The purpose of the work was to determine the earliest changing coagulogram parameters of fish under conditions of experimental stress model and to assess the suitability of these parameters for early diagnosis of stress reactions. The study was carried out in Vologda region, the fish were divided into three groups: fish with chronic stress, with acute stress and control animals, their blood was taken by puncture of the tail vein before hormone treatment, and then 7 and 21 days after. The following changes in coagulogram parameters were studied:*

thrombin time (TT), prothrombin time (PT), activated partial thromboplastin time (APTT), concentration of fibrinogen and soluble fibrin-monomer complexes (SFMC), antithrombin III. It was found that the level of plasma fibrinogen, the concentration of which is directly proportional to stress duration is the earliest and the most explicitly reacting to stress influence for carps. As far as tilapia is concerned, many parameters of hemostasis were more sensitive to the effects of prolonged stress compared to controls: a decrease of APTT, PT, fibrinogen concentration, and an increase of SFMC. These parameters can be determined as markers (bioindicators) of development of stress conditions in these fish species.

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INFLUENCE OF COLD ARGON PLASMA ON DIELECTRIC PARAMETERS OF RAT SKIN

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Keywords: cold argon plasma, microwave sounding, dielectric capacitivy, conductivity

*The purpose of this study was a comparative study of dielectric parameters of rat skin treated with argon and cold argon plasma. The experiment was carried out on 40 male Wistar rats divided into 4 equal groups. The first group of animals (n=10) was the control (intact). A pre-epilated area of the back skin (area = 1*1 cm) of the rats of the remaining groups (n=10 in each) was treated daily. The course duration for all experimental groups was 10 procedures. Animals of the second group received treatment with non-ionized argon flow (the duration of one procedure is 1 minute), rats of the third and fourth groups received cold argon plasma (1 and 2 minutes, respectively). Cold plasma was generated using a device that uses the principle of microwave ionization of a gas stream. As the latter, high purity argon (99.99%) was used. The assessment of the dielectric parameters of the skin in the treated area (for rats of the control group - in a similar part of the back) was carried out after the completion of the full course of the exposure. A specialized software and hardware complex was used for this, which provides near-field resonant microwave sounding of biological tissues. It was established that the course treatment of the skin area of the rats' back with gas flows with different ionization causes formation of a specific functional-metabolic and morphostructural response. Its character is determined by the parameters of the gas flow used: non-ionized argon significantly reduces the dielectric parameters (permeability and conductivity), and the result of the action of cold argon plasma depends on the exposure. In case of one-minute treatment, the preservation of tissue permeability at an intact level was observed with*

a moderate decrease of conductivity. In the case of 2 minute exposure, the dielectric capacitivy increased, while the conductivity remained unchanged.

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MARKERS OF METABOLIC DISORDERS IN THE BLOOD OF SOWS IN CASE OF HEPATODYSTROPHY

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Key words: hepatodystrophy, sows, metabolism, metabolic disorders, enzyme activity, violations of the liver synthetic function

Liver diseases are widespread among pigs of different gender and age groups. Hepatodystrophy (hepatosis) is most often recorded among liver diseases. Various metabolic disorders develop in sows with hepatosis. Groups of sows of different ages (farrow number) with biochemical changes which are specific for hepatosis were formed in the conditions of the pig-breeding complex. In total, six groups of 5 sows in each were formed. The list of biochemical parameters allowed to assess the state of protein, lipid, carbohydrate, mineral and pigment metabolism, as well as activity of a number of enzymes. The diagnosis was confirmed by macro- and microscopic examination of the livers of sows. Macroscopic examination of the livers of sows with hepatosis revealed their increased size, rounded edges, variegated color. Similar changes were not found in the livers of healthy sows. Granular, vacuolar and fatty degeneration were found when studying histosections obtained from liver samples of sows with hepatosis. Derangements of protein and nitrogen metabolism (high levels of total protein and creatinine, decreased concentrations of albumin and urea, albumin-protein ratio) were found in sows with hepatosis. Derangements of carbohydrate and lipid (decrease of blood glucose, total cholesterol, triglycerides) and mineral metabolism (increase of concentration of iron and inorganic phosphorus with simultaneous decrease of concentration of calcium and calcium-phosphorus ratio) were noted. These changes of metabolic processes in the body are basically preconditioned by inhibition of synthetic function of the liver in case of hepatosis of sows.

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**BOOPONUOSIS OF MARALS AND APPLICATION RESULTS OF
DIAZINON-S AND BUTOX-50 INSECTICIDE PREPARATIONS IN A
COMPARATIVE ASPECT**

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Key words: antler reindeer breeding, antler deer, velvet antlers, booponuosis, antiinsecticides, extensiveness, invasion intensity.

Booponuosis is a chronic disease of antler deer that affects growing antlers, causing significant economic damage to farms. Maral antlers are the main product of antler deer breeding. The purpose of the study is to analyze new effective medications for prevention and treatment of booponuosis of marals. The work was carried out on a breeding farm of the Altai-Sayan breed. This breed is distinguished by greater antler productivity than outbred antler deer, on average by 24%. Taking into account the peculiarities of keeping of semi-wild animals and products obtained from marals (antlers), treatment with medications was carried out in parts, in small groups of 10-12 animals during the period of antler cutting company. In total, 380 deer stags and first-horns participated in the experiment, they were divided into two equal groups. Diazinon-S (0.025% solution) was used in the first group, as for the second group, 0.02% Butox-50 solution was used. In total, both groups had 10 treatments with an interval of 3 days between them. As a result of the experiment with application of

Diazinon-S, it was noted that larvae infestation was 18% with invasion extensity (in 34 animals) starting from the third treatment, and invasion intensity was from 5 to 8 larvae, which gradually increased, reaching with invasion extensity - 46% (87 deer) and with invasion intensity - 15-22 larvae by sixth treatment. As for the second group, no damage by antler fly larvae was observed throughout the experiment; the effectiveness of Butox-50 was 100%. To prevent further spread of booponuosis in the first group and preserve the quality of products, the medication was changed to Butox-50 starting from the 6th washing (21 days), which allowed to eliminate booponuosis in the group completely and prevent it until the end of the antler cutting company. It indicates high efficiency of Butox-50 against booponuosis causative agent of marals.

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DEVELOPMENT OF A RAPID SCHEME FOR ISOLATION AND BACTERIOLOGICAL IDENTIFICATION OF AEROMONAS VERONII

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Key words: A. veronii, aeromonosis, scheme, isolation, identification, nutrient media, physiological and biochemical parameters

The article presents results of the studies on development of a rapid scheme for isolation and bacteriological identification of Aeromonas veronii bacteria, which induce aeromonosis of salmon and cyprinids, as well as A. salmonicida subsp.

salmonicida, *A. hydrophila*, *A. sobria*, *A. eucrenophila* *A. caviae*. The experiments were carried out on the bacterial strain *Aeromonas veronii* biogroup *sobria* - ATSS 9071. The scheme consists of three stages: the first is the isolation of microorganisms from the test sample using the A.v.1-ULGAU accumulative nutrient medium of the original author's formula; the second stage is reseeded of colonies typical for *Aeromonas veronii* on the author's dense differential diagnostic medium A.v.2-ULGAU; the third stage is the study of physiological and biochemical parameters: mobility specification, oxidase production, xylose utilization, pigment formation of grown bacterial colonies on GRM agar with tyrosine, decarboxylation of lysine and ornithine, arginine hydrolysis, lactate fermentation. The proposed isolation and identification method will allow to differentiate *Aeromonas veronii* from associated bacteria, including *A. salmonicida*, *A. hydrophila*, *A. caviae*, within 120 hours, at relatively low costs for nutrient media and reagents.

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CLINICAL AND MORPHOLOGICAL SUBSTANTIATION OF INTRANASAL LYMPHOMAS OF CATS

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Key words: cat, nasal cavity, neoplasm, lymphoma, tumor.

The article discusses results of the research on intranasal lymphoma spread of cats, based on the study of 38 clinical cases of animals with lesions of the nasal

cavity at the age of 5 months to 18 years with clinical symptoms from the total number (N=4937) of cats. The research was conducted at the Department of Diseases of Small Domestic, Laboratory and Exotic animals of FSBEI HE "Moscow State University of Food Production" and the veterinary clinic "Zoogalereya", Moscow. Intranasal neoplasms are rare for cats. Of all nasal oncopathies, lymphomas are most common in animals of the middle age group and, according to the literature data, take up to 1% of all tumors of cats. Endogenous and exogenous factors that cause tumors of cats' nasal cavity are diverse. If intranasal pathology is suspected, it is necessary to adhere to the plan of diagnostic manipulations, because the first clinical symptoms of the process are the same for lesions of a different nature. For diagnosis and specification of the clinical stage of the disease, it is necessary to conduct a series of diagnostic studies, including radiography, MRI and CT, aimed at determining the localization of the pathology, spread, degree of invasion and degree of involvement of blood vessels in a specific oncological process. Such diagnostic methods as palpation of regional lymph nodes, chest radiographs and ultrasonography of the abdominal organs are aimed at determining the clinical stage of oncopathologies. The most predisposed to occurrence of intranasal lymphomas was a group of cats aged 5-9 years. Gender and breed susceptibility was not revealed. In case of nasal cavity pathologies of cats, a common symptom is shortness of breath, lack of patency of nasal passages, which appears at later stages of the disease. Nasal discharge and epistaxis are rare, convulsive seizures - when the tumor invades via the ethmoid bone. The predominance of unilateral over bilateral discharge was noted as the most common symptom, 39.4%, while the nature of the discharge may be different. Sneezing occurred in 13.2%, coughing in 5.2% of cases. Deformation of the facial part of the skull was observed in 28.9% of cats, epistaxis, lacrimation and atony - in 13.2% of cases, 5.2% of cats had neurological symptoms.

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REARING FEATURES OF SIMMENTAL × AIRSHIRE × HOLSTEIN CROSS BREEDS

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Key words: rearing, genotype, average daily gain, relative gain.

The paper presents data on growth characteristics of three cross-bred Simmental × Ayrshire × Holstein heifers. The study of growth and development of

three crossbred animals showed that there is a tendency of more intensive growth of crossbred young animals of $1/8c + 1/8a + 3/4kpg$ and $1/16c + 1/16a + 7/8kpg$ genotype since the age of 6 months, which continues up to 18 months of age. The advantage of heifers of $1/8c+1/8a+3/4kpg$ and $1/16c+1/16a+7/8 kpg$ genotypes at 6 months old was 8.1-8.6 kg, at 9 months old - 9.2 - 12.1 kg, at 12 months old - 14.7 - 18.7 kg ($P \geq 0.95$), at 15 months old - 13.9-21.4 ($P \geq 0.95$) and at 18 months old - 12.3 - 23.2 kg ($P \geq 0.95$). As far as the group of heifers with $1/16c+1/16a+7/8kpg$ genotype is concerned, the average daily gain was higher than their peers in all age periods. The greatest average daily increase of 775-801 grams was noted in the period from 6 months to one year old, which is 39-73 grams more than the peers of $1/4c+1/4a+1/2kpg$ genotype and 27-9.0 grams more than the peers of $1/8c+1/8a+3/4kpg$ genotype. At the age of 18 months, heifers of $1/16c+1/16a+7/8kpg$ genotype were superior to their peers of $1/4c+1/4a+1/2kpg$ genotype in withers height by 3.0 cm ($P \geq 0.999$), rump height by 4.9 cm ($P \geq 0.999$), chest depth by 6.8 cm ($P \geq 0.999$), chest girth by 19 cm ($P \geq 0.999$), oblique body length by 8.6 cm ($P \geq 0.999$), width of pin bones by 2.0 cm ($P \geq 0.999$), head length and forehead length ($P \geq 0.999$). Significant differences at the age of 18 months were revealed in withers height, oblique body length and chest girth ($P \geq 0.99; 0.999$) between heifers of $1/16c+1/16a+7/8kpg$ and $1/8c+1/8a+ 3/4kg$ genotypes.

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EVALUATION OF PHENOTYPIC PARAMETERS OF SHEEP OF THE NORTH CAUCASIAN MEAT AND WOOL BREED BY THE ANALYSIS OF THE MAIN COMPONENTS

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Keywords: phenotype, variability, factor analysis, sheep, meat, productivity, selection, rearing, body measurements, evaluation, ultrasonography

The key to successful selection and breeding work and genetic assessment accuracy of sheep is thorough accumulation of information about their phenotype. Most of the parameters evaluated in breeding animals are fixed in the breed. However, they do not fully reflect sheep meat qualities, therefore, it is not always possible to use them in genomic breeding programs. The aim of the work is to search for new informative phenotype parameters associated with meat productivity of sheep of the North Caucasian meat and wool breed for further usage in genomic breeding programs. The possibility of determining the following parameters was studied using an ultrasound scanner: the girth of the shoulder, forearm and thigh with a measuring tape, as well as the thickness and width of the loin eye (TLE and WLE), the thickness of the femoral muscle (TFM) and fat in the lumbar part (TF). One-shear tups (n=50) of the North Caucasian meat and wool breed were the object of the study. The significance of new phenotype parameters was assessed by the main component method. In the course of the work, highly reliable relationships ($r > 0.8$; $p < 0.01$) were established between the live weight of one-year-old tups and average daily gain, withers height and rump, back and chest width, thickness and width of loin eye. The results of main component analysis showed that more than 80% of phenotypic

variability is determined by the first six components. The most significant parameter in assessing the total variance was TFM measurement - 0.67, and the least significance was shown by the thigh girth of 0.16. Thus, the parameters of TFM and TF determined by ultrasound can be used for phenotypic assessment of sheep of the North Caucasian meat and wool breed, in particular, when searching for genomic associations with productive qualities.

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INFLUENCE OF LIVE WEIGHT OF HEREFORD CALVES AT BIRTH ON THEIR SUBSEQUENT PRODUCTIVITY

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Keywords: calves, Hereford breed, live weight at birth, average daily gain, absolute gain, slaughter weight, slaughter yield

Beef production technology is based on maximum usage of genetic potential of animal productivity. In this regard, it is important to determine early economically useful traits of animals, including live weight at birth. The aim of the research was to study the influence of live weight of Hereford calves at birth on their subsequent meat productivity. The study was carried out in the conditions of OOO Hereford Organic, Cherdaklinsky district, Ulyanovsk region. Two groups of calves were formed according to the method of pair-analogues, taking into account the date of birth, each group included 10 heads. The differences between the groups were in live weight: group 1 - live weight 22 - 28 kg, group 2 - live weight 30 - 36 kg. As a result of the research, it was found that live weight at birth influences meat productivity of animals. The bull-calves of the second group, which had a live weight at birth of 30 kg or more, outperformed the bull-calves of the 1st group, which had a live weight at birth of 22-28 kg, in absolute gain in live weight by 63.6 kg (14.1%) and average daily gain by 117.8 g (14.1%). Large heifers grew and developed better than smaller heifers. Their live weight at 18 months exceeded the live weight of heifers of the 1st group by 35.5 kg (8.3%). The bulls of the second group exceeded the weight of the carcass of the peers of the first group by 43.9 kg, which is 16.3%, the carcass yield by 0.6 p.p., the slaughter weight by 47.5 kg or 16.8%, the slaughter yield by 0.8 p.p. Also, the flesh content in their carcasses was higher by 33.6 kg, or 17.0%, fat by 4.7 kg, or 26.6%.

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INFLUENCE OF VARIOUS INBREEDING DEGREES ON GROWTH INTENSITY OF REPLACEMENT HEIFERS

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Keywords: inbreeding, replacement heifers, live weight, average daily gain

The article analyzes the effect of various degrees of inbreeding on live weight and average daily gains of replacement heifers aged from birth to one year. The studies were carried out on Holstein heifers in OOO PZ Pushkinskoye of Nizhny Novgorod region. It was found that inbreeding degree increase does not have a significant effect on live weight and growth rate of replacement heifers. All heifers had almost the same weight at birth; heifers in the group with a remote degree of inbreeding had a slight superiority - 192.4 kg at the age of 6 months; at 12 months, heifers with close inbreeding degree had the largest weight - 361.9 kg. The highest growth rate from birth to 6 months is typical for replacement young animals obtained by remote and moderate degrees of inbreeding (850-856 g/day). The highest growth rate from the age of 6 months to one year is typical for a group with a close degree of inbreeding - 940 g per day. The coefficient of live weight variability at birth was 10.93% in the group with close inbreeding and the highest rate was 17.36% in the outbreeding group. Ulteriorly, the variation coefficient decrease was observed, with age it became almost the same in all groups. Moderate and remote degrees of inbreeding have almost no effect on any of the studied parameters, a close degree of inbreeding slightly increases the live weight at birth ($r = 0.194$), but has a negative effect on live weight at 6 and 12 months at the first fertilization, as well as on average daily gain from birth till 6 months ($r = -0.230, -0.243, -0.175, -0.280$, respectively).

Thus, the conducted studies did not reveal a negative effect of inbreeding degree increase on growth and development of replacement heifers.

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NUTRIENT DIGESTIBILITY AND NITROGEN UTILIZATION OF LACTATING COWS WHEN RECEIVING A FOOD MIXTURE WITH MINERAL SUPPLEMENTS

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Key words: lactation, milk productivity, metabolic energy, nitrogen balance, digestibility.

The article presents results of studies on giving natural mineral additives from the deposits of Oryol (Stimulus) and Bryansk regions (smectite tripoli) in the composition of the feed mixture to lactating cows of the second lactation of the black-and-white breed in the agricultural enterprise OOO "Mololchnoye" of Bryansk region. A comparative analysis of the effect of two dosages of their inclusion in the ration - 3 and 4% of the dry matter without changing their energy nutritional value on productivity, digestibility of nutrients and nitrogen usage in the organism of lactating cows was carried out. A positive effect on the level of milk productivity of both natural mineral additives was found, however, more significant changes in protein and lipid metabolism occurred in the body of cows who received smectite tripol as part of the feed mixture at a dose of 4% of the dry matter of the ration. Thus,

the dry matter digestibility coefficients, including organic matter, as well as protein and crude fat digestibility coefficients of lactating cows that received smectite tripoli (4%) significantly exceeded similar parameters in all experimental groups. Based on the results of the balance experiment, a positive nitrogen balance of lactating cows of all groups was established. Concurrently, a redistribution of digested nitrogen with a higher transformation into products was noted, which is confirmed by a large percentage of its transition into milk (10.3%). This redistribution of nitrogen in the body of lactating cows of the experimental groups became possible due to its lower retention in the body (by 5.9% due to "Stimulus" additive and by 11.0% - smectite tripoli). Therefore, based on the obtained experimental data, it is possible to recommend to include smectite tripoli natural mineral additive at a dose of 4% of the dry matter of the ration into the feed mixture for lactating cows.

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**LACTATION FUNCTION OF FIRST-CALF HEIFERS OF HOLSTEIN
BREED OF DIFFERENT ECOGENESIS IN THE CONDITIONS OF
INTENSIVE TECHNOLOGY**

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The largest contribution to milk production increase is made by large highly-technological complexes, occupied by animals of the Holstein breed, imported from Western European countries. It currently accounts for 26.47% in the dairy herd structure of the Russian Federation. In this regard, it is necessary to study milk productivity, quality characteristics and safety of Holstein cows' milk produced in the conditions of industrial technology, which is the purpose of our research. The scientific experiment was carried out in the conditions of OOO Agroindustrial Complex Rus, the largest milk producer in Ryazan region. As a result, high milk productivity of first-calf heifers of Holstein breed, imported from the Netherlands, Hungary and own reproduction under intensive technology, was established. There are no significant differences in production of specified lactation. The milk of cows of the studied genotypes had a high concentration of dry matter and calorie content, as for the content of somatic cells, it met the established requirements of the European and national standards. The content of minor components of milk indicated the absence of ketosis (β -hydroxybutyric acid, acetone) and compliance of energy and protein in the diets of cows (urea). The highest realization level of PIC (parent index of cow) for milk yield was shown by first-calf heifers of domestic selection, as the most adapted to local conditions, and the lowest - analogues imported from the Netherlands, with the highest PIC for milk yield. Their realization level of productive potential of milk yield was lower compared to the first-calf heifers of Hungarian and domestic selection, respectively, by 14.8 ($P < 0.001$) and 20.1% ($P < 0.001$), the coefficient of lactation curve stability is less than in comparison with domestic peers by 2.3 ($P < 0.01$), and imported from Hungary by 1.3 ($P > 0.05$), which shows that the housing conditions do not correspond to biological status of the first heifers imported from the Netherlands.

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