

# SPECIFICATION OF PARTICLE MOVEMENT IN A SPIRAL-SCREW ELEMENT

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**Key words:** *spiral, particle of loose material, motion equations, scheme of forces acting on the particle.*

*The article presents analysis of theoretical and practical research of parameters of a device for inclined grain movement in a bulk-grain. As a result, characteristics of initial motion of the material particle and geometric characteristics of the spiral are obtained. The grain that fills the spiral interturn space is in constraint conditions, consequently, the investigation of movement of grain material by a spiral-screw working organ represents one of the complex experimental and theoretical problems. Relative motion of a particle under the influence of a rotating spiral in a cylindrical body is described using the Lagrange equation of the second type. Schemes of decomposition of normal reactions of a spiral turn into components are given and described in detail. The equations of motion which take into account the combined force are given. A spiral screw with the following parameters was installed on the device: outer radius of the spiral screw = 0.045 m; the pitch of the spiral line  $s = 0.01$  m; the diameter of the wire from which the spiral was made,  $d_w = 0.008$  m, the angle of conveyor inclination to horizontal surface  $\delta = 30^\circ$ . As a result, we obtained a differential equation of particle motion, which describes the relative motion of the particle along an inclined spiral-screw device in the steady-state regime of material movement. In this case, the steady motion of a particle can be divided into 3 ranges depending on the angle of inclination and the number of revolutions: in the first range the particle moves uniformly translatory parallel to Z axis; in the second range, the particle can not move straight, slides inside the spiral screw, herewith, the angle of inclination is critical  $\kappa \beta$ , the third range at an angle  $\kappa \beta$  is greater than  $n$  and moves along the spiral line.*

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## PROSPECTIVE TECHNOLOGICAL PROCESS OF GIMBAL GEAR MAINTENANCE OF JOHN DEERE TRACTORS

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**Keywords:** *gimbal gear, joint-hinge, maintenance, running hours, burden, wear. Ensuring working efficiency of foreign machinery is an important and effective means of implementing advanced technologies of agricultural production for obtaining good crop yields. However, significant costs of maintenance and spare parts make it necessary to plan production and technological work. Regarding operation of John Deere tractors in Belgorod region, burden parameters of the machinery are consolidated, indicating irrational exploitation. An original way of servicing the joint-hinges without disassembling the bearing assemblies was developed on the example of cardan transmission of the hydraulic drive module of the John Deere 7830 gearbox. This method is the basis for experimental testing of the prospective technological process of maintenance of cardan CR115 type joint-hinges, taking into account the actual diagnostic information on the radial*

*clearance and wear in bearing assemblies, the operating time and burden along the engine profile. In case of applying the developed technological process in the groups of running time of cardan joint-hinges, differentiated repair and technical impacts are exercised taking into account the technical condition of the hinges. The article compares the recommendations of the manufacturer service department and the proposed technological process using the example of the John Deere 7830 tractor while servicing RE 52347 cardan joints. Based on the production approbation, the cardan joints are evaluated for burden, working hours and technical condition. As a result of the application of the proposed maintenance method, the total operating time of the hinges increases by 1.26 times, which leads to cost savings of 44.3 thousand rubles per tractor.*

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## **EFFICIENCY IMPROVEMENT OF DRAFT-DRIVE TILTHER**

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**Key words:** *surface tillage, efficiency of use, energy saving, tractor, speed.*

*Soil tillage is the most energy-consuming operation in crop production, accounting up to 40% of total energy costs. Increasing energy efficiency of tillage is one of the important tasks in rising of agricultural production profitability. It is proposed to increase the energy efficiency of soil tillage by means of draft-drive tilters with active working bodies that do not create high draft resistances and do not require a large draft weight of the aggregating tractor. Reduction of aggregate draft resistance is achieved by transferring the most power consumed by the aggregate to the technological process of soil loosening, with the shaft of the tractor power takeoff mechanism to the driven rotational working elements, which in turn, create a pushing force, minimizing the draft resistance of the tilter. An analysis of the energy efficiency of soil tillage using draft-drive tilters equipped with active working organs is presented. The greatest energy efficiency of the draft-drive tilter is revealed by the efficiency factor of the machine-tractor unit. This coefficient shows how much of the useful power of the tractor is used when performing the tillage technological process. The efficiency factor allows to identify ways of improving design parameters of the draft-drive machine-tractor unit. Formulas for determining the efficiency of the draft-drive machine-tractor unit have been derived. We established the possibility of increasing the aggregate efficiency by reducing the tractor wheel skidding and the loss for its rolling, which*

*is achieved by transferring part of the power with the shaft of the tractor power takeoff to the drive working organs that compensate the draft resistance and create a pushing force, reducing the resistance for rolling.*

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## **SPECIFICATION OF CONSTRUCTIVE- OPERATING PARAMETERS OF DRIVEN TOOTH DISC**

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**Key words:** *compacted soil, physical and mechanical properties, depth of sowing, loosening of soil, sowing.*

*The solution of the problem of thorough pre-sowing soil preparation is one of the main factors for obtaining high crop yields. The most difficult task is to create appropriate soil conditions on tractor traces. To decompress the soil on tractor traces, it is proposed to use a soil decompressor with combined working organs that allow to form loosened longitudinal-vertical rows in the compacted soil. They are loosened by multilevel cut and loosening paws with additional loosening with driven tooth discs, which are followed by soil packing with rod-slatted rollers to create appropriate soil density. The basis of the proposed technological process is loosening of the compacted soil with multilevel cut and loosening paws together with the driven tooth discs. Appropriate loosening is achieved with suitable design-operating parameters of the working organs. This paper provides a theoretical analysis of interworking of the working organs of the soil decompressor: a driven tooth disk with a moving soil layer pre-tilled with cut and loosening paws. The paths of soil layers after loosening by cut and loosening paws are theoretically justified, taking into account the state of these layers, and also the coordinates of the contact of tooth discs with the surface of the treated soil layer are determined. The theoretical studies made it possible to determine the current coordinates of the soil particles after they leave the working surfaces of the cut and loosening paws. Equations are obtained for calculating the radius and number of teeth of the tooth disc, as well as circumferential speed of its rotation, at which the necessary quality of loosening of soil devices is provided, taking into account their physical and mechanical properties.*

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## **EFFICIENCY INCREASE OF ONION HARVESTING BY PROPER EMBEDDING OF SEEING MATERIAL IN THE SEED FURROW**

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**Key words:** *embedding working organs, disk embedding body, soil deflectors, angle of attack, onions, seed onion, soil, harvesting, multifactor experiment.*

*A specific feature of onion harvesting is the need for such agrotechnical technique as afterripening and drying of onion after their extraction from the soil. Proper work of onion harvesting machines, both for two-phase and single-phase harvesting methods, is provided by good preparation of the field before harvesting.*

*Even insignificant content of plant contamination (free tops, weeds) of 2 ... 4% (according to agrotechnical requirements - up to 5%) makes the heap inappropriate both for sale and for storage. The process quality of the onion harvesting machine largely depends on the digging working tool, since the design and technological parameters of the separating devices depend on the type of the working tool and its technological parameters. The quality of the technological process of extracting onions from the soil is also affected by the final planting technological operation - embedding of onions in the soil. A greater depth of onion embedding, due to imperfect structural and technological parameters of the embedding organs, leads to uneven onion ripeness, as well as an increased rise of the soil layer when harvesting onions, which reduces the harvesting machine performance. The results of a multifactor experiment on the substantiation of appropriate technological parameters of a disk embedding body for determining the amount of soil necessary for proper seed onion embedding are presented, as well as results of research on determining the supply of onion to a digging plow. The technique and equipment used in the research are described. The results of the studies are presented in the form of graphical curves. The method of variational statistics was used when analyzing the results of the research.*

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**ВЛИЯНИЕ АГРОТЕХНОЛОГИЙ НА ЗАПАСЫ ГУМУСА В ПОЧВЕ  
THE INFLUENCE OF AGRICULTURAL TECHNOLOGIES ON THE  
RESERVES OF HUMUS IN THE SOIL IN THE CULTIVATION OF  
WINTER WHEAT IN THE MIDDLE VOLGA REGION**

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**Key words:** *winter wheat, humus, crop rotation, conservation tillage, nitrogen fertilizers harvest, protein content.*

*Moisture and density of soil composition were studied; the content of nitrate nitrogen of the soil, before sowing and in various phases of plant development; yield and protein content in grain, depending on the vapor precursors, soil treatment methods, one- and two-fold application of nitrogen fertilizing, on humus stocks in the soil when cultivating winter wheat of the Malachite variety. On the moisture content and density of soil, the precursors, methods of soil treatment and nitrogen fertilizing did not have a significant effect. The use of nitrogen fertilizing allowed to increase the content of nitrogen in the soil, by an average of 1.5 times, by the end of the growing season of winter wheat plants. Pure steam and plowing contributed more to the accumulation of nitrate nitrogen, up to 23 mg / kg, to a lesser extent - sideral and occupied couples, loosening and "zero" processing, up to 20 mg / kg. When comparing the variants studied, the greatest yield was obtained by pure steam, with "zero" tillage and single root fertilizing with 2.8 t / ha nitrogen fertilizer; the highest protein content - in pure steam, plowing and double application of fertilizers - 14%. When growing winter wheat with compensation for loss of humus when using pure, occupied and sideral pairs as precursors, using tillage methods, plowing, loosening and "zero" positive humus balance, a variant of sideral steam developed with all the applied soil treatments and the multiplicity of top dressing with nitrogen fertilizers. For the other variants*

*studied, a negative humus balance was obtained, and doses of organic fertilizers calculated to compensate for loss of humus in the soil were calculated.*

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## **FORMATION OF HIGH-PRODUCTIVE AGROCENOSES OF CORN AND SORGHUM CROPS ON AGRO GREY SOILS OF BRYANSK HIGH PLAINS**

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**Key words:** *corn, sorghum crops, agroecology, plasticity and stability, agro-methods of cultivation.*

*The article presents results of studying corn hybrids of different ripening groups and the range of varieties of sorghum crops in agroclimatic conditions of Bryansk region. On average, over the years of variety testing of corn hybrids, the highest yield of normalized dry matter was recorded in crops of mid-spring hybrid Voronezhsky 279 SV (16,77 t / ha) or over 80 t / ha of green mass. High-yield hybrids of sorghum such as Porumben 4 and Porumben 5 should be distinguished from the variety of sorghum crops, their yield was more than 15 t/ha of dry matter. The early hybrid Ladozhskiy 181 MV (8,75 t / ha) and hybrids Voronezhskiy 279 SV (8,46 t / ha), Voronezhskiy 185 SV (7,05 t / ha) were note for high yield of corn grain; from the group of foreign selection - the hybrid Irondel, the originator is RAGT semences (7,03 t / ha), MAS14.G (7,44 t / ha) - the selection of Maisadour semences, France. The greatest reaction to year conditions had a sorghum hybrid Porumben 5 ( $b_i = 1,2$ ) with the most stable increase or decrease of yield ( $S_{i2} = 5,1$ ). The influence of density and seeding methods on production process of sugar sorghum hybrids (Slavyanskoe Priusadebnoye), sorghum-Sudan hybrid (Kinelskaya 100) and sorghum-Sudan hybrid (Slavyanskoe pole 15 F<sub>1</sub>) was studied. Different reaction of the variety range of feed sorghum to crop overcrowding and application of mineral fertilizers was established. The coefficient of energy efficiency of sorghum feed of exchange energy was 3,7-6,6, it means that there is more energy in biomass than the energy spent for its production. The economic cultivation efficiency of Russian hybrid Ladoga 181 MV for grain was 46,1% higher than that of the hybrid of foreign selection.*

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# GENEBANK OF THE VOLGA REGION IN WINTER WHEAT SELECTION IN THE SOUTHEAST OF CENTRAL BLACK SOIL ZONE

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**Key words:** *winter wheat, selection, variety, gene pool, parentage.*

*The aim of the research was to analyze the role of varieties created in the Volga region for selection of winter wheat in the southeast of Central Black Soil Zone. The object of the study was the parentage of area-specific (included in the State Register of Selection Achievements), as well as tested varieties of winter wheat, created in Scientific Research Institute of Agriculture of the Central Black Soil Zone named after V.V. Dokuchaev during the selection work. It is stated that Gostianum 237 variety became the base for selection start in the region. The varieties of winter wheat of the first generation, such as Stepnaya 135 and Chervonnaya were created on the basis of its genome in Kamennaya Step. Development of selection works in the Volga region led to creation of such varieties as Albidum 114, Ershovskaya 6 and others. With their involvement in hybridization, new varieties were also obtained in Scientific Research Institute of Agriculture of the Central Black Soil Zone, such as Chernozemka 96, Basalt, Cruise, Chernozemka 88, Chernozemka 115 and others. Among them, Basalt has spread not only in the Central Black Soil region (5 region), but also in the Volga region (7 and 8 regions). The gene pool of the Volga region is not directly used in the last generation varieties, such as Chernozemka 130, Basalt 2 and Chernozemka 188, , but it is present in genomes of varieties of previous generations that are an integral part of new varieties. The possible reason is climate warming, which is most noticeable in the region during cessation of active vegetation of winter wheat (from November to March), as well as wider expansion of varieties of southern origin associated with it, which are actively involved in hybridization to obtain new varieties.*

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**ЭФФЕКТИВНОСТЬ ПРИМЕНЕНИЯ ГУМИНОВЫХ И  
APPLICATION EFFICIENCY OF HUMIN AND BIOCOMPOUNDS FOR  
SPRING COMMON BARLEY**

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**Key words:** *humin compounds, biological compounds, spring barley, density of planting, productivity.*

*The article presents results of a two-factor experiment on the effect of application timing of various humin and biological compounds on productivity of spring common barley of Vakula variety on leached black soil of the Republic of Mordovia in 2014-2016. The effect of treatment of spring common barley crops with humin preparations (Lignohumate and Humat Kaliya) and biopreparations (Albit and Plenris) was studied for change in crop structure and productivity; the following compounds were applied in different periods of plant vegetation: the tillering phase, the tillering phase + stem elongation, the tillering phases + stem elongation + earing. It has been revealed that the factors studied significantly influence the efficiency of solar energy use and moisture resources (plant size increased with application of humin and biological compounds in relation to the control). Under the influence of humin and biological products, as well as the timing of their application, there was a significant increase in the number of plants and productive stems from one square metre, grains in the ear, as well as the mass of thousands of grains and, accordingly, the mass of grain from the ear, resulting in a yield increase. The yield increase in relation to the control, depending on the timing of application of humin and biological compounds, increased significantly with the increase in the number of treatments (from 13.5% to 42.3%), with the best results recorded in case of triple application in all variants. The maximum yield increase was achieved on variants, when humin compound Humat Kaliya was used - 1.67 t / ha and Albit biopreparation - 1.61 t / ha.*

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**PRODUCTIVE CROP DENSITY OF WINTER SOFT WHEAT AND  
COMPONENTS OF ITS ELEMENTS IN THE CONDITIONS OF THE  
FOREST-STEPPE OF THE MIDDLE VOLGA REGION**

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**Key words:** *winter soft wheat, variety, yield, elements of yield structure, productive crop density, tillering capacity, ear capacity, weight of 1000 grains, field germination*

*The article presents studies on yield structure elements of winter soft wheat in the variety and in crop in general. The object for the research was 15 varieties of winter soft wheat included in the State Register of Selection Achievements for the Middle Volga region. It was established that productive crop density of winter soft wheat in the forest-steppe of the Middle Volga region has stable positive*



*correlation of average strength to yield in the years of research. The mass of grain from one ear correlates with the yield in different years in a weak and medium degree and in different ways. The number of productive stems of winter soft wheat, formed per a unit of area, is by 5%, 1% and 0.1% significance levels depending on the number of plants per unit area (correlation coefficients in 2011, 2012, 2013, 2014 were 0.71 , 0.85, 0.55 and 0.54). It was revealed that the field germination of seeds does not always determine the number of plants for harvesting due to the different resistance of winter wheat varieties to stress factors during wintering and during the spring and summer vegetation period. The survivability of winter soft wheat plants varies from 34.9% to 46.9% with an average value of 43.0% by the harvest period. Since of the two main elements of the structure, the density of productive stems makes the greatest contribution to the productivity of winter soft wheat, depending mainly on the number of plants that have survived by the harvest period, it is necessary to develop measures that can ensure better plant survivability for harvesting, for example, due to high field germination of seeds , the use of seed with a high degree of uniformity, which reduces auto-competition, selection of varieties resistant to stress factors, specific for local soil-climatic conditions.*

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## **INFLUENCE OF MIXED VARIETY CROPS ON DEVELOPMENT OF YELLOW SPOT OF WHEAT LEAVES**

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**Key words:** *wheat, Pyrenophora tritici-repentis, variety mixed crops, biological effectiveness.*

*Currently, one of the major wheat pathogens in the North Caucasus region is the yellow spot of wheat leaves (Pyrenophora tritici-repentis (Died.) Drechsler). The causative agent is widely spread and its occurrence in wheat crops of Krasnodar, Stavropol Territories and Rostov Region can reach 60-80% under favorable conditions. Loss of crops can reach 50-60% in the worst cases. Recently, the use of variety mixed crops in the fight against pathogens of wheat diseases, as well as other crops, has a positive result. Due to the fact that such experiments with P. tritici-repentis in Russia had not been previously conducted, we carried out a study of the influence of variety mixed crops on decrease of pyrenophorosis causative agent. Two varieties of winter wheat, widely used in the North Caucasus, Batko and Kalym, were tested in our studies; they are similar in biometric parameters*

*and maturation periods, but different in immunological characteristics. Varieties were sown in the ratio of 1R: 1S and 4R: 1S, as well as pure varieties.*

*Control of susceptibility to the disease was Batko variety. The disease intensity was observed on a natural ground in the phase of maximum development of the disease - milk-wax ripeness of grain (Z 61). Biological and economic efficiency was evaluated. Using a mixture of varieties that differ genetically in resistance to the pathogen in a 4: 1 ratio allowed to reduce the disease development by 2.3 times, and lead to a yield increase of 12.7%; in the ratio 1: 1, of the disease development decreased by 1.7 times, the increase in yield was 8.2%. Thus, a mixture of susceptible and resistant varieties (such as Kalym-Batko in the ratio 4: 1 and 1: 1) can be recommended for industrial practice in order to reduce the infectious potential of the causative agent of yellow leaf spot of wheat.*

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## **SEARCH FOR VARIETIES OF WINTER RYE WITH ENVIRONMENTAL TARGETING FOR THE SOUTHWEST OF CENTRAL RUSSIA**

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**Key words:** *winter rye, variety, yield, adaptability, stability, plasticity, homeostatic, stress-resistance, environmental conditions, productivity potential.*

*The article presents an integrated assessment of adaptivity parameters of seven varieties of winter rye that have been taking part in competitive environmental tests for five years on sod-medium podzolic soils (Dubrovsky variety commission) of Bryansk Region, located in the south-west of the center of Russia. Dynamics and growth of winter rye productivity in the region for the period of 2000-2017 are shown, supported by linear regression equation. The contribution of weather conditions to dispersion of winter rye yield exceeded the agrotechnical factor and was more than 24%. The influence of biotic and abiotic factors on rye production yield is confirmed by the indexes of environmental conditions, characterized by heat and moisture content of the growing season. Analysis of the average crop yield of grain rye in the conditions of Dubrovsky variety commission for 2006-2017 was on average of 4.95 t / ha, and varied from 1.27 to 9.15 t / ha (V = 27.1%) in that period. The contribution of the "variety" factor was 4.2%, the correlation of the contribution of the factors "year" x "grade" - about 18%, and "year" accounted for the maximum of 75% in the crop yield formation. The largest*

*inter-crop yield was realized in the years with high values of environment conditions index. Among the studied varieties Valdai realized its real potential with the lowest CV value (83.5%). Application of variety ranking by adaptive parameters allowed to identify varieties and hybrids of winter rye with ecological targeting. They are capable of producing persistent and stable yield in the soil and climatic conditions of Bryansk region, such hybrids are a hybrid of intensive type KVS Magnifiko ( $b_i = 1.40$ ,  $S_{d2} = 0.30$ ,  $H_{om} = 11.1$ ,  $V = 20.2\%$ ) and extensive stress-resistant varieties Valdai ( $b_i=0,76$ ,  $S_{d2} = 0,15$ ,  $H_{om} = 17,4$ ,  $V=14,7\%$ ) and Moskovskaya 12 ( $b_i=0,66$ ,  $S_{d2} = 0,49$ ,  $H_{om} = 15,1$ ,  $V=16,1$ ).*

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## **BIOLOGICALIZATION OF CROP ROTATION AND PRODUCTIVITY OF WINTER WHEAT ELEMENTS IN THE CONDITIONS OF THE FOREST-STEPPE OF THE VOLGA REGION**

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**Key words:** *crop rotation, pea, lupine, winter wheat, forecrop, yield, soil tillage, fertilizer backgrounds.*

*Grain-fallow rotations in the conditions of the forest-steppe of the Volga region ensure stability of phytosanitary conditions on the fields, moisture reservation, mineralization of soil organic matter, which, as a rule, increases winter wheat yield. However, negative ecological and economic consequences of fallow are also known. We carried out a comparative assessment of productivity of fallow and grain elements in crop rotation aiming at developing recommendations on adding more forecrops for winter wheat in regional agricultural conditions. Studies have shown that the highest yield of winter wheat is obtained after pure fallow, but as for productivity, of the crop leguminous elements of crop rotation have an advantage, where the grain yield increased from 2.23 to 2.80-2.95 t / ha, and grain units from 2, 23 to 3.23-3.39 thousand / ha. The following grain elements of crop rotation are advantageous in the conditions of the forest-steppe of the Volga region: peas - winter wheat, lupine - winter wheat and peas + lupine - winter wheat. Combined soil tillage is the most effective in these elements, involving soil loosening with plows with SimIME struts or their analogues for legumes for 20-22 cm. Reducing the tillage depth to 12-14 cm reduces productivity of grain legumes and elements crop rotation with winter wheat. Grain legumes increase yield and productivity of nitrogen fixation in combination with straw + N<sub>20</sub>P<sub>30</sub>K<sub>30</sub>, and winter wheat - straw + N<sub>60</sub>P<sub>45</sub>K<sub>45</sub>.*

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## **APPLICATION OF BIOGAS UNIT EFFLUENT AS FERTILIZER FOR ORGANIC FARMING**

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**Key words:** *organic fertilizers, anaerobic treatment, effluent, yield, efficiency, soil. Utilization of organic waste by method of anaerobic digestion allows to exclude waste water from cattle-breeding complexes from the hazardous category and to receive new by-products, namely, ecologically safe and effective organic fertilizers. The functioning of the agricultural biogas unit is associated with a large amount of slurry (effluent) after anaerobic digestion. The main direction of its application should be its use as a fertilizer. This article summarizes the experience of various organizations which use effluents of biogas units as fertilizers for cultivation of crops on various types of soils. The influence of the thermophilic and mesophilic operating modes of biogas unit and usage of various types of substrates (semi-liquid cattle slurry, liquid pig manure, liquid bird droppings) have been studied. In the conditions of sod-podzolic and sod-carbonate soils, the usage of effluent enabled to increase the yield of agricultural crops by 4.2-6.4% in a number of cases. The greatest yield increase was observed in cultivation of winter rye (6.4%), barley (4.2%) and corn for silage (4%). Application of effluent is especially effective on southern black soils, where the yield increase was 8-17.4%.*

*The highest yield increase was observed in cultivation of oil radish (17.4%), spring rape (14.7%), corn for silage (11.3%), spring wheat (11.1%), vetchum mixture (8.5% ). Despite the decrease of organic matter in the effluent due to biogas production, the main humus-forming substances and biogenic elements of plant nutrition were preserved. It should be noted that the level of readily available forms of nitrogen, as well as the content of amino acids, has increased in the substrate. The influence of temperature regime of anaerobic digestion on change in the properties of substrates has not been established.*

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## **SUBSTANTIATION OF APPROPRIATE TIME FOR SOWING SOYBEAN IN THE CONDITIONS OF CENTRAL NON-BLACK SOIL ZONE**

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**Key words:** *soybean, sowing period, vegetation period, sum of temperatures, yield.*

*The article presents influence of sowing time of Svetlaya soybean variety on the rate of emergence, the length of the growing season, the yield and the sum of temperatures necessary for crop formation. Studies showed that in case of later sowing time, the duration of sowing-emerging period reduces (from 14 days for sowing on April 30 to 10 days for sowing on May 15), as well as the duration of emerging-full ripeness period (from 100 to 96 days, respectively), and the duration of sowing -full ripeness period (from 115 to 106 days, respectively); the sum of temperatures decreases: for the period of sowing-emerging from 161°C to 117°C and for the period of sowing-full ripeness from 1895°C to 1808°C. Ripening of soybean seeds occurs 5 ... 7 days earlier in case of early sowing period than in case of late one, which allows to reap the crops in more favorable weather conditions. The highest yield of soybean seeds was obtained in case of sowing on May 5 - 16.3 dt/ha; when sowing on 30 April, it was 15.7 dt/ha, on 10 May - 13.3 dt/ha, on May 15 - 11.3 dt/ha. The dynamics of yield over the years of research was not stable: in 2015 and 2017 the highest yield was obtained in case of sowing on April 30, whereas, in 2016. – in case of sowing on May 5.*

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**PHOTOSYNTHETIC ACTIVITY AND PRODUCTIVITY OF MIDDLE-  
EARLY SOFT SPRING WHEAT OF KASIB SEED FIELD IN THE  
CONDITIONS OF THE SOUTHERN FOREST-STEPPE OF WESTERN  
SIBERIA**

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**Key words:** *net productivity of photosynthesis, photosynthetic potential, coefficient of economic efficiency.*

*The work presents estimation of basic parametres of photosynthetic activity and productivity of soft spring wheat of middle early ripening group of 14-15 and 16-17 of KASIB seed field in the conditions of the southern forest-steppe of Western*

*Siberia for the period from 2011 to 2016. These seed fields were represented by 49 genotypes from 17 selection programs in Russia and Kazakhstan. The research results showed that a set of wheat 16-17 varieties of KASIB seed field exceeded a set of varieties of 14-15 seed field by photosynthetic activity, but was inferior in productivity and yield. Comparative characteristics of varieties of different selection centers showed that high development of the vegetative part of varieties of Chelyabinsk SRIA and Aktyubinsk agricultural experimental station led to a decrease of spike productivity and yield. The selection varieties of Kurgan SRIA and Siberian Research Institute of Plant Growing and Selection differed by a less developed vegetative apparatus and intensive accumulation of dry biomass in the generative part of the plant, which contributed to a yield increase. The variety of the Scientific-Production Center of Grain Economy name after A.I. Baraev was characterized by poorly developed both vegetative and generative apparatus, which led to yield decrease. Assessment of the development of wheat varieties during vegetation period showed that there was competition between the vegetative and generative parts of the plant: yield decreased with an increase of assimilation apparatus ( $r = -0.304$ ;  $-0.387$ ) and reacted positively to a rise of plant accumulation of dry biomass ( $r = 0.369$ ;  $0.374$ ). The productivity of spike is also directly proportional to the accumulation of dry biomass ( $r = 0.663$  and  $0.706$ ). According to the results of the research, the varieties Lutescens P-23-18 (selection of Kurgan Research Institute) and Novosibirskaya 18 (Siberian Research Institute of Plant Growing and Selection) were the most productive in the conditions of the southern forest-steppe of Western Siberia (2.32-2.72 t / ha). These varieties were characterized by greater photosynthetic activity and productivity of spike.*

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## **PHASE FEEDING IN GOOSE BREEDING**

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**Key words:** *geese; feeding; exchange energy; protein; productivity; hematological parameters; economic efficiency.*

*The aim of the research was to increase the productive qualities of geese of the parent flock by phase feeding, depending on physiological state and productivity level. The research was carried out on Italian breed geese of the parent flock in the goose breeding enterprise of OOO Bashkirskaya Ptitsa of Blagovarsky District of the Republic of Bashkortostan. A control group and three experimental groups of 20 heads each were formed. The geese of the test groups were fed by phase depending on the level of productivity. As for the ration of the first test group, the content of exchange energy in the first productivity phase was 260 kcal, in the second - 265, in the third - 270 kcal with the content of crude protein - 16.0; 17.0 and 17.5%, respectively. As for the second test group , the content of exchange energy was 270; 275; 270 kcal, and crude protein - 16,5; 17.0 and 16.5%, respectively; in the third test group - 270; 275 and 270 kcal of exchange energy and 17.0; 17.5% and 17.0% of crude protein, respectively. The*

*geese of the control group had ordinary ration according to the recommendations of All-Russian Research and Technology Institute of Poultry. According to the results of the research, live weight of the geese of the test group-3 was higher, on average, by 4.0% by the end of the productive period, egg production - by 10.3%, egg weight by - 1.0%, compared to the control. The blood of the geese of the experimental group 3 had a greater content of hemoglobin - by 6.9%, erythrocytes by 3.83%, and leukocytes by 6.5%, as compared with the control. The hatching percentage of certified goslings in the test group-3 increased by 22.4%, in comparison to the control, and the level of profitability increased by 10.6%. Thus, during the productive period of the geese of the parent flock, it is reasonable to use phase feeding with 270 kcal of exchange energy in the ration in the first phase, 275 in the second phase, 270 kcal in the third and 17.0, 17.5% and 17.0%, of crude protein, respectively.*

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# MORPHOLOGICAL AND MORPHOMETRIC SUBSTANTIATION OF THE INSTALLATION OF PEDICULAR SCREWS IN LUMBAR PART OF THE SPINE

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**Key words:** *morphometry, morphology, transpedicular screw, fracture anchorage, spine, vessels, nerves, lumbar vertebra.*

*Performing transpedicular osteosynthesis of dogs requires knowledge of features of anatomical and topographical structure of the spine and morphometric values for animals with pedigree and growth-weight peculiarities. This research was devoted to the study of this problem. This article presents results of morphological and morphometric studies of the lumbar spine of dogs of different weight. A topographic and anatomical basis for safe position of transpedicular screws in the lumbar vertebrae is given. The studies were conducted on cadaverous material in the sectional hall of the Department of Anatomy, Histology, Physiology and Pathological Anatomy of the Institute of Veterinary Medicine and Biotechnology of Omsk State Agrarian University. The obtained knowledge was used for safe position of transpedicular screws of various sizes in the lumbar spine. In order to exclude damage to blood vessels when transpedicular screws were placed into the vertebral body, we studied skeletotomy of the lumbar spine. The performed topographic and anatomical studies with the morphometry of anatomical formations of the lumbar vertebrae and adjacent tissues made it possible to reveal the relation between the body weight of an animal and the size of the vertebra. The results of the study made it possible to determine the necessary types of transpedicular screws. The study of the distance from the ventral surface of the body at the level of its center to the outer edge of the leg (the diagonal size of the vertebral body in the horizontal plane). Analysis of the results showed that this size increases with the body weight of the animal. If the body weight of the animal is up to 5 kg, the size of the submerged part of the transpedicular screw is 1,3 cm, and if dogs weigh from 41 to 60 kg – 3,5 cm.*

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## **EFFECT OF ANIMAL GENOTYPE ON MILK PRODUCTIVITY AND COW MILK QUALITY**

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**Key words:** *breed, blood system, milk productivity, fat content, protein content of milk.*

*The article considers the results of milk productivity evaluation and milk qualitative composition of cows of different genotypes. Research was carried out at the dairy complex of OOO Agrosoyuz in Ruzaevsky district of the Republic of Mordovia. Four groups of animals were formed for the experiment according to the principle of analogues (30 heads in each): 1 group - purebred Simmentals of Austrian breeding (p / b S), 2 group - purebred animals of Red-Spotted breed (p / b RS), 3rd group - 1/2 S × 1/2 RSH, 4 group 1/4 S + 3/4 RSH. Rations and housing conditions of cows were the same for all groups. Evaluation of animals for milk productivity was carried out by control milking each ten days. Average samples of milk were selected for two days, which go one after the other. Milk physical and chemical properties were determined when carrying out research on chemical composition of milk: fat content - by acid method of Gerber; protein - by the method of titration. As a result of the conducted studies it was found that usage of Re-Spotted Holstein bulls is highly efficient for improving productive qualities of Simmental cattle. At the same time, the most productive were the hybrid animals with a blood content of 1 / 4S + 3 / 4RSH. The cows of this genotype exceeded*



*animals from the first group by 697 kg (11.9%), and from the second and third groups by 838 kg (14.6%) and 161 kg (2.5%), respectively. Live weight in these groups was in the range of 538-564 kg. The superiority in this parameter was in the first group. Qualitative parameters of milk fat and protein were improved in case of goal-oriented selection.*

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## **ANALYSIS OF INTRA-VITAM SAFETY USAGE EVALUATION OF IMPANTANTS WITH BIOACTIVE COATING**

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**Key words:** preclinical studies, calcium phosphate spraying, temperature, body weight, frequency of respiratory movements, heart rate, blood circulation.

*The article presents results of an analysis of intravital animal observations to determine the safety of implants with hydroxyapatite coating applied in different ways. Pre-clinical studies on dogs were performed. Implants were placed under the periosteum of the tibia in the form of thin plates of titanium alloy Ti6Al 4V with calcium phosphate spraying (experiment) and without bioactive layer (control). Coating was applied: by microarc oxidation in group 1, in group 2 - by high-frequency magnetron spraying, in group 3 - by plasma spraying. The animals were observed for 4 weeks. The general condition, motor activity, feed and water intake were assessed. The frequency of respiratory movements and heart rate, the overall temperature and body weight were recorded, and the blood circulation in the tissues was locally studied. There were no pathologies or serious deviations in the health status of dogs in all groups during the experiment. We did not record significant changes in the studied parameters. An increase of blood flow was locally determined as a consequence of moderate hypertension of vascular wall in the experimental groups. The results of the study confirm and supplement the available information on the biological compatibility of calcium phosphate coatings on metal base. No pathological body reaction proves the safety of application of such implants in clinical studies. The obtained results can be used as additional and as control ones when studying the safety degree of bioactive coatings with different physical and chemical properties of their surface.*

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## **APPLICATION OF NEW POLYMICROBIOLOGICAL FEED CONCENTRATE FOR DISEASE PREVENTION OF CATTLE YOUNG STOCK**

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**Key words:** *young stock, new polymicrobial feed concentrate, disease prevention, survivability, growth.*

*We studied the effect of the new polymicrobial feed concentrate for disease prevention, survivability and growth of young cattle at the age from 3 to the end of 9 months old, and determined economic effectiveness of its use. The experiment was conducted in OAO Breeding farm named after Dzerzhinsky in Yaroslavlsky district of Yaroslavl region. Young cattle from 3 to the end of 9 months of age took part in the experiment. It was found that daily application of new polymicrobial feed concentrate, regardless of the dose, had the same effect on disease prevention: reduced morbidity rate by 20% and provided 100% survivability, increasing this parametre by 20%, but different doses influenced economic parametres. Feeding with new polymicrobial feed concentrate at the age of 3-6 months at a dose of 12 ml, 7-9 months - 14 ml increased the live weight by 22.4 kg - 12.66% by the end of 9 months and its average daily gain by 80 g - 14.93%; it also decreased feed consumption per 1 kg of live weight gain by 0.68 feed. units - 10.32%, and costs by 10.07 rubles. - 11.88%; it reduced disposal losses by 11560.32 rubles and treatment costs by 1928.5 rubles; increased profit per 1 animal due to increase of live weight by 221.54 rubles; and in case of 3 times increase of doses, it increased live weight by 34.0 kg - 19.22%, and its average daily increase by 121 g - 22.57%; decreased feed consumption per 1 kg of live weight gain by 0.86 feed. units - 13.05%, costs by 13.52 rubles - 15.96%; reduced disposal losses by 15,172.92 rubles and treatment costs by 1928.5 rubles; increased profit per animal due to increase of live weight by 446.16 rubles.*

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## **CORRECTION OF COW METABOLISM WITH POLYSALTS OF MICROELEMENT**

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**Keywords:** cows, metabolism, correction, preparation "Polysalts of microelements", efficiency.

*The aim of this work was to study the effect of the complex preparation "Polysalts of microelements " on metabolism, cow productivity and survivability of calves. The research tasks included: to study biochemical parametres of cows' blood,*

*productivity of the first three months of lactation and of survivability of calves in the first 10 days of life. Two groups (test and control) of cows of Black-Spotted breed were formed, each included 15 heads. "Polysalts of microelements" preparation was daily included in the main ration in the test group for 60 days before the expected delivery. The preparation was applied together with the feed and was used as a premix. The premix was thoroughly mixed with the concentrated food in a concentration of no more than 3% of weight, and then with a daily supply of concentrates. The biochemical blood test was carried out in accordance with the guidelines for required minimum of research in veterinary laboratories. The productivity of cows in the first three months of lactation was estimated by daily records of the amount of milk received, cumulation of the data and their analysis. We kept a record of the new-born calves and their survivability in the first 10 days of life. The result processing of experimental studies was carried out using the methods of mathematical statistics. The application of "Polysalts of microelements" in the ration contributed to a shift of the reference values to the upper norm limits of calcium-phosphorus metabolism, acid-base balance, vitamin metabolism, had a positive effect on biosynthetic processes in the body due to increase of albumin concentration by 16.6% ( $P < 0.001$ ;  $r = + 0.15$ ). By the end of pregnancy, the humoral factors of unspecific protection were activated by 22.5% ( $P < 0.01$ ,  $r = + 0.26$ ). There was an increase of milk productivity by an average of 6.0-9.8% and survivability of calves in the first 10 days of life.*

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# INFLUENCE OF DIFFERENT WAYS OF TETRACYCLIN ADMINISTRATION ON RUMEN FUNCTIONS AND CONSEQUENCES OF THEIR DISORDERS

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**Key words:** *clinical pharmacology, calves, violation of rumen digestion, respiratory diseases, prevention.*

*A research was conducted to study the effect of different methods of tetracycline administration on the function of rumen and the risk of respiratory disease development of calves in the conditions of a complex for growing and fattening of purchased young cattle (calves aged 4-5 months with an average live weight of  $147.3 \pm 3.07$  kg). It was shown that oral administration of tetracycline in recommended doses (10 mg / kg bw) had a negative effect on rumen microbiota, followed by digestion disruption and accumulation of toxic substances in its cavity, which are absorbed into blood and cause the development of systemic endogenous intoxication. As a result, there is a risk of anemia and pathology of the respiratory system. Antimicrobial agents in the form of an aerosol excludes their direct impact on rumen microbiota, but sanation of the respiratory tract is achieved, which is confirmed by the absence of violations of forestomach functions and the decrease of respiratory system diseases.*

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## **INFLUENCE OF FEED ADDITIVES BASED ON SAPROPEL ON SLAUGHTER PARAMETRES OF BROILER CHICKEN**

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**Key words:** *lake sapropel, broiler chickens, slaughter parametres.*

*The aim of the research was to study the slaughter parametres of broiler chickens that received mixed feed with additives based on sapropel. To solve the tasks set, scientific and economic experiment was conducted in the conditions of the housing rooms of the Department of Animal Husbandry and Technology for Processing Livestock Products of FSBEI HE Velikie Luki SAA of Pskov Region. Broiler chickens of Ross 308 cross took part in the experiment. According to the principle of analogues, four experimental groups of 13 - day chickens were formed: broilers of the first (control) group received mixed feed, the second group - mixed feed with addition to the drinking water of 1% (of weight) of sapropel extract, third and fourth groups - mixed feed with partial replacing it (by weight) with the test additives: the third group - 2.5% of frozen sapropel, the fourth group - 10% of green sapropel mass. Chicken breeding was carried out until the age of 56<sup>th</sup> days. The best results were obtained, where the broilers of the test groups surpassed the control in all slaughter parametres. Among the chicks of the test groups, the advantage was observed in the third group. The groups of males were similar, which had a significant effect on the total parametres. Thus, without division by gender, the birds of the test groups surpassed the control group only by such significant parametres as the mass of chest and femoral muscles, the mass of heart and muscular stomach.*

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**DYNAMICS OF EXCHANGE PROCESSES OF CALVES OF HOLSTEIN  
BREED IN CASE OF APPLICATION OF HEPATOPROTECTOR AND  
PYRIDOXIN**

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**Key words:** *calves, blood, hepatoprotector, pyridoxin, metabolism*

*The purpose of the research was to study the effectiveness of hepatoprotector and pyridoxin application for correction of metabolic processes of Holstein calves. The subject of the study was calves of Holstein breed at the age of 1.5 months. Two groups of animals were formed for the experiment: control and test ones. All animals were treated with a medication which contains  $\alpha$ -tocopherol acetate, in addition, a hepatoprotector was used in the experimental group, its composition included the following active substances: Capparis spinosa; Cichorium intybus; Mandur bhasma; Solanum nigrum; Terminalia arjuna; Cassia occidentalis; Achillea millefolium; Tamarix gallica and 5% pyridoxin solution. Assessment of physiological state and biochemical parameters of blood was carried out at the beginning and end of the studies. Biochemical studies of blood serum were conducted with application of Stat Fax 1904+ analyzer and Vital reagent kits. The results of the study showed that usage of compounds with a hepatoprotective effect favorably influences biochemical parameters of calf serum, a particularly positive effect was observed in the experimental group where the hepatoprotector and pyridoxin were used in combination.*

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## THE STUDY OF BIOLOGICAL PROPERTIES OF BACTERIA SPECIES B.PETRII AND B. TREMATUM

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*Key words: bacterium, Bordetella, B.petrii, B. trematum, tinctorial properties, cultural properties, biochemical activity*

*The article is devoted to the study of the bacteriological properties of the bacteria of the genus Bordetella, in particular the types of B. petrii and B. trematum. As a result of the work, a study was carried out to study: tinctorial properties; the study of cultural properties; the study of biochemical activity. These types of microorganisms are in the form of coccoid sticks. According to our data the micro-organisms of strains of B. petrii and B. trematum had a growth on ordinary nutrient media and on differential diagnostic media. The most suitable medium for cultivation is bordetellae. These types of bacteria have a weak schoolteacherly activity. The strain of trematum (Btr-309) does not grow on Christensen's agar and is not capable of metabolizing urea. The microorganism strain of Trematum on the environment of Simmons with citrate grows, but does not change color. In contrast to the data that are presented by P. Vandamme et. al.(1996), the bacteria of trematum do not grow on differential-diagnostic media, including on agar McConkie. According to the data obtained by us, a positive reaction was detected in bacteria of the species B. petrii (bpt-461) strain on cytochrome oxidase. The ability to produce catalase was tested with 3% and 6% solutions of hydrogen peroxide. The studied culture of the microorganism strain of petrii have activity in relation to catalase. The result of the conducted researches it is possible to create schema for identification of bacteria B. petrii and B. trematum.*

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## **AGE DYNAMICS AND STRUCTURE OF CATTLE EXCHANGE ENERGY USAGE**

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**Key words:** *development, exchange energy, basic metabolism, structure, food adaptation, productivity.*

*The study of development laws of nutrition function, along with the need of development of fundamental sciences, is of practical importance. The problem of development of industrial methods of livestock product production in large industrial enterprises that do not have their own food base is more successfully solved by using small-volume high-calorie granulated feed. Bulky rations, based on green mass, silage, hay, haylage don't have such advantages and they are*

*gradually substituted in large industrial farms by small-volume, based on energy-packed feeds. However, this type of feeding differs from the evolutionarily developed, physiologically common food behavior of polygastric animals. It should also be noted that the production of "organic" food products involves the feeding of productive animals using local natural feeds cultivated in this environmentally friendly enterprise. Improvement of organizational and technological conditions of livestock product production in order to reduce the costs must be carried out taking into account the physiological needs of the organism. Volume insufficiency of the ration is a depressing factor in realization of the hereditary potential and the development of cattle productive signs.*

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# INCREASE OF BOAR REPRODUCTIVE ABILITY IN CASE OF APPLICATION OF FEED ADDITIVE OF PURPLE ECHINACEA IN A RATION

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**Key words:** *echinacea purpurea*, breeding boars, sperm, insemination, feeding, reproduction parameters.

*It is known that introduction of biologically active additives in boar rations contributes to a significant increase of both biological male cell value and to sow fertilizing capacity. A feed additive was used made of dry ground Echinacea purpurea at a dose of 0.06 g per 1 kg of live weight of boars. This feed additive was introduced into the boars' ration in all seasons of the year and after the test period (60 days) in each season, boar sexual activity, blood hormonal status, quantitative and qualitative sperm parameters were checked, as well as sow fertilization from insemination with fresh sperm. Experiments were conducted on the collective farm named after Gorin in the Belgorod Region. As a result of the experiment, it was established that the duration of sexual reflex changed of the boars that received a feed supplement and it shifted towards lengthening of the ejaculation reflex. Obviously, it happens due to boar hormonal status change, when the content of estradiol-17 $\beta$ , progesterone, cortisol and especially testosterone increases. There was also an increase in the volume of sperm, which was ,on average, 40 ml for all seasons of the year and, what is especially important, the resistance of male cells (by 1.5-1.7 times) compared with control boars. Fertility of sows inseminated with sperm from boars receiving the Echinacea purpurea supplement was higher in the range from 2.0 to 10.0%. The maximum increase of fertility is in the winter-spring period. Thus, the use of purple echinacea as an adaptogen to enhance the reproductive qualities of both boars and sows is highly advisable.*

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## **PRODUCTIVE EFFECT OF NATURAL ADDITIVE IN TURKEY BREEING**

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**Key words:** *turkey, erythrocytes, weight gain, live weight, feed additive.*

*The aim of the work is to study hematological and productive parametres of turkeys in case of using natural additive based on nanozeolite and soy okara in the*

*ration. Experiments were carried out in Ulyanovsk region in an agricultural enterprise IP "Sankeyev S.A.", turkeys of medium-heavy breed of Hybrid Creadmayker took part in the experiment. We organized scientific-production (2000 turkeys were involved) and physiological experiment, where two groups of turkeys (10 birds in each) were formed according to the analogue method (aged 1.5 ... 2 months). The feeding conditions were the following: the 1st group (control group) was fed with the main ration, the ration of the second (test group) group was supplemented by additives of nanocaolite (50 g / head / day) and soy okara (50 g / head / day). Blood parameters were determined on the automatic veterinary blood analyzer PCE-90Vet (HTI, USA). In the course of the experiment, the live weight of turkeys was measured by control weighing every 10 days in the morning before feeding. The obtained data were processed biometrically using Statistika program. Analysis of the obtained data showed that, there was a clear tendency of increase of the main blood parameters: the number of erythrocytes and leukocytes rose by 7.39 and 3.6%, the hemoglobin level and the hematocrit index - by 5.72 and 4 , 67% in the group of turkeys, where a natural supplement was used, compared with the control. Addition of natural supplement based on natural nanostructured zeolite and soybean okara increases growth energy of turkey live weight. It was established that there was an increase of average daily live weight gain by 13.01% at the beginning of supplement feeding and by 18.33% at the end, which was from 33.0 to 54.88 g, against 29.2 to 46.38 g in the control group. At the end of the experiment, young turkeys of the experimental group outweighed the average weight of their peers by 710 g, while the relative increase increased by 7.29% and amounted to 73.6%, while in the peer group this figure was only 66.31%.*

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## **BACTERIOPHAGES OF LISTERIA SPP. BACTERIA AND THEIR BIOLOGICAL PROPERTIES**

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**Key words:** *Listeria*, *Listeria monocytogenes* *listeria*, listeriosis, food pathogens, phage, bacteriophages, bacteria, biological properties.

The article presents results of studies on biological properties of 5 isolates of bacteriophages of *Listeria* genus bacteria and selection of the most promising phage strain for constructing a biological preparation for decontamination of fish, raw meat and food products. It was established that all 5 strains of the studied listeriosis bacteriophages L.m 1 ULSAU, L.m 2 ULSAU, L.m 4 ULSAU, L.m 6 ULSAU, L.m 12 ULSAU have different morphology of negative colonies. The lytic activity of the studied phages is in the range from  $1.2 \pm 0.1 \times 10^7$  to  $2.9 \pm 0.1 \times 10^{10}$  by Gracia and from  $10$  to  $10^{-9}$  according to Appelman method. No activity of the studied bacteriophages to bacteria of heterologous genera is established,

however, the *L.m 4 ULSAU* bacteriophage, except the cultures of *L.monocytogenes*, lysed cultures of other hemolytically active species of *L.ivanovii* and *L. seeligeri* listeria. The range of the phage lytic activity ranges from 37.5% to 86.8%. Bacteriophages are moderately resistant to temperature and resistant to 45 minutes of chloroform exposure. During storage for 6 months, the lytic activity of the bacteriophages was reduced in one range. During storage of bacteriophages in the freeze-dried state, the phage titer decreased in the same range, even if stored for 12 months. Thus, on the basis of the data obtained, we selected the bacteriophage *L.m 4 of ULSAU* series for further research, it has the properties which allow it to be used in a biopreparation for decontamination of fish, raw meat and food products.

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## **MATHEMATICAL SUBSTANTIATION OF THE FACTORS AFFECTING PRODUCTIVE AND BIOLOGICAL PARAMETRES OF GEESE**

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**Key words:** egg-laying season, breed, age, egg-laying period, feeding, productivity, reproductive qualities, quality of the incubation egg, physiological condition, female geese of the parent flock.

*At present, scientific research in the field of biology and agriculture, conducted on living organisms and determining the degree of influence of certain factors on them is not complex and generalizing. Studies have revealed that the highest degree of influence on productivity and reproductive quality was provided by the feed factor, in the middle range (23.67%, at  $P \leq 0.01$  and 35.42%, at  $P \leq 0.001$ ), while the influence degree of the egg-laying season, breed and age had a significant variation from 0.10 to 71.01% ( $P \leq 0.001$ ), which indicates influence instability of these factors. The quality of the incubation egg was influenced by two factors: breed and feeding, where the degree of influence was in the middle range (21.94 - 49.13% and 21.35 - 49.90%, respectively). The physiological state of female geese of the parent flock was influenced most of all by such factors as the egg-laying season, the age of the goose and the feeding factor. Based on the conducted studies, it was concluded that when studying the influence degree of the main factors (egg production period, breed, age, egg-laying period, feeding) on productive and biological parametres of the parent flock, it was determined that the average and high range of the influence degree in different groups of parametres is shown by the feed factor. The quality of the incubation egg was also influenced by such factor as the breed; the physiological state – by the egg-laying season and the age of the female geese of the parent flock. We consider it necessary to exclude from the groups of the studied parametres such parametres as the egg Haugh unit, the thickness of the shell, the volume of the egg and the number of leukocytes, because these indicators significantly exceed the limits of the average for the estimated parametre groups.*

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## **SELECTION OF SPECIFIC PRIMERS BASED ON 16S rRNA GENE FOR BACILLUS CEREUS BACTERIA**

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*Key words: Bacillus cereus group, primers, parameters, PCR RV, method, identification*

*The article presents results of studies on the selection of specific primers based on 16S rRNA gene for bacteria of "Bacillus cereus group", which includes species of Bacillus cereus, Bacillus anthracis, Bacillus mycoides, Bacillus thuringiensis, Bacillus cytotoxicus, Bacillus weihenstephanensis (the gene structure was determined, as well as conservative regions of the given gene represented in the NCBI system (BLAST nucleotide and PRIMER BLAST) of the*

strains of the above groups, multiple gene alignment and primer selection were performed). Synthesis of primers and probes was performed by chemical concentration method on ASM-800 instrument (Biosset, Novosibirsk). Oligonucleotides that can specifically bind to representatives of the entire "Bacillus cereus group" are GCGGTAATACGTAGGTGGCA-GTTTACGGCGTGGACTACCA. As a result of a series of improvement experiments, the parameters of the polymerase chain reaction were determined, at which the maximum amount of specific reaction product was amplified: annealing temperature of the primers was 60 ° C, and their number was 8 pmol / reaction. PCR validation was performed with application of 16 reference and 116 isolates from the environment of the studied "Bacillus cereus group". As a result, 132 strains were identified as representatives of "Bacillus cereus group". The real-time detection of PCR with application of primers specific for the representatives of "Bacillus cereus group" is recommended as a method of primary identification of the above bacteria and a method of indication in the objects of veterinary and sanitary supervision, its sensitivity is 10<sup>2</sup>-10<sup>3</sup> μ.k / g.

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## **CORRECTION OF MINERAL PROFILE OF BIRDS IN CASE OF APPLICATION OF PROTEIN-CARBOHYDRATE-MINERAL-VITAMIN ADDITIVE IN THEIR RATION**

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**Key words:** *calcium, phosphorus, feed additive, ration, poultry.*

*The purpose of research was to study the mineral exchange rates of laying hens in case of introduction of a protein-carbohydrate-mineral-vitamin supplement - soya okara into their diet. Experiments were conducted on Hayseks laying hens at the age of three months in a private poultry farm of Ulyanovsk region for 150 days. The birds were kept in groups (50 hens each) with free access to water and food. Analogue groups of 10 birds in each were formed for the physiological experiment. The control group received main ration, balanced by the main nutrients. Test group of birds was fed with protein-carbohydrate-mineral-vitamin supplement (soya okara) in the dose of 50 ... 60 g / head once a day. The concentration of mineral elements in bone tissues was determined by atomic absorption method on aspectrophotometer by Perkin Elmer firm (USA). The analysis of the obtained data showed that calcium concentration in the femoral bone of chickens of the test group increased by 23.3% and the phosphorus level increased by 14.5% compared to the control group. The correlation of calcium to phosphorus normalized in the*

*2nd group and was 1: 1.8. There was a noticeable increase tendency of calcium concentration in pectoral muscles of hens in the 2nd group by 18.0% and phosphorus by 8.0%, compared to the group of analogues. The study of cadmium content, one of the most dangerous heavy metals, showed that its level in muscle and bone tissues of control and experimental groups of laying hens did not exceed the allowed MRL (0.05 mg / kg) established by SanPiN of RF 2.3.2 1078-01. At the same time, its concentration in the samples of the test group was below the controls by 31.0 and 50.0%, respectively. Application of protein-carbohydrate-mineral-vitamin supplement on the basis of soy okara in the diet of laying hens improves mineral metabolism in their body.*

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## **CHANGE OF BREAM FERTILITY IN CHEBOKSAR WATER RESERVOIR**

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**Key words:** *breem, fecundity, reproduction, reservoir*

*The article presents materials of research on fecundity of bream, which is an important commercial object, including, in different age groups. The data were received in the spring pre-spawning period during 2013-2015. A comparative analysis of the obtained parameters with the data of the initial period of Cheboksary reservoir (1980s) is carried out. The absolute individual fecundity of bream was calculated, which was 29342-311434 eggs and relative fecundity - 45-112 eggs / g, depending on the age group. A decrease in both absolute and relative fertility was recorded in the entire studied age range (from 7 to 14 years) compared with the 1980s.*

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## **EFFICIENCY OF MINERAL ADDITIVES SUBSTANTIATED BY PIG CONTROL SLAUGHTER PARAMETES**

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**Key words:** pigs, feed additive, meat, slaughter yield.

*The aim of the work is to give a veterinary and sanitary justification for using siliceous marl of Siuch-Yushanskiy deposit of Ulyanovsk region in the ration of pigs. The experiments were carried out on pigs of large white breed at the age of 1, 60, 105 and 270 days. To conduct the experiment, 3 groups of animals were formed. In accordance with the experiment method, natural marl was added in the ration of the 3rd test group as a mineral supplement, in the amount of 2% of dry matter of the ration, which corresponded to the number of microelements introduced into the ration of animals of the second group in polysalt composition (copper and zinc), 1st group was a control group. The pigs were taken from the sows at the age of 60 days, fattening was stopped when they reached the age of 270 days. It was stated that feeding pigs with mineral additives (polysalts and natural marl) to had a positive effect on meat productivity. At the same time, it should be noted that siliceous marl was more effective than polysalts. So, the pre-slaughter live weight was by 10.56% ( $P < 0.1$ ) and 4.14% ( $P > 0.05$ ), the weight of the carcass by 12.81% ( $P < 0.01$ ) and the slaughter weight by 4, 76% ( $P > 0.05$ ) and 12.26% ( $P > 0.05$ ) more compared to animals of Groups I and II, respectively. Piglets that received zeolite-containing rock in addition to their ration grew and developed better. For a comparative evaluation of carcasses, an indicative criterion is the ratio of their tissues - flesh: bone - index of meat and flesh: fat - index of leanness. The best index of meatiness and leanness were carcasses of pigs, which received zeolite-containing rock in addition to main ration.*

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