

AGRONOMY, FORESTRY AND WATER MANAGEMENT

General Farming and Crop Production

UDK 631.445.4:631.41(470.64)

The content of manganese, cobalt, molybdenum and copper in arable chernozems of the foothill zone of the KBR

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Abstract. The article presents the results characterizing the content of trace elements (manganese, cobalt, copper, molybdenum) in arable chernozems of the foothill zone of the KBR. The regularities of their distribution in the soil profile are considered. An assessment of the need for arable chernozems in microelement fertilizers is given. In soil samples, the content of mobile molybdenum was determined by the Grigg method (GOST R 50689-94), manganese – according to GOST 50685-94, copper and cobalt – according to GOST R 50683-94. Extraction was carried out from separate samples of soils with an ammonium acetate buffer solution with a pH of 4.8 in two repetitions. The amount of mobile manganese in leached and podzolized chernozems ranges from 28.2 to 127.3 mg/kg, depending on the granulometric composition of the soil. Podzolized chernozems contain more active manganese than leached chernozems; this is the result of a more acid reaction of the environment of these soils, which helps to restore it to a divalent state. Ordinary chernozems, as well as meadow chernozem soils, contain very little mobile manganese (from 1.07 to 2.3 mg/kg of soil) due to the transition of manganese from divalent to tetravalent and heptavalent and its precipitation. Chernozem soils are characterized by a high content of copper, and especially in the upper humus-accumulative horizons. The studied soils contain from 0.8 to 3.9 mg/kg of mobile forms of copper, i.e. are highly provided with this element and do not need microfertilizers containing copper. The content of mobile cobalt in chernozems and meadow-chernozem soils of the foothill zone of the KBR ranges from 2.8-5.7 mg/kg, which characterizes them as soils rich in this element. The level of content of mobile forms of molybdenum in leached chernozem (0.05-0.09 mg/kg) and podzolized (0.05 mg/kg) is estimated as low, so it is advisable to use microfertilizers, which include molybdenum. Exceeding the MPC of mobile forms of copper was found in the meadow-chernozem soil.

Keywords: manganese, cobalt, molybdenum, copper, chernozems, foothill zone of the KBR

UDK 633.11:631.559.2

New varieties as a reserve to increase yield and quality of winter wheat grain

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Abstract. The article presents the results of an ecological trial of a new variety of Taulan wheat of an alternative way of life. In terms of winter-hardiness, the two-handled variety Taulan is close to winter wheat Bezostaya 1. In case of freezing, it has a high regenerative capacity. The variety is mid-season, short-stemmed, resistant to lodging. Taulan is an insurance variety for food purposes. In the conditions of the steppe zone of the KBR, in the ecological variety testing

in the autumn sowing of the Taulan variety, an average of 5.77 t/ha was harvested, where the increase to the Lastochka standard was 0.74 t/ha. In the spring sowing of the Taulan variety, an average of 6.92 t/ha was obtained over three years, exceeding the standard by 1.25 t/ha. The variety forms the highest yield when sown in the "February windows" – the beginning of March. The grade has high technological and baking qualities. In the autumn sowing, the Taulan variety surpassed the Lastochka standard in grain quality by 17 g/l, in terms of weight of 1000 grains by 2.9 g, in terms of crude protein content by 0.5%, gluten by 0.9%. In spring sowing, according to the nature of the grain, the Taulan variety exceeded the standard by 50 g/l; in terms of weight of 1000 grains, the deviation from the standard was 4.2 g; in terms of the content of crude protein and gluten, the new litter exceeded the standard by 4 and 5%, respectively. The Taulan wheat variety has been included in the State Register of Breeding Achievements of the Russian Federation since 2021. It is recommended for widespread introduction in the Krasnodar and Stavropol Territories, Dagestan, Ingushetia, the Chechen Republic, North Ossetia-Alania, Kabardino-Balkaria.

Key words: adaptability, varieties, wheat, productivity, grain quality, protein, gluten

Horticulture, Vegetable Growing, Viticulture and Medicinal Crops

UDK 635.63:631.589.2

The effectiveness of lowering the parthenocarpic cucumber when growing in winter-spring turnover in hydroponics conditions

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Abstract. This article is devoted to the study of the effectiveness of receiving the lowering of plants during hydroponic cultivation of parthenocarpic cucumber in winter-spring turnover for 2 years. The existing methods of forming cucumber plants in order to obtain fruits mainly from lateral shoots (stepsons) lead to the appearance of a large number of non-standard products, which from economic point of view is not of great interest. With the classical technology of cucumber plant formation, there is no rejuvenation of the leaf apparatus, the period of active vital activity of which is, on average, 2.5-3 months. For this reason, there is a non-standard output, especially at the end of the turn. However, there is a technique of lowering the fruit-bearing part of the main shoot, which is widely used in the cultivation of tomatoes. The purpose of the research is to study the economic efficiency of taking a parthenocarpic cucumber when growing it hydroponically in winter-spring circulation. The introduction of the lowering technique leads to an increase in the period of plant operation, an increase in yield, a decrease in the output of non-standard products and an increase in the profitability of production. The article presents data on the productivity and economic efficiency of the reception of cucumber lowering average for 2 winter-spring turnover in the conditions of LLC "Yug-Agro" Nalchik.

Keywords: parthenocarpic cucumbers, hydroponics, lowering, stepsons, standard products, non-standard products

ANIMAL SCIENCE AND VETERINARY MEDICINE

Private Animal Husbandry, Feeding, Feed Preparation and Livestock Production Technologies

UDK 636.598:636.085

Influence of feed additive LaurBak on productive and reproductive qualities of geese

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Abstract. The article presents the results of scientific research on the use of feed additive LaurBak in goose breeding. The object of the study was the geese of the parent flock; the sex ratio is 1 gander: 3 geese. For research, four groups were formed – one control and three experimental, 72 heads in each. The first experimental group received the main diet with the addition of 2 kg of feed additive per 1 ton of feed, the second and third – 2.5 and 3 kg, respectively. LaurBak was not included in the diet of geese in the control group. Based on the results of the research, we came to the conclusion about the advisability of using this feed additive in order to improve the production and economic indicators of the goose breeding industry. The most optimal dose of the LaurBak feed additive to the basic diet of the parental herd of geese was revealed – 2.5 kg per 1 ton. The use of the additive in such a dosage contributed to an increase in the safety of the livestock, had a beneficial effect on the egg production of laying hens, improved the results of incubation of eggs and the reproductive qualities of ganders, increased economic efficiency by improving the productive and reproductive qualities of poultry. According to the results of the production check, in the 2nd experimental group, which received the LaurBak feed additive in the amount of 2.5 kg per 1 ton for the main diet, 411.35 thousand rubles were received from the sale of daily goslings, which is 86.26; 63.65 and 19.38 thousand rubles more compared to the control, 1 and 3 experimental groups, respectively. In this group, the highest profit was received – 166.37 thousand rubles, and the level of profitability was 67.91%, which is 22.76 abs.% higher compared to the control.

Keywords: feed additive, LaurBak, geese, parent stock, incubation qualities

UDK 636.085.52:633.15

Influence of biopreservation of silage on the qualitative composition of milk

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Abstract. To determine the effectiveness of the use of the new biological starter "Kazbiosil", a scientific and economic experiment lasting 90 days was carried out. The studies were carried out in the conditions of the laboratory of mass analyzes of the Kazakh Research Institute of Animal Husbandry and Forage Production and in the peasant economy «Balka» of the Beskaragai district of the East Kazakhstan region. The biological preservative is a dry powder from strains of lactic acid bacteria *Streptococcus lactis diastaticus* AK-41, *Lactobacillus pentoaceticum* A-25 and propionic acid bacteria – *Propionibacterium shermanii* C-8. Preparation titer: 2x10⁹. Feeding to

lactating cows as part of the feed ration of corn silage with the introduction of the biological starter culture "Kazbiosil" contributed to an increase in milk with a 4% fat content by 9.5% while reducing energy feed units, digestible protein, respectively, by 4.5 and 5.3%, compared to control. In cows of the experimental group, the coefficients of digestibility of dry matter increased by 1.7%, organic matter – by 2.8%, protein – by 1.3%, fat – by 1.0%, fiber – by 0.7%, nitrogen-free extractives – by 3.1%, relative to the control. When feeding experimental silage, the intensity of metabolic processes in the body of cows improved. Thus, the content of total protein increased by 2.7%, creatinine – by 4.2%, ALT – by 7.7%, AST – by 4.7%, calcium – by 4.0%, phosphorus – by 3, 5%, decrease in glucose – by 7.2%, urea – by 19.4%, bilirubin – by 6.4%, alkaline phosphatase – by 7.6%, cholesterol – by 6.2%. In lactating cows of both groups in the rumen fluid, 3 hours after feeding, there was an increase in the total amount of volatile fatty acids. This increase was more pronounced in the animals of the 2nd experimental group and amounted to 12.45 mEq/100 ml, or 18.6% more than in the control.

Keywords: silage, biological preservative, blood biochemistry, milk productivity, economic efficiency

UDK 637.54:636.598:636.085

Biological value and organoleptic evaluation of goose meat when using AA-50 feed additive in diets

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Abstract. The research was carried out in LLC "Gusevod Kuban" of the Din district of the Krasnodar Territory. The object of the study were goslings of the Lindov breed. The effect of different doses of the feed biologically active additive AA-50 on the biological value and organoleptic properties of goose meat was studied, for which four experimental groups were selected – 1 control (basic diet) and three experimental (2, 3, 4 groups), who received a feed additive to the main diet in doses of 30, 50 and 100 ml per 1 kg of compound feed, respectively. Studies were carried out to study the chemical composition of the pectoral and femoral muscles of experimental geese. It was found that the inclusion of AA-50 dietary supplements over 50 ml per 1 kg of compound feed does not change the protein content in the muscles, reduces the fat component and increases the content of ash substances. As a result of the tasting evaluation of the pectoral and femoral muscles, it was revealed that the inclusion of a dietary supplement in the diet of poultry in the amount of 50 ml leads to an improvement in the aroma, taste, tenderness and juiciness of meat. A similar trend can be traced in the organoleptic evaluation of broth cooked from the meat of experimental geese. The transparency and strength of the broth has an advantage in the group with the inclusion of a feed additive in the diet at a dose of 50 ml, compared with 30 and 100 ml. Studies have confirmed the effectiveness of the use and the dose of inclusion in the diet of geese of biologically active additive AA-50, containing macro- and microelements, organic acids, bioflavonoids, antioxidants and microorganisms of beneficial microflora.

Keywords: geese, feed additive, pectoral muscles, leg muscles, tasting evaluation, organoleptic evaluation

Breeding, Selection, Genetics and Biotechnology of Animals

UDK 636.2.034:636.084:636.061(574.1)

Features of growth and development of heifers in dairy farms of Western Kazakhstan

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Stepan D. Batanov, Olga S. Starostina**

Abstract. The article presents a comparative assessment of the growth and development of Holstein heifers up to 12 months of age and Simmental heifers up to 15 months of age. The studies were carried out in the peasant farms (KH) "Anisan" and "Esbol" of the Aktobe region of the Republic of Kazakhstan in 2021-2022. In both farms, the superiority of heifers grown according to the feeding scheme was established: colostrum – 7 days, milk – 30 days, from the beginning of the 2nd month – milk replacer + reverse, with the inclusion of mixed grass hay and crushed barley in the diet. According to the parameters of absolute growth and average daily gain in live weight, a more intensive growth of young animals, both Holstein and Simmental breeds, was revealed. For the entire period of cultivation, the heifers of the experimental group differed in the maximum average daily gain in live weight in the Anisan farm, in the Esbol farm – heifers of the 2nd experimental group. By the age of 12 months, the calves of the experimental group in terms of live weight exceeded the calves of the control group by 10.4 kg, reaching a value of 293.9 kg. By the age of 15 months, the average live weight of calves of the 2nd experimental group was 347.4 kg, which is higher than that of their peers of the 1st experimental and control groups by 20.6 and 28.6 kg, respectively. An analysis of the body proportions of the animals of the experimental groups indicates that, according to the body indexes characterizing the milk type, the heifers of the experimental group of the Anisan farm and the heifers of the 2nd experimental group of the Esbol farm also favorably differed.

Keywords: Holstein breed, Simmental breed, young animals, growth and development, average daily gain, absolute gain

Fisheries, Aquaculture and Industrial Fishing

UDK 574.5:581.526.325(470.64)

Ecology of phytoplankton in reservoirs Kabardino-Balkarian Republic

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Abstract. The number of microorganisms and the features of their vertical distribution serve as important microbiological characteristics of the bottom sediments of water bodies. In this work, an attempt was made to assess the effect on the species composition and abundance of phytoplankton, as well as the intensity of photosynthesis and the degree of accumulation of heavy metals in phytoplankton and in algologically pure cultures of *M. Crocystis sp.* and *Scenedesmus quadricauda*. The action of mineral fertilizers, delivering additional trophy to phytoplankton, and this contributes to its stronger development. The analysis of the effect of water salinity on the physiological state of phytoplankton at the beginning of the experiment, as well as on the process of organic matter synthesis, is evidenced by the results of studying the

intensity of photosynthesis. It was found that in *Aphanizomenon flos-aquae* and *Microcystis aeruginosa* in a medium with 50% turbid water, the intensity of photosynthesis during one day decreases by 1.6, and in a medium with 75% turbid water, by 3.6 times. With an increase in the concentration of sea water to 90 and 100%, the decrease in the intensity of photosynthesis stops, and its value remains constant. During the studies, an increase in water Salinity in the reservoir was noted on August 2, 2018, when the chloride content here reached almost 2.7‰. At the same time, the photosynthetic activity of algae, represented mainly by the species *Aphanizomenon flos-aquae*, *Gomphosphaeria naegeliana*, *Microcystis pulvereae*, and *M. aeruginosa*, decreased from 0.243 (July 23) to 0.120 (2.08) gC/m³·h 12.9 million to 22.9 million cells/l, respectively.

Keywords: ecology, phytoplankton, reservoirs, algae, microorganism

AGROENGINEERING AND FOOD TECHNOLOGIES

Technologies, Machines and Equipment for the Agro-industrial Complex

UDK 631.331.11

Study of the operating process of a device for sowing seeds in a scattered way

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Abstract. The article proposes a solution to the problem of providing farm animals with complete feed in the conditions of transhumance. It has been established that three methods of creating cultivated pastures are used in the North Caucasian region: based on the available natural and artificial grass stands through their surface improvement (carrying out cultural work, regulating the water-air regime of the soil, combating weeds and poisonous vegetation, overseeding grasses, fertilizing); radical improvement of natural fodder farmlands, i.e. creation of artificial cultural pastures; using for pasture crops of perennial grasses cultivated on heavily eroded sloping lands to reduce or eliminate erosion processes. Analysis of the research results of disc spreaders shows that they require further improvement. For this purpose, a device for sowing seeds in a scattered way with a disk working body is proposed, which allows you to automatically select the angle of inclination of the disk working body in accordance with the steepness of the treated slope, which eliminates the need for its arrival on the mountain slope when performing the technological process for overseeding grasses and fertilizing. As a result, stable operation of the device is ensured without the risk of tipping over. When carrying out theoretical studies of the process of operation of the proposed disk working body, the sliding of the seed over the surface of the ejector was neglected (considering the speed of the seed to be small compared to the peripheral speed of the point on the surface of the ejector with which the seed is in contact, or equal to zero). Theoretical dependences are obtained, which allow to calculate the trajectory of the seed movement, taking into account gravity and air resistance. Rational parameters of device are established: peripheral speed of the sowing disc 13.1 m/s; device movement speed 2.9 m/s; the height of the sowing disc is 0.332 m. With these values, the seeding rate is within the limits of agrotechnical requirements and amounts to 4 million units/ha.

Keywords: fodder production, pastures, vegetation, seeds, sowing, norm, trajectory, device, modeling, parameters

Removal of weed seeds when harvesting grain crops with a combine harvester with conveyor cleaning

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Gumar Alamakhadovich Bekarov, Aliy Khalisovich Gabaev**

Abstract. The article discusses one of the features of the conveyor cleaning of a combine harvester, which makes it possible to deal with the spread of weeds in an environmentally friendly way when harvesting cereal crops. In view of the fact that modern combine construction is focused on the production of harvesters without hoists, and straw and chaff are scattered across the field, along with weed seeds contained in this mass, creating a problem of weed infestation of fields for future years. To solve this problem, a promising, in our opinion, conveyor cleaning is proposed, which basically does not emit weed seeds when cleaning a grain heap and, as field tests of a combine equipped with conveyor cleaning showed, most of them entering the cleaning remain in the bunker heap. And subsequently stand out during stationary cleaning of grain at the grain cleaning station. The removal of weed seeds from the field is important from an environmental point of view, as it reduces the infestation of the field with weeds in subsequent years and eliminates the need to use herbicides or other environmentally unfriendly means of control to destroy them. Tests of a grain harvester, on which a conveyor cleaning was mounted instead of a wind screen, showed that conveyor cleaning provides a cleanliness of the bunker heap of 87-97%. And in most experiments, this figure was at the level of 90-93%. It has been experimentally established that 40% by weight of the impurities remaining in the bunker heap after processing on the conveyor cleaning are weed seeds. And in general, conveyor cleaning allows you to remove from the harvested field 88.19% of weed seeds received for cleaning during harvesting. Thus, a harvester equipped with conveyor cleaning allows, along with its main task, to a large extent to solve a very important environmental problem.

Keywords: harvester, cleaning, heap, chaff, seeds, weeds, ecology, productivity, analysis, pesticides

Strength study of metal-quartz composite material

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Abstract. As a material for the manufacture of pistons, cast aluminum alloys are mainly used, and the liners are made of hardened steels. When they interact with the working surface of the piston, its intensive wear occurs. In addition, foreign impurities (contaminants) contained in the working fluid of hydraulic units affect the wear of the working surfaces of the piston and hydraulic cylinder sleeve. Once trapped in gaps between reciprocating parts, unfiltered solids can not only cause increased wear, but can also increase frictional forces. Due to the above factors, the hydraulic cylinder, after a certain duration of operation, goes into an inoperable state, since the gap in the "piston-sleeve" interface is sufficient for the oil to freely flow from one cavity of the hydraulic cylinder to another without creating the required pressure. Therefore, the development and creation of new materials that provide a significant increase in the operational

properties of parts and assemblies of machines and equipment is an urgent task. As a rule, agricultural machinery (tractors and machines) have a hydraulic system in which there are cylindrical pairs (sleeve, piston). The latter during operation fail "out of order" when less than one million work cycles are completed. In this regard, studies have been carried out to develop a metal-quartz composite material (MKCM) capable of becoming the working surface of hydraulic cylinder liners. To date, experimental samples of MKKM have been created, requiring their study (testing) for strength. For this purpose, a bench was developed for testing laboratory samples of MKKM for mechanical strength. As a result of the research, it was found that hydraulic cylinder liners with an inner working surface made of MKKM can withstand pressures up to 40 MPa. At the same time, there are no scratches, chips, etc. on its working surface, which usually lead to the carrying out from operation of the pair: cylinder – piston.

Keywords: stand, composite material, pressure, testing, hydraulic cylinders

UDK 629.3.017

Improving the reliability and durability of the brake systems of vehicles in the wheel hydraulic cylinder

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Abstract. During the operation of agricultural machinery, about 50% of its parts become inoperable with wear not exceeding 0.1 mm. A significant share in this volume is occupied by parts made of aluminum alloys, which have positive properties and, due to this, are widely used in agricultural engineering, but have low wear resistance and, accordingly, reliability and durability. To solve this problem, a metal-quartz composite material (MQCM) has been developed that can become promising in various fields of mechanical engineering, in particular, in the automotive and tractor industry. To improve the reliability and durability of the brake systems of vehicles in the wheel hydraulic cylinder, it is recommended to use MQCM as a working surface. A stand for simulation tests of the brake system of a vehicle with MQCM was developed and manufactured. Relevant tests have shown the performance of the innovative hydraulic cylinder with MKKM. A hydraulic cylinder made of a metal-quartz composite material was installed as a brake cylinder in an automobile wheel. The latter accelerated to 920 rpm, which approximately corresponded to 100 km/h of forward movement of the vehicle. The braking of the wheel was carried out in full accordance with the real conditions. At the same time, the pressure in the brake system reached 15 MPa. The braking time of the wheel on the stand practically coincided with the corresponding period of time, which is typical for the vehicle at a certain speed of its movement (1.5-2.5 s), each measurement was done three times. Studies have shown that the developed MQCM can be used in the manufacture of hydraulic cylinders for the brake system of tractors and cars. Taking into account the properties of MQCM, it is possible to predict a significant increase in the reliability and durability of wheel hydraulic cylinders up to 1 billion operating cycles.

Keywords: stand, hydraulic cylinder, brake system, simulation, reliability and durability

Investigation of the temperature homogeneity of the stirred medium in a biogas-humus plant

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Abstract. The article deals with the development of the production of biogas plants and ways to increase the yield of biogas and bioorganic fertilizers. It is potentially possible with anaerobic methane digestion of manure and other agricultural waste to obtain biogas, which will provide up to 20-25% of the need for gas fuel and valuable organic fertilizers with increased biological activity. Such processing of agricultural waste is the most effective environmental measure that ensures its deodorization, and reduces the pollution of soil, water resources and the atmosphere with pollutants and pathogenic flora. The processing of agricultural waste in biogas plants is a complex task that has not yet been fully resolved regarding the issues associated with plants of this type. World manufacturers of biogas plants are mainly focused on the silage mass as a part of the raw material laid in biogas plants. At the same time, livestock complexes, as a rule, do not have enough sown areas for growing energy crops with a large mass of plant waste. A technological scheme of a biogas-humus plant has been developed to ensure the uniformity of the temperature of the mixed medium in it for the needs of small farms, which includes: a methane tank, a gas tank, a mixing device, shut-off and control equipment. The theoretical temperature homogeneity of the mixed medium is achieved by combining the heat exchanger and the mixing device into one unit. It is shown that the theoretical temperature uniformity of the stirred medium is achieved by combining the heat exchanger and the mixing device into one unit, design and technological parameters characterizing the intensity of the forced movement of the fermented mass, with a change in thermal conductivity. Calculations have shown that the temperature uniformity of the medium mixed in the developed biogas plant is 0.98, which corresponds to its technologically acceptable values.

Keywords: biotechnology, non-traditional energy sources, biogas plant, digester, temperature uniformity, heat transfer coefficient, mixing, agricultural waste processing.

Energy intensity of the process of shredding cut branches of fruit trees with a two-roll rotary shredder

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Abstract. An important agrotechnical technique for caring for perennial fruit plantations is tree pruning, the cost of which is 22-24% of all labor costs for fruit production. Depending on the design of plantations and their age, the volume of pruned branches is 3-20 t/ha. Such waste requires the implementation of technological operations for their disposal. At present, the agricultural machinery market offers agricultural producers a wide range of machines for picking up and chopping cut branches of fruit trees, which have various design and technological differences. However, their main disadvantage is the high energy intensity of the process of grinding cut branches of fruit trees. In this regard, an urgent task is to develop and study the design of a pick-up-chopper, which allows picking up and chopping cut branches of fruit trees

with minimal energy consumption. The purpose of the work is to determine the energy intensity of chopping cut branches of fruit trees with a rotary two-roll grinder. The studies were carried out using the methods of physical and mathematical modeling and the theory of mathematical planning of the experiment. Analytical dependencies for calculating the drive power of the grinding device are obtained. An experimental laboratory setup has been developed. A regression equation has been obtained and dependences of the power necessary for grinding the cut branches of fruit trees on the design parameters of a two-roll rotary grinder have been constructed. It has been established that the minimum power (6.5 kW) spent on chopping the cut branches of fruit trees is provided with the following parameters of a two-roll rotary grinder: branches feed rate 1.4 m/s; circumferential speed of the cutting edge of the knife 11 m/s; the gap between the cutting edge of the knife and the shaft of the opposite rotor is 0.003 m, with an hourly output of the pick-up-chopper equal to 0.8 ha/h. The energy intensity of the process of crushing cut branches of fruit trees is 8.13 kWh/ha.

Keywords: fruit trees, pruning, selection, grinding, two-roll rotary chopper, power, energy intensity

Food Systems

UDK 664.66:664.665

Development of the recipe of bakery products with the addition of cocoavella

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Abstract. Bread enriched with dietary fiber is a dietary and preventive product, but at present, the range of such products is not diverse. The purpose of this work is to develop a new recipe for bakery products with the introduction of cocoa shells, as well as to determine the optimal amount of the introduced component. The results of studies on the development of bakery products enriched with cocoa shell, a by-product of coffee production, which can be included in the diet for both a healthy diet and specialized diets necessary for serious diseases of the kidneys, liver and cardiovascular system, are presented. It was revealed that cocoa shell has a significant impact on the organoleptic and physico-chemical parameters of finished bakery products. It was found that when adding 3% cocoa shell, the shape of the bread remained correct, without cracks and undermining, and the crumb became baked, elastic, with developed porosity. A further increase in the amount of introduced raw materials up to 6% led to a deterioration in the appearance and crumb of pan bread. It was found that the specific volume of bread obtained with the addition of 3% cocoa shell increased by 3% compared to the control sample, with a further increase in the amount of cocoa shell to 6%, the specific volume begins to decrease. The porosity of the sample with the addition of 3% cocoa shell also increased by 4% relative to the control sample, but a subsequent increase in the amount of cocoashell to 6% worsens the porosity of the products by 1% relative to the control sample.

Keywords: cocoa shell, bakery products, dietary fiber, quality indicators

UDK 664.661

Practical application of activated water in wheat bread technology

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Abstract. Water is a necessary ingredient in the recipe of bakery products. Enterprises of the baking industry in Russia most often use water in the production of bread products without additional processing. It is known that the structure and chemical composition of water have a significant impact on the intensity of microbiological, biochemical, colloidal processes in the preparation of dough and the quality of finished products. Therefore, the development of water pretreatment methods is an urgent task to solve such industry problems as intensification of production, improvement of product quality, extension of shelf life and microbiological safety. In this regard, the purpose of the study was to provide practical justification for the improved technology of bakery products made of wheat flour using electroactivated water. The following were used as objects of research: fractions of electroactivated water (catholyte and anolyte); distilled water; drinking main water; semi-finished products (dough); ready-made bread samples. An accelerated method of testing was used with the introduction of 10% of whey during the kneading of the dough. It is shown that the introduction of whey stimulates the work of yeast cells and leads to a significant increase in the acidity of the dough. The effect of electroactivated water on the quality indicators of wheat bread has been established. According to a set of qualitative indicators, a sample made using anolyte water was isolated. The technological scheme of bread production has been developed. The obtained results confirmed that the use of electroactivated water in wheat bread technology increases the safety of finished products and contributes to the production of environmentally friendly products.

Keywords: electroactivated water, technology, bread, quality indicators, microbiological indicators

UDK 664.66.022.39

Prospects for the inclusion of functional foods in the diet of military personnel as a factor in the adaptation of the organism to extreme conditions of service

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Abstract. The article analyzes the unfavorable factors that form the stereotypes of eating behavior, the amount of consumption of vitamins and minerals, commensurate with the optimal functioning of the body and physical performance. An analysis was made of the importance of including functional foods in the daily diet of persons belonging to the IV group of labor intensity (military personnel). The high content of amino acids, proteins, carbohydrates, minerals, vitamins and other biologically active substances in functional products justifies the expediency of their inclusion in the diet of military personnel whose activities are associated with extreme conditions of service. One of the available ways to optimize the diet is the use of powdered premixes to ensure uniform distribution of additives in a variety of products that have a loose consistency. The reliability of the obtained scientific results on the enrichment of daily diet products with vitamin-mineral complexes (for example, bakery products) is confirmed by experimental verification and clinical trials at the Clinic for Clinical Nutrition of the Federal State Budgetary Institution of Science "Federal Research Center for Nutrition and

Biotechnology". The use of a vitamin-mineral premix has a synergistic effect, since the presence of certain micronutrients enhances the action of others, which increases the effectiveness of fortified products compared to natural products containing vitamins and minerals.

Keywords: IV and V groups of labor intensity (military personnel and miners), functional product, vitamins, minerals, vitamin and mineral premix

ECONOMY

UDK 338.436.33:339.13

Mechanisms for analyzing the competitiveness of organizations

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Abstract. The article examines the mechanism for assessing the competitiveness of business entities, taking into account the internal and external environment. Competitiveness is defined as a catalyst for improving the qualitative characteristics of results production activities. The factors of formation of the strategy of organizations based on the impact of competitive advantages in conditions of risk and uncertainty are considered. The increase in competitiveness is directly related to the formation of stronger competitive positions on a long-term basis. Since this process is not for the short term, the relationship between the level of competitiveness of the subject and the formation of the strategy is clearly traced. A competitive advantage is defined as an element with a certain value, which gives it superiority over other competitors. The assessment of the internal and external side of the study object is proposed to be carried out from the point of view of strategic analysis as the basis for the development of a strategic development plan for the future. Taking this into account, the corresponding positioning matrices with the parameters "probability" and "impact" are presented with the definition of threats and opportunities at different levels, as well as SWOT schemes for analyzing the strengths and weaknesses of the functioning of subjects. The segments of the competitiveness study are evaluated from the point of view of the right, social, scientific and technological aspects, a certain role is assigned to the advertising industry.

Keywords: competitiveness, economic environment, agro-industrial complex, SWOT analysis, threat, opportunities

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Digitalization of agricultural formations of the region: current status, problems and prospects

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Abstract. The article discusses the current level of digitalization of the agricultural sector of the economy. As part of the survey of agricultural formations in the region, problems were defined and the main factors hindering the introduction of digital technologies were identified, in particular: lack of qualified personnel; deterioration of the technical and technological base of agricultural enterprises, insufficient development of information and communication technologies. It has been revealed that the transition to a digital economy will contribute to the competitiveness of agricultural formations and reduce production losses of organizations of the agro-industrial complex, and will also accelerate the automation of basic business processes. The business processes of agricultural producers depend on the completeness and reliability of data on the state

of the natural environment obtained from primary and secondary sources. The digitalization of agribusiness will optimize relations between enterprises for the production, processing and sale of agricultural products. The digitalization of the agro-industrial complex contributes to the integrated development of agricultural territories, including the concept of spatial development of Russia in the context of the formation of a digital economy. In this regard, Russian agricultural producers can be focused on a fragmented model of digitalization. The use of end-to-end technologies in the process of forming a mechanism for state regulation of digitalization of the agrarian sector of the economy in regional economic systems of various levels is proposed. The federal project "Digital Technologies and Projects" provides for the development of roadmaps for end-to-end technologies such as artificial intelligence, robotics, big data, a distributed registry system, quantum technologies, new production technologies, industrial Internet, wireless communications, virtual and augmented reality. At the same time, end-to-end technologies are defined as technologies that simultaneously cover several areas or industries, as well as changing the list of existing ones as new ones develop. A special place in the use of digital technologies in the country's agriculture is given to digital platforms and geographic information systems (GIS). The development of GIS technologies will provide agrarian territories with the integration of the results of processing large geospatial information flows, as well as an up-to-date database on assigning land plots to specific owners. All the collected information is necessary for the effective solution of the problems of the systemic development of rural areas and increasing the sustainability of agricultural production.

Keywords: agriculture, agro-industrial complex, digital economy, agricultural formations, information and communication technologies

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Ways to increase the efficiency of aquaculture production in the region

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Abstract. The article is analyzed the functioning problems of the fishery complex in KBR. It is proposed the mechanism for the formation of a new organizational structure; the elements and functional dependence of the organizations included in the RCC are investigated. Particular attention is paid to the implementation mechanism of the "Aquaculture Development" subprogram, the purpose of which is to ensure a stable growth in production of high-quality fish products based on the use of new high-tech Russian developments. The article also reveals promising areas for the development of aquaculture, including: the development of closed, industrial aquaculture systems; efficient use of natural food resources of water bodies through the cultivation of highly productive species of hydrobionts, including polyculture and integrated technologies; development of systems for interaction and implementation of scientific researches. The priority of the fish farming development is based on the biological characteristics of fish: the ability to grow rapidly, high reproduction, and the achievement of marketable condition within one season in comparison with other sub-sectors of animal husbandry. The article is also considered the efficiency of aquaculture production in order to improve it and the necessity of monitoring the assessment of the current state of the fisheries in republic in order to work out a program for its development. One of the main tasks for the successful development of the regional fishery complex of the KBR is to create an effective system for organizing the management of all parts of the RCC and its individual enterprises in the conditions of market relations. It is necessary to create an effective system of coordination and management for this purpose.

Keywords: aquaculture, fishery complex, fish products, integration and cooperation of business entities, development of aquaculture