

AGRICULTURAL SCIENCES

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FARM ANIMALS ASSESSMENT ON THE BASIS OF IMPROVED MEASURING TOOLS

The article considers one of the problems of animals measuring. This is more accurate assessment of each animal and easy application of measuring instruments. A tool for measuring farm animals was developed, and the production inspection of control sample functionality was carried out, the functional performance of a useful model was determined for improvement of measurement accuracy and ease of application. The useful model is related to devices for animal breeding, in particular, for farm animals measurement. The useful model patent BY No. 5598 is registered in the National Registry for Intellectual Property of the Republic of Belarus dated October 30, 2009. It was determined that the useful model “Animal measuring tool” is very easy to use as soon as it has only one scale instead of three used in the I-14, it is shorter by 30 cm and has a soft case. Some discrepancies were determined during the inspection. The certificate of production audit indicates that deficiencies and defects will allow to upgrade the model for further improvement of the accuracy and the efficiency of breeding work with farm animals.

Key words: useful model; indices; measurements; measuring tools; breeding work.

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MORPHOLOGICAL CHARACTERISTICS AND FUNCTIONAL PROPERTIES OF THE UDDER OF HOLSTEIN LINE COWS IN THE CONDITIONS OF THE UDMURT REPUBLIC

Morphological characteristics and functional properties of the udder were studied (shape, size of the udder and the simultaneity of milking, milk flow rate, completeness, duration of milking, intensity of milk flow). The studies have shown that proper milking of heifers, i.e. without the preparatory operations (udder hygiene, stripping of first streams of milk) with tethered stock keeping takes on average 87.3% of the time, and the costs of all operations to prepare for milking amounted to 12.7%; with loose and cubicle housing it takes 90.5% and 9.5% respectively, due to the milking technology. Duration of proper milking with tethered keeping in the third lactation was an average 92.9% of the time, and the costs of all operations to prepare for milking amounted to 7.1%; with loose and cubicle housing the results were 92.4% and 7.6%, respectively. The milk residue in the udder of heifers calving for the first time with tethered keeping was 187.8 ± 60.56 ml with single milk yield of 7.72 ± 0.18 kg, milking completeness was $97.8 \pm 0.82\%$. The milk residue in the udder of first-calf heifers with loose and cubicle keeping was 108.0 ± 27.50 ml with single milk yield of 7.58 ± 0.30 kg, milking completeness was $98.54 \pm 0.38\%$. The research results revealed that first-calf heifers with tethered keeping had milk in the udder more by 79.8 ml, and the completeness of milking was less by 0.74%. The milk residue in the udder of cows in the third lactation with tethered keeping was 171.0 ± 36.34 ml with single milk yield 12.30 ± 0.61 kg, milking completeness was $98.56 \pm 0.36\%$. Cows with loose and cubicle keeping had the milk residue in the udder 165.2 ± 33.64 ml with the single milk yield 12.3 ± 0.61 kg, milking completeness was $98.62 \pm 0.31\%$. It was found out that cows with tethered keeping had milk residue in the udder more by 5.8 ml, but the milking completeness was greater by 0.06%.

Key words: cows; morphological characteristics; functional properties; udder; milk.

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FOREST MANAGEMENT OPTIMIZATION IN THE SPARSELY FORESTED REGIONS

The effect of selective cutting on the formation of continuously productive timber land in the Sabinsky forestry is considered. It was revealed that the uneven aged stands formed by selective cutting create the possibility of the periodic cutting of mature trees in 8-10-15 years. Favourable conditions for seedling emergence and for self-seeding of spruce and fir are created under the canopy of dense soft-wooded stands, and in small glades where there is no soil sodding. However, the appeared self-seedings and undergrowth undergo natural suppression by the canopy of tree and bush vegetation, and in the absence of a timely thinning of shading canopy it goes into the category of unreliable. Forestry measures were developed on formation of coniferous hardwoods on site of softwoods. The introduction of such measures of reforestation and forest management aimed at reformation of deciduous plantings in conifers in the Sabinsky forestry covering 48 year period has increased the area of coniferous forests from 31 to 40%, average stock per 1 hectare increased by 85%, the average age has increased by 13 years, quality class improved by 0.1 unit, stand density increased by 0.01 of a unit, and the share of softwood plantations decreased from 63 to 48%.

Key words: selective cutting; protection forests; exploitable forests; complex cutting; clear cutting; undergrowth; self-seeding; reforestation.

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GENETIC FACTORS INFLUENCING PRODUCTIVE LONGEVITY OF COWS IN BROWN SWISS BREED

The aim of this work was to study the effect of genetic factors, including hereditary characteristics of sires and line of cows on their productive longevity. The study was carried out on Brown Swiss cows in the breeding farm «Semyanskoe» of the Nizhny Novgorod region. Duration of cows' productive use was 65.6% due to the influence of their fathers, lifetime milk yield 57% depends on the genotype of the bull, the impact is significant ($F > F_{st}$). Daughters of the bulls Vitamin 5835 (8.5 lactation), Mineral 78930 (8.4 lactation) and Paleny 415 (7.8 lactation) are distinguished by productive longevity, therefore they also have the highest indicators of lifetime productivity. In Brown Swiss breed there are 12 lines and related groups. Studies have shown a relationship of the length of cows' productive longevity from their lines. The maximum value of this indicator is in the lines of Istok and Barhat - 7.7 and 6.9 lactations, respectively; in this regard, these lines recorded the highest lifetime productivity - more than 30,000 kg of milk. Ladok Line is characterized by the least duration of life – 1.8 lactations. Differences in productive longevity between lines is highly significant ($P \leq 0.001$), the share of influence of the cow's line on the duration of its use was 40.6%, on first lactation milk yield - 15.48%, on high lactation milk yield – 11.97%. Many animals of Bor and Istok lines combine high milk yield and long productive life, hence these lines are most promising for breeding. Therefore, when evaluating sires for the quality of the offspring it is necessary to consider not only indicators of milk production of daughters in first lactation, but also consider their longevity and lifetime milk production.

Key words: productive longevity; lifetime milk yield; lines; bull-sires.

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**DIFFERENTIATED ASSESSMENT OF BEE PASTURES WITH
LAND ZONING OF THE STEPPE DON AREA**

The amount of honey yield is dependent on the geographical location of the area, the structure of honey plants, on the weather and other conditions. The steppe Pridonye has a significant bioresource potential of forests and farmlands for honey yield. The purpose of the research is to provide a differentiated evaluation of honey forest pastures and agroforestry landscapes with zoning of vast areas of the steppe Pridonye based on the definition of bioresource potential of melliferous resources. The assessment of honey yield was performed using the indicator “District of honey yield”. The area description of honey yield was carried out according to landscape features and climatic factors affecting bioresource potential of forests and farmlands, their honey producing capacity, usage and land reclamation. We defined the bioresource potential and exploitable honey volume of forage lands for bees in the territories of various designation purposes. Honey resources of the Rostov region on forest land and agroforestry landscapes make up 3,639,919.41 ha. In the overall structure of forage the forest areas occupy 3.2% of the total area, pastures – 78.5%, field crop rotation – 11.8%, forest strips of farm and forest landscapes – 4.4%, vegetables and melons fields – 1.3%, gardens and berries fields – 0.8%. The obtained cartographic material, data on honey volume of bee pastures for honey yield areas will help make schedules of apiaries migrations for pollination of cultivated plants and fuller utilization of bioresource potential of forests and agricultural lands of the honey yield area.

Key words: melliferous resources; honey yield area; honey stock; bioresource potential; forest land; honey yield.

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YIELD AND QUALITY OF SPRING RAPE SEEDS OF JUBILEYNY VARIETY USING CALCULATED DOSES OF FERTILIZERS IN THE SOUTHERN FOREST-STEPPE OF THE REPUBLIC OF BASHKORTOSTAN

The experimental verification of the possibility of obtaining the planned crop yield of spring rape seeds of good quality, cultivated in rotation on leached chernozems in the application of different doses of fertilizers was conducted. The fertilizer rate was calculated by the balance method for the planned crop yield of spring rape seeds 2.5 t/ha using balance ratios of nutrients application from fertilizers and soil. The usage of different doses of fertilizers on leached chernozems of the southern forest-steppe zone of the Republic of Bashkortostan average of period 2015-2016 made it possible to increase the yield by 0.33-0.40 t/ha and obtain 2.13-2.20 t/ha of spring rape seeds, which accounted for 83-88% of the planned level. The crude protein content in these variants increased by 3.3 – 3.5 % in comparison with the similar factor of seeds grown without fertilizers. Application of calculated doses of fertilizers made possible to increase nitrogen, phosphorus, potassium yield of 1 t of seeds by 6-7, 1-2 and 8 kg respectively. For each kilogram of fertilizer 1.34-1.79 kg of seeds were obtained; fertilizers equity participation in the formation of the crop was 16-19%, and the energy efficiency equaled to 1.12-1.41 units. The more effective for agronomy, profitable and environmentally friendly option is the variant with the calculated doses of fertilizers with adjustment of nitrogen dose according to the results of diagnosis of the soil.

Key words: spring rape; balance of nutrients, crop yields; removal; efficiency.

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EFFECT OF PRESTARTERS ON DIGESTIBILITY AND NUTRIENTS UTILIZATION IN PIGLETS DIETS

The comparative analysis of the effect of feeding the prestarters “Delfi”, “Koudais”, and “Kargill” was conducted to reveal the digestibility of piglet rations nutrients and utilization of nitrogen, calcium, and phosphorus. Youngsters of the 2nd and 3rd experimental groups which were fed with the prestarters “Koudais” and “Kargill” digested their rations better than the youngsters from the control group – dry substance by 1.89-2.37% ($P \leq 0.05$), organic substance – by 2.55-2.77% ($P \leq 0.05$), crude protein – by 3.75-4.30% ($P \leq 0.05$), nitrogen-free extractive substances – by 3.24-4.35% ($P \leq 0.05$). Feeding piglets with the prestarter “Koudais” positively influenced the balance of nitrogen and mineral substances; animals of the 2nd experimental group utilized ration nitrogen by 6.48%, calcium – by 2.56%, and phosphorus – by 0.40% more effective than the piglets from the control group. Thus, feeding piglets with the prestarters “Koudais” and “Kargill” in the diets since the fifth day of their lives and during two weeks after weaning increases fodder consumption and contributes to a higher intake of basic nutrients and their better digestibility.

Key words: feeding; piglets; prestarters; digestibility; nitrogen balance.

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ECONOMICAL SCIENCES

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MANAGEMENT OF THE INTENSIVE DEVELOPMENT OF AGRICULTURE OF THE UDMURT REPUBLIC

The article provides a comprehensive analysis of the intensive development of the agriculture of the Udmurt Republic; the quantitative parameters of investments in the agriculture, provision of agricultural labour, material and land resources were evaluated. Tendencies of investment development of agricultural production were determined, the solvency and financial stability of agricultural organizations, as well as the efficiency of their productive capacity and capital were defined. The research established recommendations for improving the system of agricultural management based on the development of its informative, evaluative, monitoring and analytical functions, and for the invention of strategy for the further intensive development of agriculture.

Key words: investments; intensive development; cost; profitability; modernization; financial results; strategy.

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TECHNICAL SCIENCES

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THEORETICAL STUDY OF THE FEED PRESSING PROCESS BASED ON SUNFLOWER CAKE

The aim of the research is to reduce the energy intensity of the feed pressing process on the base of sunflower cake. The power of the press-extruder of the cut part of the screw with variable step while pressing the feed and the time of pressing was determined. Taking into account the assumptions of V.Yu. Frolov we consider

a work process of the variable step screw of the press-extruder in the following way: the processed feed material based on sunflower cake moves along the axis of the screw as a continuous unbroken environment and in one of its rotation it moves along the axis for one step of helical surface; the cross-sectional area of the processed feed material is perpendicular to the axis of the screw and is quasi-permanent. The smaller the pitch of the coil, the smaller the volume of the same amount of mass at the same angle it is rotated, the more it condenses, and the weight quickly comes to the desired concentrations. Based on the results of the conducted theoretical research the formulas were obtained for determining the power of the press-extruder of the cut part of the screw with variable step while pressing the processed feed material based on sunflower cake and the time of its pressing. The power of press-extruder of the cut part of the screw with variable step depends on its structural parameters and physical and mechanical properties of the processed feed material based on sunflower cake. The time of the pressing is directly proportional to the design parameters of the screw with variable step and is independent of the material entering the extruder.

Key words: extruder; cut part of the screw with variable step; processed feed material; sunflower cake; performance; power; pressing time.

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**INTERACTION OF TRANSITION METAL OXIDES WITH
A CYCLOPENTADIENYL. DENSITY-FUNCTIONAL CALCULATIONS**

Nanoparticles of transitional metals and their oxides surrounded with a graphite-like carbon shell are considered as a promising microfertilizer for presowing treatment of seeds. Process of low-temperature synthesis of such nanocomposites, their structure and chemical activity are determined by interaction of metal oxide with graphene sheet fragments. Structural defects of graphene are of great importance. In the article quantum chemistry calculations are performed of the $MeOC_5H_5$ complexes where $Me = Cr, Mn, Fe, Co, Ni, Cu, V$. These complexes

are the simplest model systems allowing to research metal oxide interaction with a pentagonal defect of hexagonal graphene. Density Functional Method is used in the calculations with exchange - correlation functional B3LYP and the basis sets m6-31G and expanded 6-31GK including besides m-631G polarization orbitals for all atoms, except hydrogen, and diffuse orbitals for oxygen. The method used in the present research shows a good agreement with experimental data for dissociation energies of chemically similar systems. The research results have shown that the strongest interaction with a carbon ring is observed for the complexes containing oxides of vanadium, cobalt and copper. These complexes are of high symmetry. Oxide of metal is located on an axis of symmetry of carbon pentagon. Thus, transition metal forms a chemical bond with π – electrons cloud without breaking its structure. The weakest interaction is observed in the case with manganese and nickel. For these clusters symmetry of system is broken, and oxide of metal is displaced from the center of a carbon ring and settles down at an angle to its plain.

Key words: grapheme; defects; transition metals; quantum chemistry; microfertilizers.

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