AGRONOMY, FORESTY AND WATER MANAGEMENT

General Farming and Crop Production

UDK 633.15:631.8

The new liguid complex organomineral fertilizers′ influence on the size and quality of the corn crop

Nurbiy I. Mamsirov, Alim Yu. Kishev, Ali L. Bosiev, Dmitry A. Zhirov

Abstract. The study is devoted to increasing corn yields in Republic of Adygea, where crop instability (about 4 t/ha) is associated with a deficiency of mobile forms of nitrogen and phosphorus in the soil. The purpose of the work is to evaluate the effectiveness of liquid complex organomineral fertilizers to increase productivity and grain quality. Field experiments were conducted in 2022–2024 on leached medium loamy chernozems using a zoned variety of corn. The effect of five types of fertilizers (Polydon®) was studied. Bio, Nutrivant Plus, CompleMet, Waterfall, Ultramag Combo) at various humidity conditions. The results showed that the use of liquid complex organomineral fertilizers in combination with optimal hydration significantly increases biometric indicators: leaf area increased by 7–10%, plant height – up to 322 cm, and grain yield reached 8.98 t/ha (2023). The highest efficiency was observed when applying 120 kg/ha of nitrogen and phosphorus, which it provided a 15–24% increase in dry weight. In the dry years (2022), applying fertilizers without irrigation did not have a significant effect that confirms the importance of an integrated approach. The scientific novelty of the work is to study the effect of liquid complex organomineral fertilizers in leached chernozems. The practical value is the development of agrotechnical recommendations to stabilize yields at the level of 8–10 t/ha. The study demonstrates that optimizing mineral nutrition and moisture availability is a key factor in increasing corn productivity in the region.

Keywords: corn, yield, quality, liquid complex organomineral fertilizers, mobile phosphorus, easily hydrolyzable nitrogen

UDK 633.15:631.8(470.64)

The influence of complex innovative fertilizer Microvit Standard on the formation of corn crops in the foothill zone of Kabardino-Balkaria

Yuri M. Shogenov

Abstract. The aim of the research was to study the effect of the innovative integrated fertilizer Microvit Standard on the productivity of a corn hybrid in the foothill zone of Kabardino-Balkaria. The researchers were faced with the task of identifying the dose and timing of the application of the integrated fertilizer Microvit Standard for grain cultivation. It was established during the studies conducted in 2022–2024 that the doses and timing of application have an impact on the formation of the yield and quality of corn grain in the foothill zone of the Kabardino-Balkarian Republic. It was found that when treated with an innovative complex fertilizer, the maximum height of plants in the Standard micronation variants (1.0 l/ha) in phases 5 and 9 of leaves

+ $N_{30}P_{30}K_{30}$ is 226.2–227.8 cm, where the increase was 11.6–12.2%, and the height of the cob attachment increased to 68.7–69.2 cm, where the difference with the control it was 8.7–9.2 cm or 14.5–15.3%, the length of the cob increased to 20.6–20.8 cm, which is 14.4–15.9% higher than the control, as well as an increase in the number of grains in a row in the range of 31.1–32.3 pcs. or 3.1–4.3 pcs. and the number of grains in the cob increased from 428.8 pcs. up to 452 units, which is higher than the control by 35.8–60.0 units. or 9.4–15.3%. In the field experiment, the maximum yield was obtained in the Microvit Standard (1.0 l/ha) in the 9 leaf phase + $N_{30}P_{30}K_{30}$ – 69.7 c/ha, which is higher than the control by 24.3 c/ha or 53.6%. The lowest yield 4,54 c/ha was formed in the control variant without the use of Microvit Standard and mineral fertilizers.

Keywords: corn hybrid, ROSS 195 MV, complex fertilizer, Microvit Standard, mineral fertilizers, processing time, yield, grain

Land reclamation, water management and agrophysics

UDK 633.2.03:636.084.752(470.64)

Improving the efficiency of high-altitude pasture watering points in Kabardino-Balkarian Republic

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Abstract. The organization of pastures today plays a huge agricultural role for animals. This article discusses various watering points on pastures, depending on the terrain. The aim of the study is to increase the efficiency of using watering points in the high-altitude pastures of the Kabardino-Balkarian Republic. The main element of such a point is a watering trough, the parameters of which are determined by the need for economical consumption of materials, zootechnical and operational requirements. As for the profile, as practice shows, semi-circular watering troughs are the most efficient in operation. Field studies have shown that watering troughs are installed with a constant slope along their entire length in one direction. The utilization rate of their volume is very low. Thus, a trough made of asbestos-cement pipes sawn along with a nominal diameter of 500 mm and a length of 40 m with a bottom slope of i=0.005 is characterized by a volume utilization factor of 0.45. With a lower slope of the bottom, the troughs are poorly emptied after watering and quickly become polluted. In addition, precipitation is poorly discharged from them, which sometimes accumulates and freezes at subzero temperatures. The advantages of the developed watering point are a high utilization rate of the trough volume (0.92–0.96), simultaneous filling of the trough along the length, automatic and rapid discharge of water after the end of watering, a large slope of sections (i=0.01), providing conditions for sediment flushing by the flow of discharged water.

Keywords: watering station, atmospheric precipitation, terrain, operation, water supply pipelines, water spillway

ANIMAL SCIENCE AND VETERINARY MEDICINE

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

UDK 636.52/.58:636.082.4(470.57)

Feeding standards of sprouted barley grains to chickens of parent flocks of meat direction

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Abstract. The article examines the effect of feeding the main diet with the inclusion of sprouted barley grain on the productive and incubation qualities of poultry. When conducting research on chickens of the parent flock of the Ross 308 meat cross, we considered the following parameters: the live weight of chickens and roosters for 60 weeks, the safety of livestock, egg production for the initial laying hen, the yield of incubation eggs, as well as the percentage of young brood. Based on the results of the experiment, it was found that the experimental groups generally outperformed the control groups in terms of basic indicators, both at the beginning of the experiment and after a 60-week period. High safety values were observed throughout the study, and these values ranged from 92 to 93% in chickens, while 90% in roosters were at the same level. According to the results of the study, it was found that the optimal feeding of sprouted barley grain is in the evening for 20 g per head. The level of profitability when using sprouted barley grain exceeded the cost option on 31%.

Keywords: hens, roosters, cross "Ross 308", sprouted grain, live weight, egg production, incubation qualities

UDK 636.082.474

Effects of disinfection and cooling of wall ventilation panels of closed poultry houses on the productive qualities and resistance of broiler chickens

Astemir S. Duduev, Rustam Z. Abdulkhalikov

Abstract. In modern poultry farming, special attention is paid to creating optimal microclimate in poultry houses, which directly affects the productivity and health of livestock. The purpose of the study was to scientifically substantiate and develop an effective way to increase the productivity and natural resistance of Ross-308 broiler chickens using a disinfection and cooling system for wall ventilation panels in closed poultry houses. The research was carried out in the production conditions of Baksan Broiler Agrogroup LLC using two groups of 100 heads each – experimental and control.During the experiment, it was found that the use of this technology had a positive effect on growth rates, livestock safety and a reduction in feed costs. By the age of 37 days, the live weight of the broilers of the experimental group exceeded the weight of the control group by 5.39%, and feed costs decreased by 8.3%. The productivity index of the experimental group was 418 points, which is 58.7 units higher than that of the control birds. There was also a 4% increase in slaughter yield and a 3% increase in the proportion of carcasses of the first category.Hematological studies showed that all blood parameters were within the physiological norm. The chickens of the experimental group showed an increase in hemoglobin levels by 2.95%, bactericidal activity of blood serum by 3.73% and lysozyme activity by 1.79%,

which indicates an increase in nonspecific resistance of the organism.The results obtained confirm the expediency of introducing a disinfection and cooling system for wall ventilation panels in closed poultry houses to increase the efficiency of broiler meat production and improve the physiological condition of birds.

Keywords: broilers, productivity, resistance, microclimate of poultry houses, meat poultry farming

UDK 636.5.082

Calibration of incubation eggs by weight and growing of replacement quail in equal weight communities

Artyom K. Osmanyan, Amina A. Edilova, Viktor V. Malorodov

Abstract. In industrial quail farming, one of the key factors for the effective production of hatching eggs and daily quail is the creation of equal weight communities of the parent quail herd. Achieving a uniformity in live weight of the parent herd is possible by calibrating eggs and selectively forming a replacement quail obtained by incubation. The research was carried out on the basis of the "Zagorskoe EBF" All-Russian Scientific Research and Technological Institute of Poultry in 2024 in an incubator and a poultry house with cage batteries. In the experience 600 incubation eggs and 448 heads of quail were used. Before incubation, eggs were calibrated according to three weight categories, conditionally "Light", "Medium" and "Heavy". After hatching, the replacement quail were grown in individual communities according to the egg calibration. It was found that the brood of quail from eggs calibrated by weight is on average 12,5 percentage point higher, and the uniformity of daily quail by live weight is 8,0% higher compared with incubation of eggs without calibration. Under the created groups, uniformity the replacement quail by live weight, bred from eggs calibrated by weight, higher than their peers, bred from eggs uncalibrated on average 7,1%, including 8,6% females. An increase in the quantity of females was achieved by an average of 9,7 percentage point. The profitability of egg calibrated incubation has been increased by 8,3 percentage point, and the growing replacement quail by 12,9 percentage point.

Keywords: incubation of quail eggs, egg calibration by weight, replacement quail, equal weight community, uniformity of eggs by weight and quails by live weight, variability of egg weight and live weight of quails, economic efficiency

Breeding, Selection, Genetics and Biotechnology of Animals

UDK 636.2:636.082

A new method for differentiating lactating cows on their resistance to heat stress

Zaurbek M. Aisanov, Timur T. Tarchokov, Madina G. Tleynsheva

Abstract. The level of dairy productivity of cattle, in addition to genetic factors, is determined by the influence of paratypical factors, which include temperature and humidity parameters of the environment. High temperature and humidity in the summer, when animals are on pastures and

the microclimate cannot be artificially regulated, can cause heat stress in lactating cows, leading to a decrease in the daily milk yield. The purpose of the research was to test a new method proposed by the authors for differentiating lactating cows of dairy and dairy-meat breeds in terms of resistance to heat stress based on the value of IRHS (index of resistance to heat stress). The research was conducted at Dargan LLC in the Chereksky district of the Kabardino-Balkarian Republic in 2024–2025 on 254 brown Swiss cows. The authors have developed a special differentiation scale for lactating cows, according to which animals with a IRHS value of 4,9 or less are resistant to heat stress, moderately stable – from 5.0 to 9.9, unstable – 10,0 or more. Among the 254 cows studied by the authors, the proportion of animals of a stable, moderately stable and unstable type to heat stress was 42,1; 21,3 and 36,6%, respectively. A comparative analysis of productivity showed that stable type animals outperformed their peers of the type unstable to heat stress in milk yield for lactation by 7,3% (cows of the first calving), 9,1% (cows of the second calving) and 10,5% (cows of the third calving). In terms of milk fat yield, the superiority of stable type cows over heat-stress type animals was 7,6% (cows of the first calving), 8,6% (cows of the second calving) and 9,7% (cows of the third calving). In all cases of comparison, the found differences were statistically significant (p>0,95).

Keywords: brown Swiss breed, pasture period, dairy productivity of cows, temperature and humidity index, index of resistance to heat stress

AGROENGINEERING AND FOOD TECHNOLOGIES

Technologies, Machines and Equipment for the Agro-industrial Complex

UDK 631.331:001.891

Ways to improve the dynamic and technological characteristics of a machine-tractor unit on a slope

Kazbek D. Kudziev, Mukhtarbek A. Kubalov, Alan M. Aguzarov

Abstract. Agricultural machinery designed for mountain conditions must be universal, capable of operating on a slope and a plain. It is also necessary that mobile slope units be combined, if possible, and perform two or more technological processes. Modern agricultural units used on slopes are resistant to tipping over, however, if scientifically based rules for turning are not observed, an emergency situation often occurs at the ends of the run, and the unit tips over. This especially applies to wheeled tractor units. The above suggests that mobile slope units must have the property of sufficient maneuverability. The conducted analysis of the state of the problem under study showed that the quality of technological processes performed on slopes is decisively influenced by the shape and parameters of the relief, which disrupt the controllability and stability of the mobile unit along the horizontal slope. A dual-circuit automatic device has been developed to stabilize the direction of movement and improve the dynamic and technological characteristics of the machine-tractor unit when working on a slope. The device for stabilizing the direction of movement with a two-circuit angular correction is characterized by the presence of a systematic error at the level, the value of which increases with the steepness of the slope. Compensation for this error is possible with the periodic use of horizontal reference points every 20–30 m of the passage of the machine-tractor unit. As a result of the conducted studies, a significant influence of the field microrelief and soil variability on the stability of movement on the slope was established.

Keywords: slope, relief, soil, machine-tractor unit, technological process, directional stability, horizontal

UDK 631.312.024

Optimization of plowshare parameters with additional elements for soil crumbling

Vladimir S. Kurasov, Dmitry A. Dmitriev, Valery V. Tsybulevsky

Abstract. Moldboard plowing is an integral element of most technologies for cultivating field crops, as well as fruit plantations. Plowing is one of the most labor-intensive and energy-intensive operations. It takes up to 40% of the energy costs. Therefore, reducing fuel consumption during plowing is an urgent task. Based on the analysis of scientific and technical information and exploratory studies, we made the following assumption: installing additional working elements in the form of a tetrahedron on the blades of the plow body and skimmer should reduce the traction resistance of the plow, and accordingly, fuel consumption. The PNU-5-35 plow was modernized. To experimentally test this assumption, we made tetrahedrons – three for each share of the plow body and two for each skimmer. The tetrahedrons are located with a step that prevents clogging of soil and plant residues between them. It has been experimentally confirmed that installation of additional working elements in the form of tetrahedrons on the blades of the ploughshares of the plough body and coulters reduces fuel consumption. The lowest fuel consumption when ploughing to a depth of 23–25 cm by plowing units consisting of the T-150K tractor and the modernized PNU-5-35 plough is achieved at a unit speed of 7.4 km/h, a tetrahedron length of 0.094 m and a spacing of 0.123 m. Compared with the control (T-150K tractor and factory PNU-5-35 plough), the specific fuel consumption decreased by 3.4 l/ha and amounted to 36.2 l/ha. The area of rational parameters has been established, at which fuel consumption is less than 37 l/ha: the speed of the plowing unit is 6.4–8.3 km/h, the length of the tetrahedrons is 0.084–0.104 m, the step of the tetrahedron arrangement is 0.105–0.140 m.

Keywords: plowing, soil, plow, ploughshare, tetrahedron, fuel consumption

UDK 664.143.72

Optimization of the process of coating seeds: modeling and experimental verification

Artur M. Sokhrokov, Amur G. Fiapshev, Marat M. Khamokov, Lyuda Z. Shekikhacheva

Abstract. The article analyzes modern pelleting machines that operate on the basis of the technology of applying a protective and stimulating coating to seeds using the rolling method, their areas of operation, and systematizes key operational limitations. The areas of their operation are analyzed in detail and the key operational limitations are systematized. Based on the assessment, it was found that in the segment of the equipment under consideration, combined mixers-pellets equipped with a spiral mechanism demonstrate significant potential. Research of algorithms describing the formation of shells from bulk substrates revealed significant limitations of modern approaches. Firstly, most models require labor-intensive calibration using extensive experimental data. Secondly, their applicability is limited to processes where the

growth of granules (pellets) with seeds is due to the gradual layering of particles of small fractions of the filler, which excludes the description of systems with a fixed particle size distribution. Additional gaps include: ignoring the dynamics of material movement in the working area, underestimating the heterogeneity of the fractional composition, and failing to take into account accompanying effects (abrasive wear, thermal effects). The most adequate description of the kinetics of granule formation is demonstrated by stochastic methods, including probabilistic mechanisms of agglomeration. At the same time, the analysis of models of transportation of bulk components in drum units with a smooth inner surface made it possible to extrapolate these solutions to spiral devices – due to the decomposition of the spiral into a chain of successive cells simulating sections of a rotating drum. The development of a hybrid algorithm combining the kinetics of granule formation for drum and spiral systems is substantiated. The concept of "resource-consumer" is chosen as a basis, supplemented by a model for predicting shells for polydisperse systems. The main requirement is to take into account the variability of the sizes of "consumer" granules, which will reflect the dependence of the layer growth on the initial distribution of particles. To verify the approach, an experimental cycle was conducted: comparison of agglomeration in different types of devices, monitoring of granule morphology and statistical assessment of deviations of the model from real data. The solution of these problems will increase the accuracy of control of the pelleting process in industrial conditions.

Keywords: coating drum, seeds, shell formation, granulation, dragees, coating adhesion, stochastic methods, kinetics of granulation

UDK 635-134

Kinematic analysis of the sprayer drive mechanism

Ramazan M. Tavasiev, Arkady P. Dzitstsoev

Abstract. An integrated plant protection system plays a special role in preventing the negative impact of chemicals on plants and the environment. An integrated plant protection system is based on the maximum use of environmental factors that have a detrimental effect on pests or limit their survival. The main purpose of such systems is to apply a set of measures that limit the number of harmful organisms to some extent. An analysis of the state of the problem under study showed that the use of existing equipment is inappropriate or impossible. Thus, the creation of new technical means, in particular, a small-sized highly effective unit for the destruction of the Colorado potato beetle in peasant and farm households seems promising. When developing a sprayer, it is necessary to justify the pump drive parameters. The design of the sprayer hydraulic pump drive mechanism based on the MK-1 "Mole" motor cultivator is proposed. To justify the geometric parameters of the sprayer drive mechanism, its kinematic analysis was carried out, which made it possible to determine the dependence of the hydraulic pump piston position on the rotation angle of the mechanism eccentric. The dependence of the piston position on the rocker arm rotation angle and the geometric parameters of the mechanism is obtained. Based on the calculation results, a nomogram of the piston position dependence on the eccentric rotation angle is constructed. The nomogram allows you to select the optimal eccentricity value for the eccentric. The developed piston-type sprayer drive mechanism can be used to destroy the Colorado potato beetle in peasant (farming) households based on the MK-1 "Mole" motor cultivator.

Keywords: diagram, mechanism, roller, equation, parameters, eccentric, piston stroke

UDK 631.5

Increasing the efficiency of stone removal operations in cultivated fields of mountainous and foothill areas

Taimuraz A. Urtaev, Artur G. Kabaloev, Nikolai S. Dzhioev

Abstract. The efficiency of work in precision farming technologies, as well as in traditional crop cultivation technologies, often depends on the timely resolution of issues on reducing the impact of negative natural and climatic factors on the technical and operational indicators and agrotechnical quality of the performed technological operations. Negative factors affecting the quality of soil cultivation, plant care and harvesting of agricultural crops in mountain and foothill farming include heterogeneity in the physical and mechanical composition of the soil and contamination of areas of cultivated fields with stones. The proposed technology and research methodology can reduce labor and time costs for monitoring the stony content of fields. The inertial sensors, alternative to GPS communication using to determine coordinates can be used to provide an increase in the measurement frequency compared to GPS and cameras (SLIM technologies) up to 400 Hz and more, which is an order of magnitude higher than the video frame rate of 30 Hz. However, their use requires calculating the results in a fixed coordinate system with integration over time, during which measurement errors (drift) accumulates – the longer the measurement period, the greater the resulting error the next moment, so it is advisable to use GPS together with inertial sensors consummately.

Keywords: stony soil, cultural engineering, stone harvesting, stony research, field cleaning, tillage machines, field mapping

Food Systems

UDK 641.85

Innovative technological solutions in the development of functional desserts based on natural raw materials

Lyudmila G. Vlaschik, Anna V. Tarasenko, Viktor A. Turbin

Abstract. The aim of the work was to develop a technology for functional desserts based on natural berry raw materials, without addition of auxiliary substances that form the aroma and taste of the finished product. The objects of the research were red and white grapes and blueberries containing biologically active substances and ensuring the functionality of the finished product. The organoleptic and physicochemical indicators of the raw materials were determined, confirming their technological and functional properties. It has been established that these types of raw materials contain a significant amount of dietary fiber, which allows obtaining final dessert pectin-containing products. The possibility of using this raw material in the technology of desserts with a functional direction is confirmed by the high content of monomeric and polymeric forms of phenolic substances with antioxidant properties and P-vitamin activity. To develop the dessert technology, semi-finished products were obtained from grapes and blueberries. A study of their quality indicators berries confirmed their nutritional value. A dessert recipe with an increased content of natural plant biologically active substances has been developed. Organoleptic evaluation of the developed desserts has shown the possibility of using grape raw materials and blueberries in the form of puree for the production of jelly in preventive nutrition.

Keywords: grapes, blueberries, functional product, dessert, jelly, recipe, puree, biologically active substances

UDK 658.567.1

Problems and prospects of fruit and vegetable waste disposal technologies

Kirill I. Koptelov, Elena D. Goryacheva, Ksenia S. Kuznetsova

Abstract. Fruit and vegetable waste constitutes a significant share of the total food waste not only in Russia but also worldwide. Currently, the bulk of fruit and vegetable waste is excluded from circulation by burying it in landfills, which is not economically feasible and has a negative impact on the environment. The purpose of this study is to compare existing methods for excluding fruit and vegetable waste from economic circulation. The study found that two types of excluding fruit and vegetable waste from economic circulation are permitted in Russia: burying waste in landfills or recycling waste. Waste recycling includes four main options: recycling, regeneration, recovery, and use as a renewable energy source. Each method of waste recycling has its own advantages and disadvantages. When choosing a recycling option for fruit and vegetable waste, it is necessary to first assess the economic feasibility of processing a specific resource potential (amount of waste) and the consequences of the negative impact on the environment of the selected option. The results of the review can be used as material for further research to improve the technologies for recycling fruit and vegetable waste using new achievements in biotechnology and bioengineering.

Keywords: recycling, regeneration, recovery, resource potential, vegetable and fruit waste, retail

UDK 664.661

The effect of functional additives and shock freezing on bread quality indicators

Natalia V. Sokol, Nadezhda V. Keniz, Svetlana S. Matchak

Abstract. The quality and safety of food products directly depend on the raw material base, the chosen technology, compliance with the norms of the technological process of production and shelf life. Increasing the nutritional value and quality of manufactured products can be achieved through the introduction of functional additives of plant origin. A promising direction in the bakery industry is the technology of deferred baking, which allows flexible organization and management of the production process, to ensure a longer preservation of the freshness of products. In this regard, the purpose of this research was to study the effect of herbal additives and the use of shock freezing on the quality of bakery products made from frozen semi-baked semi-finished products. The authors substantiate the expediency of using herbal supplements from chia seeds, flax and amaranth oilcake. It has been established that the optimal dosage of a functional herbal supplement is 10% by weight of flour according to the recipe. To increase the time to preserve the freshness of bread, the possibility of using shock freezing of dough blanks with powder from chia seeds, flax seeds and amaranth cake was investigated. The blanks were baked at 180 °C for 20 minutes. Partially baked bread samples were subjected to shock freezing for 30 minutes to a temperature inside the products of minus 18 °C. The partially baked samples were stored in a refrigerator at a temperature of minus 18 °C for 14 days. The baking of bread from frozen semi-finished products was carried out in 3 stages. An assessment of the quality

of bread by organoleptic and physico-chemical parameters showed that the optimal option is to add 10% vegetable additives and apply shock freezing.

Keywords: functional additives, flax seeds, chia seeds, amaranth cake, shock freezing, delayed baking, bakery products

UDK 664.64:633.811

Formation of quality indicators of bakery products with the addition of dog violet (*Viola canina* L.) infusion

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Abstract. A modern trend of increasing the nutritional value of bakery products is the use of plant biologically active substances as additional recipe components. The aim of the research was to assess the possibility of using the above-ground part of *Viola canina* L. in the production of bakery products. The objectives of the study included clarifying the chemical composition of the above-ground part, developing a recipe for a bakery product (Stolichnaya bun) with improved quality characteristics using *V. canina* infusion. Raw materials were harvested during the period of mass flowering of plants (II-III decades of April 2023–2024) in the forest belt near Nalchik. According to chemical analysis, the extractive substances of the herb contain water-soluble polysaccharides (10.61%), pectin substances (1.66%), flavonoids (1.65%), vitamin C (109.71 mg%), carotenoids (6.4 mg%). When replacing water for kneading dough with infusion of *V. canina* flowers, a decrease in relative plasticity and an increase in relative elasticity, an improvement in the taste and smell of finished products, an increase in the dough proofing time by 5 minutes were noted compared to the control. Replacing water with infusion of *V. canina* herb helps to improve the rheological properties and organoleptic indicators of the Stolichnaya bun, and reduce the dough proofing time by 4 minutes compared to the control due to an increase in the fermentation activity of yeast cells. The increase in the nutritional value of buns with infusion of *V. canina* herb is due to the presence of pectin substances (0.42 g/100 g of product), carotenoids (1.6 mg/100 g), flavonoids (105 mg/100 g) in their composition. 100 g of a Stolichnaya bun with infusion of V. canina herb satisfies the physiological needs of an adult by 2.1; 13.3 and 32.6%, respectively. The obtained results are of practical and scientific interest in terms of expanding the use of *V. canina* in the production of functional bakery products.

Keywords: *Viola canina* L., bakery product, infusion, water-soluble polysaccharides, pectin substances, flavonoids, carotenoids, nutritional value

UDK 663.52

Changing the composition of the medium during pasteurization of wort for the preparation of yeast in alcohol production

Madina B. Khokonova, Dzhamilya R. Sozaeva, Inal Y. Begidov

Abstract. This work is devoted to determining changes in the amino acid composition of the alcohol wort medium before and after pasteurization, saccharified with malt and surface mold culture. The studies were conducted at Premium LLC and at the Department of Technology of Production and Processing of Agricultural Products of the Kabardino-Balkarian State Agrarian University in 2023–2024. The objects of the study were saccharified wort before and after pasteurization, mash,

wheat malt, and *Asp. Oryzae* culture. The study was carried out on corn wort, saccharified in the first variant with a mixture of malts (barley 35, oats 35, millet 30%); in the second one with a surface culture of *Aspergillus oryzae* mold. It was found that pasteurization of wort saccharified with various saccharifying agents has a somewhat greater effect on the environment where it was saccharified with a surface culture of *Aspergillus oryzae* mold. The corn wort saccharified in the first variant with a mixture of malts (barley 35, oats 35, millet 30%) was studied; in the second one with a surface culture of the mold *Aspergillus oryzae*. It was found that pasteurization of the wort saccharified with various saccharifying agents affects to a slightly greater extent the environment where the surface culture of the mold *Aspergillus oryzae* was saccharified. In this case, 26.5% of amino acids are lost during pasteurization, while in the wort saccharified with malt 14.2%. A tendency for the loss to increase is observed for all six acids, with the exception of L-leucine, the content of which in the pasteurized wort saccharified by the mold fungus culture is also somewhat lower than in the pasteurized wort sample. It was determined that during pasteurization of the medium, its amino acid composition does not change significantly, but amino acids in the wort saccharified by the surface culture of the mold fungi *Aspergillus oryzae* are more exposed to temperature effects. The total content of amino acids in starch-containing media saccharified by malt and the surface culture of mold after pasteurization is relatively the same and is sufficient to provide amino nitrogen for yeast generation and fermentation.

Keywords: wort, amino acid composition of the medium, pasteurization, saccharification, alcohol yeast

UDK 635.657

Influence of container geometry on amino acid composition of chickpea protein during microwave treatment

Valentina N. Khramova, Dmitry I. Surkov

Abstract. Chickpeas are a rich source of nutrients that have not been widely used due to their specific bean flavor and anti–nutritional substances. This problem can be solved by heat treatment, including the use of microwave. The effectiveness of such treatment is influenced not only by the parameters of exposure to micro-wave radiation – the frequency of the magnetron, the output power, the duration, but also the geometry of the container. This article is devoted to the study of the influence of various geometric shapes of polypropylene containers on the mass fractions of moisture, protein and amino acid composition of chickpeas. For the study, we selected chickpeas of the Volzhanin-50 variety grown in the Volgograd region in 2023, some of which were treated with microwave radiation (400 W for 3 minutes) in containers shaped like a rectangular parallelepiped with a square base and a cylindrical shape. The mass fractions of moisture and protein, as well as the amino acid composition, were studied in the control (raw) and experimental (microwave-treated) chickpea seed samples. Microwave processing of chickpeas led to an approximately threefold reduction in moisture content, as well as a decrease in protein and total amino acid levels (by 28.7 and 24.6% in cylindrical containers, and by 21.6 and 18.6% in rectangular parallelepiped containers, respectively), while eliminating the undesirable beany flavor. The results of this study can be applied in the development of heat-resistant polypropylene packaging materials designed to enable efficient cooking of food products while preserving their nutritional value.

Keywords: chickpea, microwave radiation, microwave treatment, amino acid composition, geometry of container

ECONOMY

Regional and Sectoral Economy

UDK 338.436.33

Estimation of investment lag in the dynamics of agricultural production

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Abstract. Modern agriculture is highly capital intensive, which is due to many factors. One of the most significant aspects of this problem is the substitutability of production factors. The study of this issue involves considering several key areas. Firstly, the deterioration of the basic factors contributing to the development of agriculture is of great importance. This includes both a decrease in soil fertility and a reduction in the amount of new land put into operation. The situation is also complicated by unfavorable climatic conditions, an aging population in rural areas and a reduction in the influx of new labor. Secondly, there is an increase in competition in the agricultural market. Taken together, these factors require an increase in the volume of capital investment in various sectors of agriculture. However, an increase in the share of investment alone is not enough to ensure the necessary level of competitiveness. The key elements for achieving positive results are not only the quantity, but also the quality of capital investments, their regularity and synchronicity, which significantly depends on the structural organization of national agriculture both by industry and by region. In addition, it is worth emphasizing that the technical and technological complexity of modern agricultural production and the protracted value chain of production also contribute to the emergence of investment lag. This article proposes to clarify individual theoretical and methodological provisions related to investment lag in agriculture, as well as an analysis of empirical trends with subsequent interpretation of the data obtained.

Keywords: agriculture, investment, lag, investment intensity, investment return, gross output, growth, momentum, infrastructure