



INNOVATIONS

**BELARUSIAN STATE AGRICULTURAL
ACADEMY**



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Computer program ‘NPK-OPTIMIZER’ for precision farming systems

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Purpose of the innovation: computer program ‘NPK-optimizer’ is designed to calculate and optimize the application rate of NPK in precision farming systems.

Characteristics and application

Significant cost savings for NPK fertilizers (\$ 30–120 / ha) are obtained by determining the level of optimal yield and doses of NPK for each elementary section of a particular field. At the same time, the planned yields from this field are achieved. The program includes data for 39 field crops, including hayfields and pastures. The action and aftereffect of 15 types of organic fertilizer are taken into account. The input data also involved: the number of elementary sections, their areas, acidity, particle size distribution, depth and volume weight of the arable horizon, humus content, P₂O₅ and K₂O, predecessors, cost of 1 kg of active substance N, P and K, cost or cost price of 1 t of cultivated produce, planned yield and the planned percentage of NPK participation in the cost (cost price) of the produce. Any currency can be used.

Primary competitive advantages

1. The program performs the most accurate calculation of the number of NPK coming from soil stocks.
2. Shows in percentage and monetary terms the resulting conditional cost savings for NPK, as well as the yield increase (t / ha) due to optimization.
3. Allows you to select a crop for a particular field (taking into account variegated soil fertility), the cultivation of which will allow you to obtain the greatest cost savings for NPK, and also to determine the economic importance (in terms of money) of the predecessor and the organic fertilizers applied.
4. Allows you to determine the yield level for a particular field, which will combine the maximum use of natural soil fertility with minimum doses of mineral fertilizers.

Commercial offers: installation of the computer program in agricultural enterprises on a contractual basis.

Varieties of durum wheat

Winter durum wheat Slavitsa

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Purpose of innovation: macaroni and cereal production

Characteristics and application

The variety was created by the method of intraspecific hybridization with subsequent individual selection from a hybrid population (Novinka 4 × Odessaia chernokolosaia × Aisberg Odesskii).

A type of leucurum.



Middle-late. Plant height is 80-87 cm. It is resistant to lodging. Winter hardiness is 80-87%. The variety shows a high regenerative capacity in the spring to restore tillering shoots, is



characterized by a high tillering rate of 2.7–3.0 pieces.

Resistant to brown rust, powdery mildew, medium-resistant to ear septoria, weakly resistant to ear fusarium.

The average yield during 3 years of research was 6.47 t / ha, the highest yield in 2008 was 10.03 t / ha.

The weight of 1000 grains is 48–57 g, the vitreousness is 95–98 %, the content of crude protein is 14–16.3 %, gluten is 34-38%, the first group of quality. The nature of the grain is 798–810 g / l.

Macaroni properties: moisture – 12.4%, acidity – 2.9 deg., coefficient of increase in weight after cooking – 2.2, loss of dry solids during cooking – 5.7 %, smooth surface of macaroni, vitreous state of fracture, white color with light cream tint. The quality of macaroni is high.

It is included in the State Register of Varieties in 2015, it is allowed for cultivation in all regions of the Republic of Belarus.

Commercial offer: production and sale of seeds.

Spring durum wheat Rosaliia

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Purpose of innovation: macaroni and cereal production

Characteristics and application

The variety was created by physical mutagenesis of the NT-4 line with subsequent selection.

A type of hordeiforme. Mid-late, vegetation period is 94-97 days. Medium-resistant to lodging. The height of the plant is 96–105 cm.

The variety is resistant to brown rust, medium-resistant to septoria and fusariosis of ear, powdery mildew.

Forms a large ear with a length of 7–9 cm, the number of spikelets is 17–19 pieces.

The average yield during 3 years of research was 5.63 t / ha, the highest yield in 2008 was 6.87 t / ha.



The weight of 1000 grains is 48–56 g, the vitreous content is 92–97 %, the protein content is 14.8–16.2 %, gluten is 38–42 %, the first group of quality.



Macaroni properties: moisture – 12 %, acidity – 2.8 deg., coefficient of increase in weight after cooking – 2.2, loss of dry solids – 5.8%, surface – smooth, vitreous state of the fracture. It is included in the State Register of Varieties in 2015, it is allowed for cultivation in all regions of the

Republic of Belarus.

Commercial offer: production and sale of seeds.

Resource-saving technology of perennial grasses seeds production

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Purpose of innovation: production of seeds of perennial cereals and leguminous grasses with minimal costs.

Characteristics and application

The technology is based on the use of energy-saving measures in the system of seedling care and protection from weed vegetation. Optimization of the system of application of mineral fertilizers on the testes of perennial grasses.

The study of timing and methods of applying nitrogen fertilizers both in spring



vegetation period and in the phase of summer-autumn tillering of cereal grasses in order to stimulate the formation of vegetative short shoots in plants of the winter type of development. Application of growth regulators and microfertilizers on testes to increase plant resistance to diseases and adverse weather conditions. Determination of the height and timing of harvesting of grassland litter on the testes of perennial grasses. Determination of the optimal timing of perennial legumes testes cutting and of their care system.

Commercial offers: introduction in agricultural enterprises of resource-saving technologies for the production of seeds of perennial grasses on a contractual basis. The experience of introducing these technologies is available at the agricultural production cooperative 'Sozh-Agro' of the Mstislavsky District, where testes of 7 species of perennial cereal grasses have been developed according to this technology on an area of 162 hectares.

Determination of factors ensuring guaranteed obtaining of *Silphium perfoliatum* seeds with high seeding qualities

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Purpose of innovation: obtaining *Silphium perfoliatum* seeds with high seeding qualities.

Characteristics and application

Silphium perfoliatum is a new promising forage crop for the Republic of Belarus. It is well adapted to growing in different soil and climatic conditions, has high fodder qualities. As a result of the development of technology for cultivating the crop for green mass and seeds, it has been established that the productivity of both green mass, dry matter, and seeds of *Silphium perfoliatum* depends on the method of sowing, the density of planting and the doses of nitrogen fertilizers.



The highest yield of dry matter of 15.6 and 13.3 t / ha and of seeds from 0.32 to 0.36 t / ha is formed when plants are planted with seedlings according to the scheme 70×30 and 70×50 , respectively. When sown with seeds, the yield of dry matter was 17.3 and 19.1 t / ha and 0.27 t / ha of seeds. Application of increased doses of nitrogen fertilizers N_{90} and N_{120} in the second year of life of the crop ensured the yield of 0.36–0.37 t / ha of seeds. The weight of 1000 seeds was from 23.9 to 25.5 grams, germination energy was 48–59 %, and seed germination was 69–78 %.

Commercial offers: introduction in agricultural enterprises of the technology of cultivation of *Silphium perfoliatum* on a contractual basis.

Creation and rational use of pastures

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Purpose of innovation: assistance to specialists of agricultural enterprises in the creation and organization of pasture land use.

Characteristics and application

The recommendations for specialists and heads of agricultural enterprises thoroughly consider issues related to the creation and rational use of pastures: the importance of pastures, their creation, use, current care. Particular attention is paid to the rational use of pastures, as with their proper operation and maintenance, the productivity without irrigation reaches 4–5 thousand, and with irrigation – 7–8 thousand fodder units and more from 1 hectare. With pasture fodder, animals receive more than 60 % of fodder units and about 70 % of digestible protein from the total amount of feed consumed. Due to pasture, the annual need for feed is covered by 35–40 %.

Pasture grass has a high nutritional content and contains all the minerals and vitamins necessary for animals.

Recommendations for specialists and managers of agricultural enterprises are provided with background information on the compilation of mixtures, the norms of mineral and organic fertilizers used, the timing and methods of re-planting pasture grasses, and examples of pasture rotation.

Commercial offers: introduction of technology for creating and providing practical and consultative assistance in the creation and use of pastures in agricultural enterprises on a contractual basis.

The technology of cultivation of oil radish, white mustard and winter cress for seeds

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Purpose of innovation: development and improvement of the technology of cultivation of cruciferous field crops for obtaining seeds.

Characteristics and application

Selection of predecessors, justification of the norms and timing of sowing, doses, timing and forms of application of macro- and microfertilizers for oil radish, white mustard and winter cress to obtain high stable yields of seeds.

Commercial offers: scientific support of cultivation of cruciferous crops for seeds in the conditions of a farm, production of seeds.



Agrobiological estimation of mixed crops for the conditions of sward-podzolic soils in Belarus

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Purpose of innovation: the study of the influence of doses of nitrogen fertilizers, bacterial preparations, trace elements and growth regulators on the formation of yield and quality of grain of cereals (oats, spring wheat, barley, spring triticale) and leguminous plants (lupine, pea) in pure and mixed crops.

Characteristics and application

In mixed crops, the role of nitrogen nutrition and the influence of meteorological conditions are reduced in comparison with single-species crops.

In mixed agrophytocenoses of barley and peas, a more sustainable yield increase on all backgrounds of mineral nutrition ($N_{30}P_{60}K_{90}$ and $N_{60}P_{60}K_{90}$) was ensured by non-root treatment of crops with boron and molybdenum, which contributed to an additional harvest of 0.18 to 0.24 t / ha of grain. The maximum energy yield in research (1.97 units) was obtained in mixed crops of barley and pea with inoculation of seeds with rhizobacter and saponite against the background of $N_{30}P_{60}K_{90}$.



In mixed crops of spring wheat and lupine against the background of $N_{30}P_{60}K_{90}$ and inoculation of seeds before sowing with biopreparations (saponite, rhizobacterin + phytostimophos), there is high efficiency of microelements: copper, zinc, molybdenum, and boron, – the bioenergetic coefficient is 2.03, the payback of 1 kg of NPK is 20.9 kg of grain.

With resource-saving technologies for mixed planting on the background of 30 kg / ha of mineral nitrogen and inoculation of seeds with biological preparations, preference should be given to foliar feeding with molybdenum, since the content of digestible protein in 1 fodder unit is 102 g.

When cultivating lupine in a mixture with oats and spring wheat, total energy costs decrease in comparison with single-species oats crops by 0.9–2.1 %, wheat – by 2.9–5.4 %. Seed treatment with biopreparations (rhizobacterin and saponite) in crops of the studied crops allows reducing nitrogen doses by 30 kg / ha. In mixed crops (lupine + oats + spring wheat), compared with single-species cereal crops, total energy costs for the

production of 1 kg of crude protein decrease by 12.6–23.9 % in oat crops and by 6.3–14.0 % in wheat crops. For 1 fodder unit in mixed crops there is less energy expenditure compared to single-species oats and lupine crops by 6.1–14.3 and 10.5–22.9 %.

For the mixed crops of spring triticale and narrow-leaved lupine, the level of nitrogen nutrition of N_{30} and seed inoculation with a triple mix of preparations (saponite + rhizobacterin + phytostimophos) are energetically justified at a mixture components ratio of 50/50 and 65/35, since the energy release coefficient is 2.4 and 2.2, respectively. With a component ratio of 75/25, the level of nitrogen nutrition of N_{60} and seed inoculation before sowing, the energy release coefficient is 1.5.

Commercial offers: the results of research in the form of recommendations and regulatory materials approved by the Scientific and Technical Council of the Crop Production Section of the Main Directorate of Plant Production of the Ministry of Agriculture and Food of the Republic of Belarus can be used by the enterprises of the republic's agro-industrial complex and farms.

Development of the structure of meadow ecotypes on the basis of their phytocenosis compatibility for the formation of permanent hay and pasture grasslands on peat soils

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Purpose of innovation: development and implementation of resource-saving intensive technology for the formation of high yields of perennial pasture grasses on reclaimed anthropogenic soils, adapted for the specific conditions of the agricultural enterprise.

Characteristics and application: we have estimated the existing situation of production of grassy forages on meliorated peat bogs of an agricultural enterprise. A structure of meadow ecotypes is developed on the basis of their phytocenosis compatibility for the formation of long-term haymaking and pasture grasslands under various flood conditions. Modern intensive elements of the technology of production of coarse forage from perennial cereals and leguminous herbs of pasture direction are developed

and introduced into production (red fescue, meadow grass, meadow fennel, meadow fescue, meadow timothy, hybrid clover, white grass, etc.).

The most economically viable and nutritious are perennial herbs. Therefore, they should be given as fodder in plenty both in summer in the pasture, and in winter on stall maintenance (hay, haylage, silage of grass).

The cost of pasture feed is 30 % lower compared to feeding with green mass in feeders. The total costs for cultivating perennial grasses in crop rotation fields are 7–15 GJ / ha, which is 6–10 times less compared to tilled fodder crops.

Comparative analysis of bioenergetic efficiency of cultivation of various crops as the main objective economic indicator indicates that perennial grasses are the lowest-cost components of crop production. According to the yield and protein output, perennial herbs are superior to all the other forage crops. Intensive technology of cultivating perennial grasses is based on complete satisfaction of the plants' need for the regulated crop-forming factors of the environment: light, warmth, water, air, mineral nutrition.

Reclaimed plots that are wet or not suitable for cultivation of field crops in the spring or during intensive rains are used to create long-term meadow lands.

If we take into account that previously these lands were not used at all in economic circulation, this is a very advantageous method, since the liberated lands in the structure of crop rotation on mineral soils, where pastures used to be located, will allow them to be reoriented to other crops.

The placement of hayfields and pastures on different, according to the hydrological regime, types of soils, creation and use of a system of differently maturing grasses, and the observance of the appropriate fertilizer regime make it possible to obtain fodder with an exchange energy content of 9.5–10.5 MJ per kilogram of dry matter. The yield of green mass for all three cycles of grazing was 26 t / ha.

Commercial offers: introduction of technology providing practical and consultative assistance in the creation and use of hayfields and pastures on reclaimed peat bogs and periodically flooded soil in agricultural enterprises on a contractual basis.

Optimization of the system of fertilization of winter wheat, barley, oats, clover and potatoes with the use of new forms of macro- and micro-fertilizers and growth regulators



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Purpose of innovation: improvement of the system of fertilization of cereals, potatoes and meadow clover using highly effective new forms of complex fertilizers, micro-fertilizers and growth regulators, complex preparations that allow reducing the costs of fertilizers and growth regulators, increasing the yield and quality of crops.

Characteristics and application

A rational, economically advantageous technology with the use of new forms of complex, micro-fertilizers and biologically active substances has been developed in the cultivation of winter wheat, barley, film and naked-grain oats, potatoes and clover.

According to the research results, new forms of complex fertilizers and micro-fertilizers, and complex preparations based on micro-fertilizers and growth regulators activate the photosynthetic activity of crops, increase the accumulation of biomass, which contributes to an increase in yields, protein content in cereal grains, starch in potato tubers, and positively influences also other indicators of crop produce quality. The proposed technology contributes to an increase in net income and profitability when using

chemicals.

Commercial offers: developed recommendations using the effective technology of application of new forms of complex, micro-fertilizers and growth regulators in the cultivation of winter wheat, barley, oats, potatoes and clover, approved by the board of the Committee on Agriculture of the Mogilev Regional Executive Committee, can be used by agricultural enterprises of the Mogilev region.

Technology of getting high yields of potatoes with the use of new forms of complex fertilizers

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Purpose of innovation: improvement of potato cultivation technology for getting yield of 450–500 t / ha of potato tubers with the use of new forms of complex fertilizers with microelements for basic application and non-root dressings to optimize plant nutrition.

Characteristics and application

With modern potato cultivation technologies, obtaining high and stable yields is possible with the integrated application of macro- and micro-fertilizers. One of the most common ways to use micro-fertilizers is foliar top dressing during the growing season. Foliar top dressing is the fastest way to eliminate nutrient deficiencies, and an additional source of nutrition, not replacing the main application of fertilizers.



As a result of research conducted in 2014–2016 on sward-podzolic light loamy soil with new forms of complex fertilizers and medium-early maturing potato variety Manifest, high efficiency of fertilizer system was established with the application of the main fertilizer in the form of standard fertilizers ($N_{120}P_{70}K_{130}$) and two-time foliar top dressing with a complex fertilizer Nutrivant Plus (potato) at a dose of 2.5 kg / ha in the phases of

‘closure of the leaves’ and ‘budding – the end of flowering’. The application of this fertilizer system helps to obtain the maximum yield of potatoes – 50.0 t / ha, increases the yield of tubers on the background ($N_{120}P_{70}K_{130}$) by 9.1 t / ha, with a payback of 76 kg of tubers per 1 kg of NPK, increases the starch content by 0.4 %, vitamin C – by 5.3 mg%, provides the maximum yield of starch (8.5 t / ha). Net income in this system of fertilizer application was 4973.46 rubles / ha with a profitability of 558%.

High economic efficiency was obtained with the use of liquid complex micro-fertilizer and growth regulator MicroStim B, Cu at a dose of 1.3 l / ha in the phase of budding for the potato variety Manifest. Application of the main fertilizer in the form of standard fertilizers ($N_{120}P_{70}K_{130}$) and non-root feeding of MicroStim B, Cu provides the yield of potato tubers of 44.4 t / ha, the payback of 59 kg of tubers per 1 kg of NPK, and the yield of starch of 7.4 t / ha. Net income in this system of fertilizer application amounted to 3,821.21 rubles / ha with a profitability of 548%.

Commercial offers: developed highly effective technology for obtaining high yield of potatoes can be used in agricultural enterprises of the Mogilev region.

Technology of obtaining 90-95 t / ha of green mass of meadow clover with the use of macro- and micro-fertilizers and plant growth regulators

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Purpose of innovation: improving the technology of cultivation of meadow clover for getting a yield of green mass of 90-95 t / ha with the use of macro- and micro-fertilizers and growth regulators to optimize plant nutrition.

Characteristics and application

Currently, in the forage production of the Republic, unresolved problem is the low protein content of feed. To solve this problem, it is necessary to expand the crops of perennial leguminous grasses. Of the perennial leguminous grasses, the largest sown areas in Belarus are covered by perennial clover species.

To obtain high yields of meadow clover, it is necessary to optimize the supply of not only the basic elements of nutrition, but also microelements. The use of growth regulators increases the resistance of plants to unfavorable growth conditions. Of great interest is the application of complex preparations based on microelements and growth regulators, the use of which allows reducing the influence of unfavorable growth conditions and obtaining more stable yields.

The treatment of meadow clover crops with a complex preparation based on the microelement of boron and growth regulator EleGum B on the background of top-dressing in spring by ammoniated superphosphate and potassium chloride in a dose of $N_{16}P_{60}K_{90}$ provided on average during 2012–2013 the yield of green mass of 90.3 t / ha in the sum of two cuttings, 14.66 t / ha of dry weight, dry matter content of 24.9 % crude protein, and the supply of a digestible protein of 151.7 g.

With application of complex micro-fertilizer and growth regulator MicroSil V, Cu in the spring in the top dressing, against the background of $N_{16}P_{60}K_{90}$, the yield of green mass of clover in the sum of two cuttings was 95.0 t / ha, dry weight – 20.28 t / ha, crude protein content – 24.9 %, the content of digestible protein in a fodder unit – 151.6 g.

Commercial offers: the developed highly effective technology for obtaining high yield of meadow clover with the use of macro- and micro-fertilizers and growth regulators can be used in the farms of the Mogilev region.

Biological justification of methods of reducing the rate of phyto-pathogens of the Fusarium species in cereal crops and the contamination of grain by mycotoxins

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Purpose of innovation: the study of contribution of various factors to the level of infection of plants with phyto-pathogens of the Fusarium species and the optimization of protection of cereal crops from fusarium infection.

Characteristics and application

The effectiveness of various schemes of complex protection of cereals from fusarium infection has been studied.



Commercial offers: research results can be used to optimize the protection of grain crops from fusarium infection in agricultural enterprises of the Republic of Belarus.

Development and introduction of the elements of adaptive technology of cultivation and protection of uncommon crops

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Purpose of innovation: the study, improvement and implementation of elements of adaptive technology for cultivating and protecting new, promising and less widespread crops (soybeans, beans, fodder beans, vegetable crops, phacelia and many others).

Characteristics and application

The influence of a number of disinfectants, herbicides, fungicides, growth regulators and certain methods of adaptive cultivation technology on the growth, development and productivity of little-spread crops has been studied.

Commercial offers: developed elements of cultivation and protection are recommended for introduction into production in the conditions of agricultural enterprises of the northeast of Belarus.



Development and introduction of soy cultivation technology

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Purpose of innovation: production testing of elements of adaptive technology of cultivation and protection of soy.

Characteristics and application

Elements of adaptive soybean cultivation and protection technology have been developed. The introduced elements ensured a favorable phytosanitary situation in crops and guaranteed yield of soybean grain under adverse weather conditions. With a grain yield of 1.5-2.0 t / ha, a high economic effect is achieved.



Commercial offers: developed elements of cultivation and protection are recommended for introduction into production in the conditions of agricultural enterprises of the northeast of Belarus.

Development and introduction of white mustard cultivation technology elements

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Purpose of innovation: production testing of elements of adaptive technology of cultivation and protection of white mustard.

Characteristics and application

We have developed a technology of cultivation of white mustard, ensuring a favorable phytosanitary situation for the growth and development of the crop and formation of highly-productive crops at the level of 2.0–3.0 t / ha.

Commercial offers: developed elements of cultivation and protection are recommended for introduction into production in the conditions of agricultural enterprises of the northeast of Belarus.

Veterinary preparation Gisterosan MC

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Purpose of innovation: the preparation is used to prevent and treat cows with endometritis of varying severity and etiology caused by a microflora that is sensitive to the preparation components.

Characteristics and application

The preparation is produced in glass vials with a capacity of 10 cm³, containing one dose (1.1 g), or two doses (2.2 g). One dose contains: norfloxacin nicotinate 550 mg, spectinomycin 210,000 IU and gentamicin 130,000 IU. Before use, the preparation is dissolved for injection in water, heated to 40–45 °C, at the rate of 50 ml per 1 dose; it is applied to the uterus of animals.

Clinical recovery requires from 2.8 ± 0.1 to 5.7 ± 4.9 injections of the drug into the uterus at intervals of 3-5 days, depending on the timing of treatment beginning, disease severity and the conditions of animals feeding and keeping. In milk, residual amounts of antibiotics are not detected. The main indicators of reproductive capacity of the recovered animals are close to the standard and exceed the indices of animals treated with imported preparations of endometrocus and metricurus.

TU BY 700189441.042-2014. State registration No. 042710 of December 10, 2014. The registration number of the catalog sheet is 53884. The instruction on the use of the preparation "Gisterosan MC" was approved by the Veterinary Biological Pharmaceutical Council on October 24, 2014.

It has been produced since 2015 by the Mogilev Plant of Veterinary Preparations.

Commercial offers: cooperation with agricultural and other organizations in the field of development and production testing of veterinary drugs and methods of treating obstetric and gynecological diseases of animals.

Veterinary preparation Fertilphil C

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Purpose of innovation: the preparation is used to treat and prevent subclinical endometritis and increase the fertility of cows with the syndrome of estrus recurrence, in the history of which there were diseases of the metritic complex, and also for inclusion in the bull semen diluent as an antimicrobial agent.

Characteristics and application

The preparation is produced in glass vials with a capacity of 10 cm³, containing one dose (0.375 g) or four doses (1.5 g). One dose contains: lincomycin hydrochloride 75 mg, spectinomycin 95,000 IU, tylosin 20,000 IU and gentamicin 73,000 IU.

Before application to cows, the drug is dissolved in water for injection at a rate of 25 ml per 1 dose and applied to the uterus 60 minutes before insemination. After the application, active ingredients are evenly distributed in uterus horns and prevent the negative influence of microorganisms on spermatozoa, improve the condition of environment in the uterus. When the preparation was applied to cows, up to 77.7 % and 50.0 % of the animals were fertilized in the third or fourth insemination correspondingly.

The drug is added to the diluent for bull semen in the amount of 4 doses per 1 liter after dissolution of all other components. When the preparation is included in the diluent, the growth of pathogenic microorganisms is

suppressed, and the quality of sperm increases. In melted after freezing sperm, in 72.7 % of samples, the growth of non-pathogenic microorganisms was not observed (in control – 0 %), and after incubation at 38 ° C for 5 hours, there were 22 ± 0.3% of mobile spermatozoa (in the control – 20 ± 0.3 %; P < 0.01).

TU BY 700189441.044-2014. State registration No. 042734 of 12/12/2014. The registration number of the catalog sheet is 53873. The instruction on the use of preparation "Fertiliphil C" was approved by the Veterinary Biological Pharmaceutical Council on October 24, 2014.

It has been produced since 2015 by the Mogilev Plant of Veterinary Preparations.

Commercial offers: cooperation with agricultural organizations and breeding enterprises in the field of rational use of the drug for increasing the fertilization of cows, improving the diluents and sperm diluting technology and improving sperm quality.

Veterinary preparation Fertiliphil S

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Innovation purpose: the drug is used to improve the reproductive qualities of sows, in the anamnesis of which there is long-term delivery and endometritis, vaginal discharge syndrome, estrus repetition after infertile insemination, and also for inclusion in the diluent of boar semen as a sanitizing substance.

Characteristics and application

The preparation is produced in glass vials with a capacity of 10 cm³, containing one dose (1.7 g). One dose of the drug contains: lincomycin hydrochloride 210 mg, spectinomycin 265,000 IU, neomycin 138,000 IU, gentamicin 206,000 IU, streptomycin 226,000 IU and benzylpenicillin sodium 300,000 units.

Before application to sows, the drug is dissolved in sterile water at the rate of 100 ml per 1 dose and applied to the uterus after pathological birth and the manifestation of vaginal discharge syndrome, or 3–4 hours before re-insemination. The preparation is added to the diluent for boar semen in the amount of 1 dose per 1 liter after the dissolution of all other components.

Application of the preparation to sows with obstetric pathology, or 3–4 hours before insemination during estrus recurrence, contributes to the target fertilization rate of 80–85 %.

When the drug is included in the diluent for sperm, the number of technological piglets is increased (by 5.9%) due to a decrease in the number of animals in the litter of which dead piglets are born, and an increase in the weight of litters and newborns.

TU BY 700189441.043-2014. State registration No. 42788 of December 17, 2014. The registration number of the catalog sheet is 53927. The instruction on the use of the preparation "Fertiliphil S" was approved by the Veterinary Biological Pharmaceutical Council on October 24, 2014.

It has been produced since 2015 by the Mogilev Plant of Veterinary Preparations.

Commercial offers: cooperation with pig-breeding enterprises and pedigree enterprises in the field of rational use of the drug for increasing the reproductive ability of sows, improving diluents and boars sperm diluting technology, as well as improving sperm quality.

Programme-mathematical optimization of recipes of feeding rations and pig breeding technology

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Innovation purpose: programme-mathematical optimization of recipes of feeding rations and pig breeding technology.

Characteristics and application

We have presented computer programs, the use of which allows developing optimal feeding rations for pigs, organizing mass production for a pig-breeding enterprise of any production volume.

A.V. Solianik Programmatic optimization of feeding rations and technology of pig rearing / A.V. Solianik, V.V. Solianik; Belarusian State Agricultural Academy. – Gorki: BSAA, 2007. – 160 p.

Commercial offers: for the Ministry of Agriculture and Food of the Republic of Belarus, its structural subdivisions of the regional and district levels, pig-breeding enterprises.

Development of programme-methodical complex for the support of specialists in realization of measures ensuring full and efficient feeding of dairy cattle

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Innovation purpose: to provide specialists in the field of feeding and fodder production with a single software to optimize the feeding rations, automate the calculation work for the analysis and planning of fodder base for a given productivity, and also maintain all the necessary documentation.

Characteristics and application

For the first time in the Republic of Belarus, with the help of information technologies, a unified program and methodical complex will be created that will allow automating the registration of feed consumption and the planning of fodder base on the basis of full and economically effective feeding rations for all production groups of livestock at milk production enterprises. Rations, mixtures, recipes of mixed fodders will be calculated using the original algorithm of multipurpose mathematical approximation, which provides the best possible combination of feeds and additives.

There is a computer program "Feeding Rations Constructor", developed by the scientific supervisor of the project, protected by the law on intellectual property (certificate No. 074 dated 09.04.2009 in the register of registered computer programs). This program will be the core of the program-methodical complex.

Commercial offers: implementation of the project in production will provide additional net profit of at least 650 rubles per conventional head of the main herd per year (depends on the initial intensity of production).

Increased resistance of the organism and growth energy of calves

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Innovation purpose: to increase natural resistance of calves and their growth intensity.

Characteristics and application

The use of various iodine-containing preparations (potassium iodide, iodomarin® 200, monclavite-1) in diets of dry cows promoted an increase in the level of organism resistance: bactericidal activity of blood serum by 0.5–3.0 percentage points, lysozyme activity of serum by 0.4–2.6 pp, phagocytic activity of leukocytes by 0.1–1.3 pp, significant increase in live weight of calves obtained from them by 2.3–4.3 %, increase in the growth rate of calves by 3.8–9.3 %; the receipt of additional profit per head was accordingly 32.3–79.4 thousand rubles. The most effective iodine-containing preparation in the diet of dry cows, which had the greatest impact on the productivity of the calves, is monclavite-1 at a dose of 1.45 ml per head – the additional profit per head is 79.4 thousand rubles (in 2012 prices).



Commercial offers: the development of effective methods for the use of iodine-containing drugs in dairy cattle breeding; scientific and practical advice on the creation and improvement of the system of application of iodine-containing drugs in agro-industrial enterprises.

Organizational-technological methods of milk quality management

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Innovation purpose: increasing the productivity of animals, improving the composition and properties of milk, increasing the level of sales of high-quality products.

Characteristics and application

We have developed and scientifically substantiated organizational and technological methods of milk quality management, consisting of grouping cows according to the number of somatic cells, using preliminary



forecasting of the level of production and quality of commodity products.

We have established that the concentration of somatic cells is closely related to the productivity of cows, the composition and properties of milk. With an increase in the

number of somatic cells, a significant decrease in milk production reaches 43.7 %, the content of fat in milk is 11.2–12.5 %. At the level of somatic cells in milk over 1.0 million / cm³, the total milk protein content increases by 6.1–18.0 %, lactose content steadily decreases by 5.7 % and 7.7 %.

Excess of 2.0 million / cm³ of somatic cells in milk leads to a decrease in its potassium content by 14.5 %, calcium – 10.45, phosphorus – 13.5, magnesium – 26.9, dry milk residue – 8.89, dry matter – 8.8 and an increase in the chlorine content – by 21.0, sodium – by 49.9 %. A high level of somatic cells in milk caused an increase in the freezing point by 0.06 °C, a decrease in density by 3.6° A, acidity by 1° T, thermal stability by 3.3°, duration of rennet clotting by 61.5 min, a decrease in the diameter of fat globules by 42.0 % and an increase in their number by 13.6 %. The increase in the content of somatic cells in milk from 71.09 thousand / cm³ to 2896.18 thousand / cm³ increases the number of microorganisms from 27.27 thousand / cm³ to 271.55 thousand / cm³. It has been proved that cows

grouping, taking into account the number of somatic cells in individual samples using preliminary forecasting of the level of production and quality of commercial products, allows increasing the specific weight of cows whose production meets the requirements of Belarusian standard to 89.3 %, reducing the number of animals whose milk does not meet the requirements of the standard by 21.8 %, reducing the level of somatic cells by 36.4 %, bacterial seeding by 50.6–61.2 %, and increasing the level of sales of the "extra" grade of milk to 85.9–90.6 %.

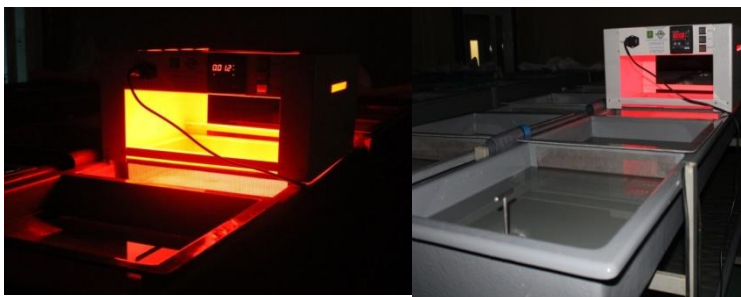
The economic efficiency of introducing in the production of organizational and technological methods for managing the quality of milk contributes to an increase in the average price of sales of products by 15.5 %, an increase in cash proceeds by 7.5 % and an additional profit of 1714.0 rubles, or 85.0 rubles per one cow annually on average.

Commercial offers: introduction into production of organizational and technological methods based on the systematic analysis of individual and group milk samples according to the content of somatic cells, fat, protein and other indicators. The methods include grouping cows according to the number of somatic cells using preliminary prediction of the level of production and quality of commodity products; scientific and practical advice on milk quality management at dairy farms and complexes, which makes it possible to reduce the number of animals whose products do not meet the requirements of Belarusian standard and increase the level of sales of high-quality products.

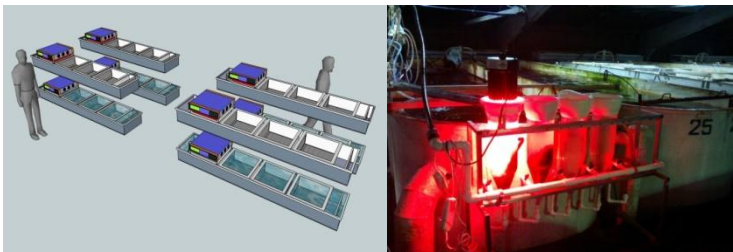
Laser-optical devices for incubation of caviar of valuable fish species

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Innovation purpose: it is used in the technology of artificial reproduction of fish in the conditions of aquaculture and fish farm.



Characteristics and application

Laser-optical devices are designed to improve the survival rate of fish planting material of valuable fish species (sturgeon, salmon, etc.) in the conditions of fish-breeding industrial complexes due to low-intensity optical radiation. Laser-optical instruments have a prolonged stimulating effect on the embryonic development of valuable fish species (sturgeon, salmon, etc.) with subsequent production of a viable fish-planting material.

Commercial offers: it is proposed to produce a laser-optical device for incubating rainbow trout caviar (Strong) and a laser-optical device for incubating caviar of sturgeon, catfish and carp fish (Sturgeon) on pre-order for hatcheries of fish-breeding organizations.

The system of formation of replacement-breeding school of sturgeon fish for obtaining food caviar

Author: N.V. Barulin, Candidate of agricultural sciences, Associate professor

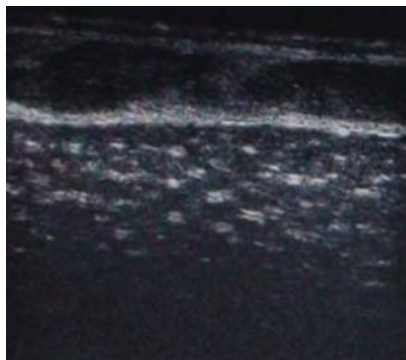
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Innovation purpose: it is used in the technology of artificial reproduction of fish in the conditions of aquaculture and fish farm.

Characteristics and application

The system of formation of replacement-breeding schools of sturgeon fish for obtaining black food caviar includes a set of biochemical, ultrasound and laser-optical methods for identifying fish at early stages of development with potentially high fertility for the purpose of selection into

the replacement-breeding caviar school. The proposed system makes it possible to significantly reduce the costs of maintenance of replacement-breeding school due to the culling of fish with low fertility.



Commercial offers: fish breeding organizations on a contractual basis are offered to carry out evaluation of sturgeon for selection into replacement-breeding caviar school of fish with potentially high fertility.

Cavity disperser for liquid fodder mixtures preparation

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Innovation purpose: cavity disperser is intended for the preparation of liquid feed mixtures on the basis of crushed canned grain, dry crushed grain, green mass and silage.

Characteristics and application

It performs mechanical grinding of the feed mix components, provides an improvement in the carbohydrate composition of the feed (an increase in the content of readily soluble carbohydrates by 2.7 times), allows increasing the average daily gain in the live weight of young pigs by 80 grams.



General view of cavity disperser

Technical specifications

Capacity:

for crushed grain, t/hour.....4.1–6.1;

for feed mixture, m³/hour.....8.5–10.4;

Energy intensity of processing

crushed grain, kWh/t.....10.3–14.4;

feed mixture, kWh/m³..... 3.9–4.9;

Installed capacity, kW45.

Principle of operation.

When the rotor 2 rotates (Fig. 1), its channels 8 are periodically connected and disconnected to the channels 7 of the stator 3, which creates

a discontinuous movement of the feed mix. At the moment of channel separation, the movement of the feed mixture in the stator channel slows down sharply, which leads to the formation of a negative pressure impulse causing cavitation. The mechanical treatment of the feed mix consists of grinding grain particles at the boundary of the channels of rotor and stator.

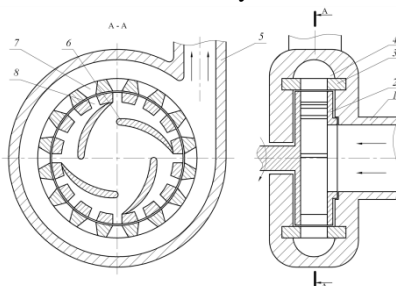


Fig. 1. Structurally-technological scheme of the disperser:
 1 – inlet nozzle; 2 – rotor; 3 – stator; 4 – working chamber of stator;
 5 – outlet nozzle; 6 – blades; 7 – stator channel; 8 – rotor channel

Commercial offers: the proposed device is recommended for production at agricultural machinery enterprises.

The cutting unit of multi-rotor mower with trapezoidal knives

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 e-mail: melmash2016@yandex.ru

Innovation purpose: it is intended for high-quality cutting of both thin-stemmed herbaceous and tree-shrub vegetation on reclaimed lands and grassland.

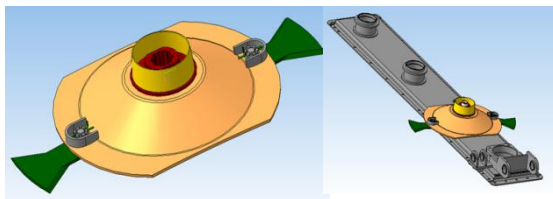


Fig. 1. General view of cutting device with trapezoidal knives

Characteristics and application

The construction of trapezoidal knives (Figure 2) is an elongated steel plate 1 with a hole for the bolt 2 for fastening to the rotor 4 at one of its ends and having sharpened lateral cutting edges 3 which are arranged radially, in addition, the knife is made to expand to the periphery, and the outer edge 5 is made along an arc of a circle with a center coinciding with the axis of rotation of the rotor 6.

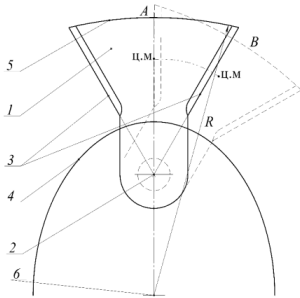


Fig. 2. The scheme of cutting device with trapezoidal knives:

- 1 – plate; 2 – bolt hole;
- 3 – cutting edges;
- 4 – rotor; 5 – frontal edge of knife;
- 6 – rotor rotation axis

Knives of this design, in comparison with rectangular knives, have a larger mass, the center of mass farther from the center of the bolt, which allows transferring a higher energy of knife action to vegetation stems and the expected increased efficiency due to the greater kinetic energy of the knives and stabilization of their position during vegetation cutting.

Technical specifications

Angle of sharpening of cutting edges of knives, deg.....	20
Angle of divergence of cutting edges of knives, deg.....	65
Diameter of rotor along the edges of knives, mm.....	610
Diameter of cut vegetation, mm.....	up to 45
Height of cutting, cm.....	7.6–7.9



Fig. 3. Multi-rotor mower, equipped with cutting device with trapezoidal knives

Commercial offers: the proposed device is recommended for production at agricultural machinery enterprises.

Device for preliminary liquid cleaning

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Innovation purpose: the device for preliminary liquid purification is designed for highly efficient separation of suspended particles and can be used for pre-treatment of industrial wastewater or aqueous process solutions before the hydrocyclone.

Characteristics and application

Fig. 1 shows a schematic diagram of the device. The liquid pre-cleaner works as follows.

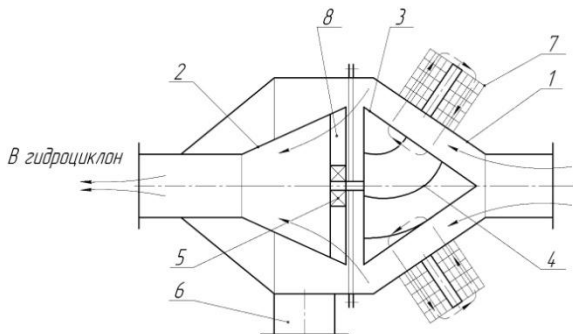


Fig. 1. Device for liquid pre-treatment:

- 1 – slurry separation chamber; 2 – conical nozzle; 3 – conical fairing;
- 4 – blades; 5 – bearing assembly; 6 – slurry nozzle;
- 7 – electromagnetic coils; 8 – conical nozzle windows

When the electromagnetic coils 7 are turned on, the conical fairing 3, which is a rotor, starts to rotate in the bearing assembly 5, the rotational speed of the rotor depending on the current in electromagnetic coils 7 and

can be adjusted. The liquid to be purified enters the slurry separation chamber 1 and crosses the magnetic lines of force passing through electromagnetic coils 7 and the conical fairing 3 to the blades 4 of the conical fairing 3. The magnetic treatment of liquid results in the coagulation of finely dispersed suspended particles. Due to the centrifugal forces arising during the rotation of conical fairing 3, the suspended particles are thrown onto the walls of the slurry separation chamber 1 and discharged through the slurry nozzle 6. The pre-cleaned liquid is discharged through the windows 8 in the conical nozzle 2.

The use of electromagnetic coils mounted on the body of slurry separation chamber and the conical fairing, which can rotate in the electromagnetic field created by electromagnetic coils, allows the creation of constant centrifugal forces independent of the pressure at the inlet to the slurry separation chamber, and also changing their magnitude by decreasing or increasing frequency of rotation of the conical fairing due to a change in the current in the electromagnetic coils, which increases the efficiency of separation of suspended particles.

The use of magnetic treatment of the liquid results in the coagulation of suspended particles, which additionally increases the efficiency of separation of suspended particles.

Commercial offers: the proposed device is recommended to be used at technical service enterprises.

Japanese millet cultivation technology in irrigation conditions

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Innovation purpose: increasing the productivity of Japanese millet to strengthen the feed base of livestock.

Characteristics and application

The technology of cultivation of Japanese millet in irrigation conditions includes irrigation norms developed on the basis of field research and minimal inter-irrigation intervals when sprinkling this crop depending on the calculated availability and irrigation norms, as well as the limits of optimal hydration against the background of mineral nutrition.

The calculation of the main elements of the design irrigation regime is based on the calculation of water balance and probability of adverse water events occurring in the conditions of irrigation reclamation. In the course of calculations, water consumption, irrigation rates and parameters of their supply curve, intra-seasonal distribution of irrigation rates and irrigation terms, and minimum duration of inter-irrigation intervals were determined.



Fig. 1. Experimental plots for the cultivation of Japanese millet

Irrigation norms and minimum inter-irrigation intervals for irrigation of Japanese millet on mineral soils of the northeastern zone of Belarus, depending on the calculated availability and irrigation norm, should have the following values: with an irrigation rate from $200 \text{ m}^3 / \text{ha}$ to $350 \text{ m}^3 / \text{ha}$ for a dry year (10 % availability), the irrigation rate should be – 259 mm, minimum inter-irrigation interval – 5 days; medium-arid (25 %) – 192 mm, 6 days; average (50 %) – 132 mm, 8 days; medium-moist (75 %) – 92 mm, 15 days, respectively.

Sprinkling of Japanese millet on sward-podzolic loamy soils of the northeastern zone of Belarus at the level of mineral nutrition $\text{N}_{90}\text{P}_{110}\text{K}_{150}$ and 3-harvest use provides an increase in the yield of dry matter in comparison with natural moistening at the lower thresholds of pre-irrigation moisture of 60 % of minimum moisture-holding capacity – 3.02 t / ha (28.4 %), with 70 % – 5.65 t / ha (53.1 %), with 80 % – 9.90 t / ha (93.0 %).

When growing crops for grain, the yield increments for the indicated limits of pre-irrigation humidity are as follows: for 60 % of minimum moisture-holding capacity – 0.30 t / ha (12.0 %), 70 % – 1.0 t / ha (40.0 %), 80 % – 1.61 t / ha (64.4 %).

Commercial offers: sprinkling technology provides a net income when using Japanese millet for haylage – 450 rubles / ha with a profitability of

68.2 %, and when it is cultivated for grain – 550 rubles / ha with a profitability of 78.6 %.

Sprinkler irrigation technology with hose sprinklers

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Innovation purpose: for use by specialists of agricultural and other enterprises engaged in irrigation of vegetable and forage crops, as well as fruit and berry plantations using hose sprinklers.

Characteristics and application

Sprinkler irrigation with hose sprinklers requires the following:

1. The values of permissible intensity of intermittent sprinkling on sward-podzolic loamy soils, depending on characteristic conditions, should be for the soil after pre-sowing treatment – 0.25–0.11 mm / min; at a plant cover height of 5-10 cm – 0.29-0.16 mm / min; at a plant cover height of 10–20 cm – 0.20–0.42 mm / min.

2. The erosion-permissible irrigation norms and the irrigation time providing irrigation without the formation of puddles and surface runoff on sward-podzolic loamy soil should be: for the soil after pre-sowing treatment – from 13 mm to 16 mm; at a plant cover height of 5–10 cm – from 19 mm to 29 mm; at a plant cover height of 10–20 cm – 30 mm. The time of irrigation before the formation of runoff is from 64 to 150 minutes.

3. For high-quality watering with a hose sprinkler, the wind speed should not exceed 3.3 m / s. At the same time, the effective irrigation coefficient corresponds to agrotechnical requirements of 0.70–0.80, the irrigation area is 3,116–4,160 m², the average intensity is 0.14-0.23 mm / min.

4. The most optimal biometric indicators of annual grasses during irrigation by hose sprinklers are: plant height not more than 40 cm, and the leaf area should not exceed 22.06 thousand m² / ha. With these biometric indicators, the loss of water for vegetation cover does not exceed the recommended values of 10%, which can be ensured with a 3-harvest use of the grasses.



Hose sprinkler UD-2500

Commercial offers: sprinkler irrigation technology with hose sprinklers helps to select the necessary sprinkling equipment for watering crops to meet environmental requirements. Therefore, it is proposed to use it in the educational process of high schools and colleges of an agricultural profile, as well as in agricultural enterprises cultivating various crops on irrigated mineral soils.

Method of application of lake sapropel deposits in water management construction

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Innovation purpose: reduction of filtration losses of water and protection of water resources from pollution by waste products of harmful industries.

Characteristics and application

In the proposed resource-saving technology for the construction of anti-filtration curtains (walls, barriers) by the "wall in the ground" method,

unlike the bentonite or local clays used, the use of natural deposits of lakes – sapropels – is proposed.

The use of local sapropels in the construction of anti-filtration curtains will dramatically reduce the filtration loss of water at the base of water-retaining structures, reliably protect water resources (rivers, lakes, water bodies, groundwater) from pollution by hazardous waste products, for example, in the construction of nuclear power plants, petrochemical plants, non-ferrous and ferrous metallurgy and other industries.

It is recommended to build the proposed curtains to a depth of 15 m.

The cost of building of 1 m² of the proposed anti-filtration curtains can be 60–80 % lower than traditional ones (cementation, clay-soil curtains, sheet pile walls, etc.).

It has been protected by a copyright certificate, developed, approved by the scientific-technical council, and recommendations for production have been issued.

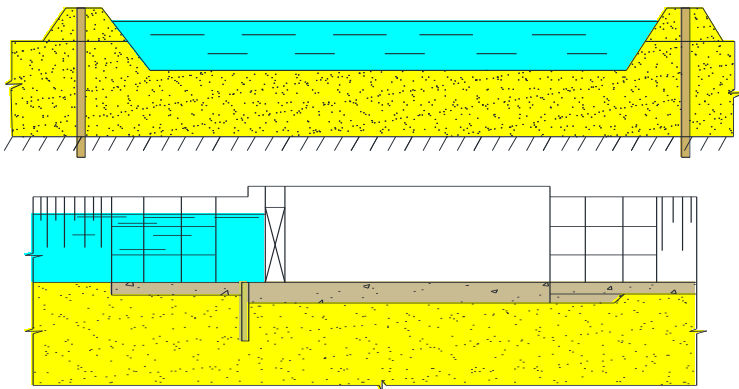


Fig. 1. Schemes of application of sapropel antifiltration curtains

Commercial offers: recommendations on the design and construction of land reclamation and water management facilities were developed and approved by the scientific-technical council. They are called "Application of anti-filtration curtains constructed using the 'wall in the ground' method with the use of sapropels". The innovation is designed for project and construction organizations of the water management industry, as well as for students in the course and diploma design of water-retaining structures in water management systems.

Features of GIS technology application in agricultural land production capacity evaluation

Authors: T.N. Myslyva, Doctor of agricultural sciences, Associate professor; P.V. Drugakov, Candidate of technical sciences, Associate professor

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Innovation purpose: improvement of cultivation technology and increase in the productivity of grain and forage crops

Characteristics and application

A methodology for creating plans for field sowing and field passports was developed using the capabilities of both proprietary and open source GIS. The technique allows you to create digital projects in which each field corresponds to a specific vector path that has a specific set of attributes stored in the geodatabase and available for editing.



A raster image of a part of the territory of Mogilev region, obtained by combining the RGB channels of satellite Landsat-8

Methods for remote monitoring of crop conditions based on the analysis of Landsat-8, MODIS and BelKA satellite imagery have been developed,

which allow obtaining prompt and objective information on the development of crops on large areas. Interpretation of the monitoring results is done by creating maps of the NDVI value – the normalized difference vegetation index. NDVI is a simple quantitative indicator of the amount of photosynthetically active biomass that allows you to quickly and qualitatively assess the quantitative characteristics of vegetation cover both in local areas and within the administrative area or region.

Commercial offers: application of the development results will allow you to plan effectively the volumes and terms of carrying out the work on the care of crops, in particular the application of mineral fertilizers, to forecast the yield of grain crops and to reduce the cost price of grain and feed production.

The main results of the study can be used by the Ministry of Agriculture and Food of the Republic of Belarus, the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, agricultural organizations of the republic, as well as in the educational process of universities and colleges in the training of land management personnel.

Development of an organization's business plan for the purpose of obtaining deferrals (installments) of debt repayment for the main debt on loans to finance state programs and activities in agro-industrial complex

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Innovation purpose: to develop an organization's business plan for the purpose of restructuring credit debt.

Characteristics and application

We have presented recommendations on the development of an organization's business plan for the purpose of obtaining a deferral (installment plan) for repayment of debt on the principal debt for loans provided for the financing of state programs and measures in the agro-industrial complex.

The recommendations were approved by the Board of the Committee on Agriculture and Food of the Mogilev Regional Executive Committee (Resolution No. 10-21 of March 4, 2016). Recommendations are intended

for managers and specialists of agricultural organizations, students of the faculty of professional skills upgrading, teachers and students of agricultural higher education institutions.

Commercial proposal: the developed recommendations can be used in practice by managers and specialists of agricultural organizations to develop a business plan for restructuring credit debt.

A set of methods for improving resource management in agro-industrial production

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Innovation purpose: a set of techniques allows you to increase the resource saving effect in the agroindustrial complex

Characteristics and application

A set of techniques for improving the management of resource-saving in agro-industrial production is outlined.

Commercial offer: for specialists and managers of agricultural enterprises, listeners of the system of advanced training, scientists, teachers, post-graduate students and students of higher educational institutions.

System analysis and modeling of the program of development of agrarian organizations

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Innovation purpose: a set of methods is proposed that allows for a systematic analysis and a reasoned justification of the program for the development of an agrarian organization with a view to maximizing the results of management.

Characteristics and application

A set of methods has been developed that ensures an increase in the efficiency of production and an increase in the competitiveness of both

products and the agrarian organization in optimizing the structure of production and rational use of resources based on the application of economic and mathematical modeling:

1. Methodology for assessing the effectiveness of the use of resources of agrarian organizations of the regional agro-industrial complex, based on the construction of econometric models, on the basis of which they calculate the efficiency of conversion of resources (land, labor and capital) into the average, marginal and average partial products, which allows quantifying the identified trends in the formation of indicators , substantiate the reasons for differentiation in the use of resources and determine the rational parameters of their payback.

2. The methodology for calculating the main indicators of agricultural production, based on an interrelated system of developed econometric models, based on the coordination of planned indicators in crop production and livestock farming, which allows substantiating the initial information of the economic-mathematical model.

3. Methodical recommendations for increasing the efficiency of production in agrarian organizations based on the application of an improved optimization economic and mathematical model, the solution of which allows you to justify a rational variant of resource use and propose an optimal program for the development of an agrarian organization.

Commercial offers: a set of methods can be used both for analyzing the work of an agrarian organization and identifying the reserves of production, and for short-term planning. It is intended for specialists and employees of planning departments, researchers, teachers, post-graduate students and students of higher agricultural educational institutions, students of the system of professional development.

Mechanism of formation of small and medium-sized agribusiness in new conditions

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Innovation purpose: we have proposed the main directions and methods of functioning of small and medium-sized agribusinesses in relation to market conditions in the agro-industrial complex of the Republic of Belarus, and improved the main parameters and conditions for the mechanism of state regulation and support of small and medium-sized agribusiness entities.

Characteristics and application

We have developed a methodology for identifying small and medium-sized agribusinesses based on the use of two criteria (the average number of employees for a calendar year and the average annual value of assets), which allows for more precise delineation and concretization of the activities of these economic entities. We have developed a model of organizational and economic mechanism of state support of small and medium-sized business entities of the agrarian sector of the economy consisting of 11 main elements. Each element of the mechanism is responsible for the specific direction of this policy and provides appropriate support. We have improved the mechanism of taxation of subjects of small and medium-sized agribusiness, based on the application of regressive tax rates, established on the basis of the growth of production and sales of products (works, services). Forms of organization of accounting for subjects of small agribusiness (simple, abbreviated), which allow you to optimally organize and maintain records in these organizations, have been improved. The forms of the financial statements have been improved: the balance sheet and the profit and loss account, as well as the technique for their compilation. We have suggested the methodology of current and long-term analysis of economic activity of small agribusiness entities.

Commercial offers: the use of developed techniques for the functioning of small and medium-sized agribusiness will contribute to increasing the volume and efficiency of agricultural production, the development of socio-economic relations in rural areas, the development and creation of rural

infrastructure, the implementation of food security program, raising the level of profitability and welfare of workers, which as a whole will lead to economic stability and development of the country.

Trends and prospects of development of technical service system in the agroindustrial complex

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Innovation purpose: we have suggested prospective directions of development of technical service as one of the basic directions of development of a market infrastructure in the agroindustrial complex of the Republic of Belarus.

Characteristics and application

A number of trends in the organization and development of technical services can now be identified throughout the world. Thus, there is a tendency of wide dissemination of high-quality technical service, which implies a set of measures ensuring at minimal costs: maximum reduction in losses arising from the operation of machinery due to technical reasons; maximum reliability of machines. In the world's best practices, the following strategic attitudes have emerged to ensure a high quality of service: considerable attention should be paid to preventive measures aimed at the greatest possible reduction in machine failures; timely proactive repair of aggregates of each machine should be carried out, until this repair is not laborious, is not complicated and does not require large expenditures of resources and long downtime of the machine; all actions for technical operation are expedient to be performed during the planned downtime of the machines and during off-hours; it is advisable to reduce the time as much as possible for each repair of the machine, and the time of its waiting. In connection with the complication of the design of machines there is a steady trend, in which the direct user of machines does not engage in service. This is done by dealers, trading companies, specialized service companies, rental and leasing companies.

Commercial offers: the use of foreign and domestic experience in organizing service maintenance of agricultural producers made it possible to determine the following main directions for improving it: the formation of a

market system for repair and maintenance, the optimization of the composition of dealer (technical) centers of manufacturing plants.

Evaluation of performance of butter market in the integrated structures of the dairy subcomplex of the AIC

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Innovation purpose: assessment of effectiveness of the functioning of butter market and development of theoretical and methodological provisions, as well as practical recommendations for the formation and dynamic

development of butter market.

Characteristics and application

We have substantiated a mechanism for improving the efficiency of the functioning of butter market. The essence of this is the systematization of the factors of efficiency of production and processing of milk fat in agricultural and processing spheres and the calculation of indices of the change in factors in the integrated production cycle system that allows taking into account the basic requirements of butter market, and also, on the basis of index analysis with the identification of qualitative parameters, identifying possible changes in factors, and determining reserves of growth of butter market performance.

We have suggested methodical recommendations on increasing the efficiency of functioning of butter market using elements of strategic analysis on the basis of which the typification of agricultural organizations was carried out, taking into account production potential and the efficiency of its use, which allows us to use the mechanism of increasing efficiency in full, while increasing the production of milk fat, based on the internal

potential of typical groups and conditions at markets of agricultural products and food.

Commercial offers: the results of research can be used in agricultural organizations and milk processing enterprises of the Republic of Belarus.

Organizational and economic justification of formation of public-private partnership in agribusiness

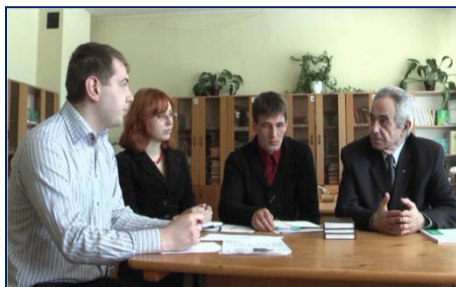
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Innovation purpose: increase of interest of managers, specialists and workers of agricultural organizations in the final results of economic activities.

Characteristics and application

The implementation of conceptual approaches is the basis for developing practical recommendations for enhancing the role of private labor ownership and creating conditions for effective management through the participation of employees in the organization's profits.



Commercial offers: provision of services for the development of projects for the organization of production structures on the basis of public-private partnership.

Ensuring sustainable economic development of rural territories on the basis of optimizing the use of wild resources and plantation growing of lingonberry

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Innovation purpose: increase of economic efficiency of using resources of wild berries, organization of plantation cultivation of berries of lingonberry plants.

Characteristics and application

The concept and the organizational and economic mechanism for the formation of a single market for wild and cultivated species of lingonberry plants have been developed on the basis of a cluster approach. Its



application is aimed at the rational use of natural potential of the regions, increasing employment, increasing budget revenues and, thus, ensuring the conditions for their sustainable economic development. Practical recommendations to the production have been published, in which issues of

economics and organization of harvesting berries of lingonberry plants are set forth on the example of Lepel district in Vitebsk region.

Commercial offers: the obtained research results can be used by scientists, managers and specialists of enterprises, organizations, farms that harvest and grow berries of lingonberry plants.

Development of a business plan for investment (innovation) project

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Innovation purpose: the business plan of an investment project is designed to justify the economic and social effectiveness of investment costs, attract investors and determine the terms of repayment of borrowed funds.

The business plan of an innovation project is drawn up with the acquisition (construction) of innovative facilities, equipment and technologies for the republic. It has a high degree of risk, a more complex system of calculations and assessment of the effectiveness of investment costs.

Characteristics and application

The business plan is compiled using a computer program developed by the author based on Exel. In addition to the tables provided for in the legislative acts of the Republic of Belarus in the field of business planning of investment projects, additional tables have been drawn up related to the specifics of agriculture. All the indicators in the tables are interrelated by formulas. Therefore, such a business plan is easily adjusted when prices and size of resources change.

The next distinctive feature of the business plan of an investment project developed by the author is the compulsory drawing up of tables for the investment (innovative) object with the purpose of determining the prime cost and profitability of innovative products, and not just the calculation of indicators as a whole for the organization without taking into account the project and taking into account the project.

The business plan of an investment project in an agricultural organization has an industry specificity that must be taken into account in the development, namely, the need to compile the balance sheets of crop production and livestock. For example, when building a dairy farm, not only the number of cows will change, but also the number of young animals, and the structure of sowing areas in the direction of increasing crops of fodder crops, and a number of other changes will occur.

The business plan includes the following sections: summary; characteristics of the organization and its development strategy; product description; marketing analysis and marketing strategy; production plan; organizational plan; investment plan, sources of financing; forecasting of financial and economic activity; project performance indicators; legal plan.

In the period 2014-2016, under the leadership and with the participation of L.I. Dulevich, dozens of business plans for innovative projects were developed, including projects-finalists and award winners of the 6th republican contest of innovative projects; Republican contest of youth projects “100 ideas for Belarus”; the international student contest “Business Idea”, held at the Vyatka State Agricultural Academy (Russia), and Inwest Weekend, held by the Mogilev Regional Committee of the NGO “Belarusian Republican Youth Union” and the Mogilev City Center for Small Business Development.

On a contractual basis, a business plan for an innovative project “Acquisition and installation of automatic machines for the reception of secondary (returnable) packagings (PET bottles and aluminum cans) from the public” was developed for the superadded liability company “Ecology” in Minsk.

Commercial offers: development of business plans for innovative projects.

The mechanism of formation and implementation of marketing strategy of a meat processing enterprise

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Innovation purpose: the mechanism of formation and implementation of the marketing strategy of a meat processing enterprise is designed to enhance the effectiveness of strategic management of the development of industry enterprises in market conditions.

Characteristics and application

The proposed modern mechanism for the formation and implementation of a meat-processing enterprise marketing strategy, in addition to the existing theoretical concepts and practical methods, contains methods of strategic market analysis adapted to domestic business conditions in the industry market, a model of the 10-component structure of marketing strategy, a methodology for determining the determinants of the marketing strategy, factors of the internal and external environment of a meat-processing plant, a strategic map with balanced system of indicators of a meat processing enterprise. The application of the proposed mechanism will make it possible to enhance the effectiveness of strategic management and marketing by identifying and accounting for specific market and industry characteristics in the methodology for strategic analysis of the meat market and meat products market and methods for studying the marketing environment of a meat-processing plant, structuring the components of marketing strategy, and using formal evaluations in the strategic control process.

Commercial offers: the mechanism can be used in a strategic planning system for the activities of meat processing enterprises.

