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МИНИСТЕРСТВО СЕЛЬСКОГО ХОЗЯЙСТВА ЧУВАШСКОЙ РЕСПУБЛИКИ
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ACTUAL ISSUES OF PRODUCTION AND PROCESSING OF AGRICULTURAL PRODUCTS

DEVELOPMENT OF TECHNOLOGY FOR THE PRODUCTION OF SULUGUNI CHEESE

Dr. Gennady Larionov, Natalia Mardaryeva, Nadezhda Schiptsova, Maya Terentyeva, Olesya Checheneshkina, Helena Yatrusheva, Raisa Ivanova
Department of Biotechnology and Agricultural Processing, Chuvash State Agrarian University, Cheboksary, Russia
larionovga@mail.ru

In the world, milk of cows is mainly used for the production of cheeses, therefore the relevance of the study of the cheese suitability of milk is high [G Larionov et al. 2020 Russian magazine. Problems of veterinary sanitation, hygiene and ecology 443]. In Russia, in 2020, the monthly production of cheese amounted to 43-44 thousand tons [G Larionov et al. 2020 IOP Conf. Series: Earth and Environmental Science. International AgroScience Conference (AgroScience-2020)]; [G Larionov et al. 2020 Dairy Bulletin p 149].

The work is aimed at studying the cheese suitability of milk and developing a technology for the production of cheeses with cheddarization and thermomechanical processing of cheese mass.

Research was carried out to determine the chemical composition and physicochemical properties of milk from cows at the Studencheskiy educational scientific production center by the ultrasonic method on the «Klever-2M» milk analyzer and on the «Nitron-pH» pH meter-thermometer. It was found that the milk of cows in terms of mass fraction of fat, protein, lactose, salts, dry skimmed milk residue, dry milk residue, active acidity, titratable acidity, freezing point meets the requirements of the interstate and national standards. The results of studies of the chemical composition of milk were used to normalize milk for the production of «Suluguni» cheese. The ratio of the mass fraction of protein and fat in the normalized mixture was 1.0: 1.19, which meets the requirements for the production of cheeses with cheddar and thermomechanical processing of cheese mass. For the production of cheese, the optimal modes of milk preparation in terms of temperature, time and pH were selected. We have developed a technology for the production of Suluguni cheese in the laboratory of the Chuvash State Agrarian University.

Keywords: milk, quality, safety, technology, processing, cheese, cheddarization, cheese mass, thermomechanical processing.

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INFLUENCE OF SILICON NANOPARTICLES ON THE MOLECULAR PROCESSES OF NITROGEN FIXATION OF LEGUMES

Dr. Olga Shplis,
Siberian State Medical University, Russia
o.shplis@yandex.ru
Dr. Natalia Kolomiez
Siberian State Medical University, Russia
borkol47@mail.ru
Dr. Natalia Abramez
Siberian State Medical University, Russia
abrameznu@mail.ru
Dr. Elena Deibova
Siberian Research Institute of Agriculture and Peat, Branch of the Siberian Federal Research Center, Russia
edaibova@yandex.ru
Dr. Natalia Karachieva
Siberian Research Institute of Agriculture and Peat, Branch of the Siberian Federal Research Center, Russia
kosovanatalia@yandex.ru

Abstract. As a result of the study, the influence of silicon nanoparticles and organosilicon particles on the ecological and biological features of legumes, the processes and sizes of symbiotic and associative nitrogen fixation, and the effect on the agroecological properties of soils in the subtaiga zone of Western Siberia were studied.

Acknowledgments It was found that pre-sowing treatment of legume seed material with silicon nanoparticles obtained by laser ablation in different concentrations of 0.3%; 0.15%;0.03% has a significant effect on the mechanism of lectin-carbohydrate interaction between plants and microorganisms, inhibiting it against the background of an increase in the taxonomic diversity of soil fungi. In turn, organosilicon particles obtained by mechanactivation of flax fiber significantly affected the increase in the activation of nitrogen fixation processes, the accumulation of legume lectin (enzymes, Nod-factors [1]).

Pre-sowing treatment of legume seed material with silicon had not only a significant impact on changes in the composition of the microbial community of the rhizosphere of plants, but also a significant impact on the physical and mechanical properties of soils, improving the mechanical, granulometric composition, reducing the content of heavy metals, contributing to increased soil fertility.

Keywords: silicon oxide nanoparticles, Lotus corniculatus L, Medicago sativa L, plant morphometric parameters, fertility, mechanical composition microbial community of the rhizosphere.

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INFLUENCE OF IMPROVED PROTECTION SCHEMES ON THE BIOCHEMICAL COMPONENTS OF MANDARIN FRUITS GROWN IN THE ABKHAZIA REPUBLIC

Dr. Liosik Ya. Ayba, Mr. Levan D. Kulava
Institute of Agriculture of the Abkhazian Academy of Sciences,
Abkhazia Republic
kivi_50@mail.ru
Dr. Natalia N. Karpun, Mr. Nikolaj A. Konnov, Dr. Oksana G. Belous
Federal Research Centre the Subtropical Scientific
Centre of the Russian Academy of Sciences, Russia
nkolem@mail.ru

Abstract. The studies were carried out on full-aged plantings of cv. Unshiu mandarin. The scheme includes 8 options and provides the 4 foliar treatments. Control – treatment with water without insecticides; technical processing (standard) - Bi-58 (0.2 %) + Preparation 30 Plus (3.0 %). The analysis of biochemical components (sugars and organic acids) in mandarin fruits was carried out. It has been shown that fruits with *technical processing* contain a greater amount of soluble carbohydrates, as well as on *option 3* (Confidor Extra (0.05 %) – the 1st treatment; Vermitek (0.1 %) - the 2nd treatment; in 3rd and 4th treatment with Karate Zeon (0.05 %); on *option 4* (Confidor Extra (0.05 %) + Siliplant (0.15 %) - the 1st treatment; Vertimek (0.1 %) + Siliplant (0.15 %) - the 2nd treatment; in 3rd and 4th treatment Karate Zeon (0.05 %) + Siliplant (0.15 %); on *option 6* (Metomax (0.15 %) + Vertimek (0.1 %) – the 1st treatment; Karate Zeon (0.05 %) + Vertimec (0.1 %) in the other three treatments) and on *option 8* (4 foliar treated with 6% diatomite). The predominant form of monosaccharides is fructose (17.78-17.85 g. l^{-1}, with 11.89 g. l^{-1} in the control) in the fruits from the technical processing and in *option 6*, which is preferable, since it has the greatest sweetness (173 units), providing a sweeter taste of the fruit. In addition, fructose is an antioxidant that extends the shelf life of foods, keeping them fresh. According to the content of organic acids, *options 6* and *8* were distinguished, the content of citric acid on which was 11.86 – 11.3 mg. l^{-1}. A more balanced taste of the fruit on *options 6*, *7* and *8* (SAI from 7.7 to 7.9 units). Taking into account the content of basic acids and sugars in mandarin fruits, it is possible to predict the effect of insecticides and their combinations on their basic taste properties.

Keywords: mandarin, pesticides, biochemical components

PRODUCTION OF COTTAGE CHEESE BY ACID-RENNET COAGULATION OF PROTEIN

Dr. Gennady Larionov, Olga Kayukova, Natalia Mardaryeva, Nadezhda Schiptsova, Maya Terentyeva, Olesya Checheneshkina, Helena Yatrusheva and Raisa Ivanova
Department of Biotechnology and Agricultural Processing,
Chuvash State Agrarian University, Cheboksary, Russia
larionovga@mail.ru

Cottage cheese can be attributed to products of everyday use for the majority of the population of Russia. Lactic acid bacteria in the curd mass normalize intestinal motility, this helps to improve the activity of the gastrointestinal tract. Cottage cheese in the diet reduces the risk of coronary heart disease, lowers cholesterol levels and strengthens blood vessels. Its systematic use increases hemoglobin and improves the functioning of the nervous system. The variety of substances in cottage cheese has a beneficial effect on pregnant women [*T N Kirilyuk, S A Motrich and O A Ogneva 2020 Colloquium-journal*].

In Russia, milk from cows is mainly used for the production of cottage cheese. The quality of cottage cheese depends on the quality of milk and the correct organization of the technological process [*A V Ganicheva and A V Ganichev 2020 Contemporary Science and Innovation*].

Cottage cheese is produced using starter microorganisms – lactococci or a mixture of lactococci and thermophilic lactic acid streptococci. For the production of cottage cheese, methods of acidic or acid-rennet coagulation of proteins are used, followed by the removal of whey by self-pressing and pressing.

The work is aimed at studying the quality of cow's milk supplied for the production of cottage cheese, formulation and optimization of the modes of technological operations for the production of cottage cheese by acid-rennet coagulation of protein.

It was found that the milk of cows in terms of physicochemical and microbiological indicators meets the requirements for the production of cottage cheese. The results of studies of the chemical composition of milk were used to normalize milk. We have selected the optimal modes of milk preparation by temperature. We have developed a technology for the production of cottage cheese in a research laboratory on the technology of milk and dairy products of the Chuvash State Agrarian University for use in farms.

Keywords: milk, quality, safety, technology, processing, cottage cheese, coagulation, protein, acid-rennet method.

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EFFECT OF BIOSIL ON PEACH YIELD AND CROP RESISTANCE TO MONILIOSIS

Ye.V. Mikhailova, N.N. Karpun
Federal Research Centre the Subtropical Scientific Centre of the Russian Academy of Sciences, Sochi, Russia
mixailovaozr@mail.ru

Peach cultivation on the Black Sea coast of the Caucasus is facing a serious threat of intensive development of moniliosis (Monilia cinerea Bonord). The disease causes significant damage to plantings, as a result of which the productivity and quality of the crop decreases. To combat a phytopathogen, the most effective method is considered to be chemical. However, repeated use of fungicides has a depressing effect on the environment [Ayba et al. 2020]

One of the ways to increase crop yield and its resistance to diseases is the use of growth regulators [Bardak et al. 2001]. This new environmentally friendly direction with the use of natural protective mechanisms is the most promising at the moment. The composition of plant growth regulators includes compounds with high physiological activity, which are capable of influencing plant growth and development in small doses [Tsybenov, Dabaeva 2010]. Determining the role of growth regulators in their effective use to increase fruiting and early maturity, as well as plant resistance to diseases, is of great practical importance.

Of considerable interest for practice is the use of a new generation plant growth regulator Biosil, obtained on the basis of triterpenic acids from Siberian fir needles [Raldugin et al. 1998].

The paper presents the results of applying Biosil on peach in order to increase the productivity of the culture and increase its resistance to moniliosis. The use of the growth regulator Biosil, can significantly increase the yield of the crop when used both in pure form and in a tank mixture with half the rates of fungicide consumption. The positive effect of the drug on peach resistance to moniliosis was noted. The results obtained during the experiment are comparable to those in the standard. Application of the growth regulator Biosil allows to reduce the consumption rate of fungicides by half, increases the yield of peach and its resistance to moniliosis.

Keywords: yield, Biosil, moniliosis.

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IMPACT OF NEW TECHNOLOGY FOR FEEDING MILKING CAMELS-DROMEDARS ON THEIR MILK PRODUCTIVITY

Dr. Asylbek Baimukanov[1], Dr. Vladimir Semenov[2], Dr. Nuradin Alibayev[1], Cand. Meirambek Ermakhanov[1], Mr. Galymzhan Abuov[1]
[1]South-West Research and Development Institute of Animal Breeding and Plant Growing, Shymkent
asylbek.baymukanov@gmail.com
[2]Chuvash State Agrarian University, Cheboksary
semenov_v.g@list.ru

In the Republic of Kazakhstan, productive camel farming is mainly developed due to the breeding of Kazakh baktrians. Under the conditions of the southern zone of the Republic of Kazakhstan, the number of dromedars producing milk with a fat content of more than 4% is increased [*Baimukanov D A 2019 News of NAS of the Republic of Kazakhstan: series of agricultural sciences 5*]. Camel uterus with appropriate selection technology, using effective maintenance and feeding technologies, are able to produce milk for a year [*Kaskous S 2018 Journal of Food and Agriculture 30*].

The purpose of the work is to determine the impact of the new technology for feeding milking camels-dromedars on their milk productivity.

To determine the effect of various feeding technology of milking camels-dromedars on their productivity, scientific and economic experiments were carried out, which were carried out on three experimental groups of milking camels-dromedars of 7 heads each, selected into groups according to the method of analogues by age, living weight and strength. Studies had shown that the milk productivity of experimental groups of milking camels had gradually increased since the beginning of the lactation period. Thus, the average daily milkness of camels of I, II and III experimental groups in April was 8.3, 8.9 and 9.5 kg, and by autumn (october month), respectively, 8.8, 10.0 and 10.6 kg. For 12 months of lactation period milk productivity of milking camels of control group, under domestic grazing conditions with feeding of 3 kg of wheat bran, amounted to 2995.3 l, with an average daily milking of 8.2 l. From the milking camels of the II experimental group received 3236,2 liters of milk with an average daily milking capacity of 8.8 liters, and the milking capacity of camels of the III experimental group was 3467,9 L, with an average daily dairy productivity of 9.5 L, or was greater compared to the control group by an average of 472,6 l (115.8%), and with the II experimental group – 240.9 (8.04%).

It was found that the average fat content of camel milk since spring (4.22%) by the summer-autumn season slightly increases (4.35%), and in general, the average fat content of camel milk of sucker camels-dromedars depending on the level of feeding on average is 4.22-4.39%.

Keywords: dromedars, camels, diet, milk productivity, fat, annual milk productivity.

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THE USE OF NATURAL FOOD ADDITIVE "VITGRASS" IN THE PRODUCTION OF WHEAT BREAD

Olesya Checheneshkina, Helena Yatrusheva, Gennady Larionov, Maya Terentyeva, Natalia Mardaryeva
Department of Biotechnology and Agricultural Processing, Chuvash State Agrarian University, Cheboksary, 428003, Russian Federation
checheneshkina1991@yandex.ru

In connection with the unbalanced nutrition of the population, insufficient consumption of dietary fiber, vitamins and minerals, an important task is to develop the production of functional, therapeutic and prophylactic products and products of increased nutritional value. The priority area is the production of bakery products enriched with natural food additives. The use of such additives allows not only to increase the nutritional and energy value of bakery products, but also to compensate for the lack of vitamins and minerals necessary for the body [1].

Currently, the direction of development of healthy food products based on sprouted cereals and their processing products is popular. Such products are rich in biologically active substances and contain functional ingredients: bran, deodorized wheat flour, wheat germ flakes, sprouted whole grains of wheat, rye, etc [2].

Our work presents the results of a test laboratory baking of wheat bread with the addition of a natural food additive "Vitgrass", which intensifies biotechnological processes in the dough during its fermentation and proofing, and also has a beneficial effect on the smell and taste of bread.

To carry out a test laboratory baking, a control sample (a unified recipe for wheat bread) and a prototype (a production recipe with the addition of a natural food additive "Vitgrass" in the amount of 2% to the flour mass) were formed. It was found that in appearance, smell, taste, the product meets the requirements.

The results of the test laboratory baking showed that bread with the addition of a natural food additive has a pleasant appearance of the correct rounded shape, without undermining, the crumb consistency was uniform, without traces of impurities, the smell and taste of the product with a pronounced smell of raw "pumpkin seeds".

Keywords: natural food additive, bread, organoleptic characteristics.

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TILLAGE SYSTEM IN IRRIGATED AGRICULTURAL PRODUCTION

A.V. Panfilov, V.G. Popov, E.G. Panfilova, E.N. Martynov, Yu.V. Larina,
Saratov State Agrarian University named after N.I. Vavilov, Saratov, Russia
uyo2Sur@yandex.ru

On irrigated lands, cultivation solves even broader tasks than in rainfed agriculture, arising from the very process of preparing the soil for irrigation and the influence of the latter on its water-physical, agrochemical and biological properties, fertility and weediness.

To implement highly productive and high-quality irrigation from the point of view of uniformity and the required degree of soil moisture, as well as to prevent deterioration of its meliorative state (salinization, waterlogging), it must have a well-planned and systematically leveled surface. When irrigating an unleveled surface, the soil is moistened unevenly - excessively in depressions and insufficiently in elevated places, which just leads to a deterioration in its meliorative state, a drop in fertility.

Leveling the soil means leveling its surface, giving it by cutting off elevated areas and backfilling lowered absolute horizontality (for irrigation of flooded checks) or a given uniform slope (for irrigation by overflow in strips, furrows, sprinklers). On a leveled surface, the topsoil is more evenly moistened and it is prepared earlier for cultivation and sowing. Watering saves water, reduces losses for filtration outside the root layer and for evaporation from the soil surface. The productivity and quality of agro-reclamation work increases, and the yield increases.

The intensification of irrigated agriculture imposes certain requirements on soil cultivation. The main cultivation usually includes stubble plowing and fall plowing. In some cases, plowing is replaced by deep loosening, flat-cut or even surface tillage. The most effective cultivation at different depths is carried out taking into account the soil and climatic conditions, environmental protection requirements, the type and period of harvesting of the predecessor, the type and degree of weediness of the field, phytosanitary conditions, residual moisture reserves and biological characteristics of the cultivated crop.

Intensification of soil cultivation provides for the widespread use of combined units of the RLR type (ripper-leveler-roller) of various modifications; VIP-5,6 with needle discs, leveler and roller; AKR-3,6 with active working bodies, etc. The system of the main and pre-sowing treatment is determined by many conditions and is constantly being improved depending on the goals set. There are alternatives including no-till and direct seeding on stubble-mulch. This technology most fully meets environmental requirements, is considered promising, but has not yet been developed.

Key words: tillage, irrigation, productivity, weediness, soil.

Abstract: the surface leveling of the soil, the features of the main and pre-sowing soil treatments are considered.

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FORECASTING TO PRODUCTIVITY HAZELNUT VARIETIES IN SYSTEM "WEATHER-HARVEST-GROUND" OF THE HUMID SUBTROPICS OF RUSSIA

Sci. (Agric.) Tina D. Besedina, PhD (Agric.) Tsiala V. Tutberidze,
PhD (Biol.) Natalya S. Kiseleva,
Federal Research Center, Subtropical Scientific Center of the Russian Academy of Sciences, Russia
supk@vniisubtrop.ru

In condition of the general deficit moisture the heats, reductions of the soil fertility and period to market transformation especial importance has differentiated use natural, biological and technological resource.

Krasnodar region - one of large in Russia territory on production fruit-berry product, but on Chernomorsk seaside – an nut-fruits, subtropical and berry patch. The Existing facilities of the population form the varied structure of the plantings: 29%-seed-bearing fruits, 33,6%-pit-fruits, 37,2%- nut-fruits, subtropical and berry patches. Modern market conjuncture denominated increase nut-fruits, citrus and berry patch. Efficiency domestic Agro-industrial complex (AIC) requires constant increasing to validity, timeliness and accessibility recommendation agricultural science production [Zhuchenko A.A., 2009-2011].

Goods production of the hazelnut (C pontica) guide to subtropical region Turkey, Italy, Spain, USA, Russia, load; embark; stevedore, Azerbaijan, in region residing under influence water pool Mediterranean, Black and Caspian seas, forming warm and humid climate required for plants of the hazelnut.

Intensifikaciya production fruit hazelnut in the first place depends on productivity sort, adapted to condition of the places cultivation. Exactly regional (zonal) use varieties, approved or created in concrete condition, promotes stability of the value and conservation quality harvests. Study of influence agroecological factors on harvest of hazelnut’s culture in variety ‘s variation in system "weather-harvest" has allowed to reveal the condition of the manifestation of their interaction and forecast values performance of the harvest with modern design and optimum dose using of the mineral.

Estimation of ground on contents bioenergycal potential, reactions of the soil ambience, powers of the soil profile, agrophysical characteristic on grown agrofitocoenosis in subtropics of Russia, has shown the biological culture’s potential. Thereby, system approach at analysis of the influence of the complex factors "weather-harvest-ground" on productivity hazelnut’s agrofitocoenosis enables to control their adaptive reaction and forecast success development of the valuable culture as lipoido-protein product of the feeding, long saving their own quality.

Keywords: varieties, hazelnut, agroclimatic’s factors (weather, soils).
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INFLUENCE OF INNOVATIVE FORMS OF FERTILIZERS ON THE PRODUCTIVITY OF TEA PLANTS IN THE CONDITIONS OF THE FOOTHILL ZONE OF THE NORTH-WEST CAUCASUS

Ms. Angelina Lagoshina, Mr. Eduard Pchihachev
Adyghe branch, Subtropical Scientific Centre of the Russian Academy of Sciences, Russia
gvenvivare@mail.ru
Dr. Oksana Belous
Subtropical Scientific Centre of the Russian Academy of Sciences, Russia
oksana191962@mail.ru

The research is aimed at finding effective ways to regulate the functional state of tea plants under stress, ensuring an increase in yield and its stability in varying climatic conditions, preserving and improving the quality of products (ready-made tea). The objects of research are tea plants of the Kimyn variety population. The following agrochemicals were used (calculated per ha): rokogumin (5 l/150 l of water); sodium humate (150 g /1000 l of water); bombardier (5 l/1000 l of water); consumption of working solutions – 50 l/ha. This group of organomineral fertilizers is humic acids with a complex of amino acids and mineral elements. Control - treatment of plants with water. Non-root spraying of the tea plant with agrochemicals stimulated the active formation of proline (135.1 – 179.2 $mg.g^{-1}$, in the control – 122.6 $mg.g^{-1}$) and ascorbic acid (177.8 – 226.5 $mg.g^{-1}$, in the control – 131.4 $mg.g^{-1}$) in the leaves, which indicates the inclusion of processes associated with the mechanism of nonspecific protection against stress [*Lagoshina A. G., et al., Subtropical and ornamental gardening 75*]. The optimal state of tea plants treated with fertilizers also explains the more developed specific surface density of the leaf (1.44 mg. cm^{-2}, in the control-1.24 mg. cm^{-2}), as an indicator of assimilation processes [*Mokronosov 1983*]. The developed specific surface density of the leaf was ensuring the active operation of the leaf apparatus on the experimental variants, which is expressed in a higher productivity of the leaves (1.31-1.38 $g.dm^{-2}$), compared to the control plants (1.23 $g.dm^{-2}$).

A more favorable functional state of plants under the influence of growth regulators, in 2019-2020, led to a slight increase in the yield of the plantation. The highest yield (22.88-32.22 c/ha) was observed in the variant with non-root treatments with rokogumin, in the variant with sodium humate (31.47 c/ha), the yield exceeded the control (26.88 c/ha) only in 2020, which may be due to the accumulative effect.

Keywords: Tea, stress factors, innovative forms of fertilizers

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ACTUAL PROBLEMS OF ZOOTECHNCS AND VETERINARY

METABOLISM LEVEL IN CALVES 14 DAYS BEFORE DIARRHEAL SYNDROME IN DIFFERENT AGE GROUPS

Mrs. Nadezhda Malkova,
mnn.1@mail.ru
Mrs. Marina Ostyakova,
most-68@bk.ru
Mrs. Svetlana Shcherbinina,
s-shherbinina@mail.ru
Mrs. Vera Irkhina,
irkhin83@mail.ru
Far Eastern Zonal Research Veterinary Institute, Russia

Annotation. The article presents data on the study of the level of metabolism in young cattle 14 days before the manifestation of diarrheal syndrome in different age groups.

Introduction. Diseases occurring with diarrheal syndrome are often recorded among calves with metabolic imbalance, which is due to the vulnerability of the young organism to external influences. This type of pathology negatively affects the development and growth of young animals, thereby reducing the productive qualities of the animal. One of the effective methods of combating the morbidity of young livestock is to prevent the development of pathology, by developing adequate preventive measures, taking into account the assessment of the level of metabolism in calves.

Research methods. The research was carried out in the conditions of the Amur region. Three groups of conditionally healthy calves of the Holstein breed were formed, being in equal conditions: group 1 - calves at the age of 19.0 ± 0.44 days of life; group 2 - calves at the age of 30.0 ± 0.87 days of life; group 3 - calves at the age of 52.0 ± 2.41 days of life. The level of metabolic processes in young cattle was assessed 14 days before the development of pathology according to the results of a biochemical blood test using a StatFax 1904 + R biochemical photometer (USA) and Vital reagents (Russia). Additionally, clinical blood parameters were determined with differential leukocyte counts. Blood sampling was carried out in the morning before feeding. The obtained digital material was mathematically processed, analyzed, the differences between the samples were considered significant at $p<0.05$.

Results. At the same time, the precursors of the development of pathology on the part of the digestive system were reduced Ca / P by 41-65 % and the level of magnesium by 25-46 %, as well as an increase in this indicator (by 38 %) in older calves against the background of a low value of the protein index (by 53-77 %) relative to generally accepted standard values. In the studied animals with the above-mentioned deviations from the norm, diarrhea was recorded in 40-60 % of cases on the 14th day of the study.

Conclusions. Calves aged 19-52 days are very vulnerable to the effects of the external and internal environment, which greatly affects their health and the herd as a whole. This period is characterized by metabolic disorders and a high percentage of diseases accompanied by diarrheal syndrome.

Keywords: metabolism, calves, diarrhea.

ANTIBIOTIC-FREE LIVESTOCK THERAPY

Cand. of Cemich. Sc. Rudenok V.A.[1], Doct. of Techn. Sc. Kondratyeva N.P.[1], Popkova M. Yu.[1], Cand. of Techn. Sc. Bolshin R. G.[1], Cand. of Techn.Sc. Krasnolutskaya M.G.[1], Doct. of Techn. Sc. Kirillin N.K.[2], Doct. of Techn. Sc. Ovchukova S. A.[2],
[1] Izhevsk State Agricultural Academy
[2]Chuvash State Agrarian University, Russia
rudenva@rambler.ru

Abstract: The elements of therapy for animals by direct electrochemical oxidation of blood have been developed, excluding the use of antibiotics.

The widespread use of antibiotics in animal husbandry leads to their appearance in human food. The synthesis of medicinal preparations in the blood stream from the substances that make up the blood itself by its electrolysis reduces the danger of a person getting used to them.

Materials and methods. To carry out the electrolysis process in a blood vessel, a platinum wire electrode with a diameter of 0.2-0.3 mm and a length of 200-300 mm is used.

Conductive rubber electrodes are used to pass direct current through the system. They are applied to the surface of the skin near the ends of the wire electrode using gauze swabs moistened with saline. The current was passed through the electrodes using a regulated constant current source. The source itself was powered either from a 220V network, or from a small-sized lead-acid battery. The current in the electrode circuit is 2 - 3 milliamperes. With a current of 10 mA, an unbearable pain sensation occurs.

Own experiments. The technique of direct electrochemical oxidation of blood has been developed, which does not require the use of antibiotics in the treatment of animals. For the first time [1-4] performed the process of electrochemical oxidation of blood inside a blood vessel. In this case, the chlorine ion, which is part of the sodium chloride of the blood plasma, is oxidized. The effectiveness of the described process has been successfully tested on various animals [2].

It should be emphasized that in the body of animals, similar processes proceed without external interference. The liver of higher animals produces a special enzyme P-450, which is responsible for the oxidation of chlorine - ion to hypochlorite. Thus, the above-described electrolysis process only repeats and enhances the mechanism of the animal's body fighting disease known in nature.

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INFLUENCE OF THE PROBIOTIC PREPARATION IMMUNOFLOR ON THE PHYSIOLOGICAL STATUS OF A YOUNG CHICKEN

[1]Dr. Vladimir Semenov, [1]Pg. Valery Boronin,
[1]Dr. Nikolay Kosyaev, [2]Dr. Sergey Kozak,
[1]Cand. Nikolay Ivanov, [1]Cand. Raisa Ivanova, [1]Cand. Elena Ivanova
[1]Chuvash State Agrarian University, Cheboksary, Russia
[2]All-Russian Research Institute of the Poultry Processing Industry, Russia
semenov_v.g@list.ru

The article presents the results of studies of the effectiveness of using the complex probiotic preparation Immunoflor in the diet of young chickens.

In conditions of intensive growth from the first day of life of young chickens, changes are noticeable that are associated with restructuring of the body and adaptation to new feeding patterns [*M Islam et al. 2017 Poultry Science 96*]. During this period, disorders of the digestive system occur, natural resistance decreases, therefore, its resistance to the action of unfavorable environmental factors [*Q Xiang et al. 2019 Animals 9*]. Based on this, in recent years, interest in probiotic preparations, which are used as stimulants for the productivity of birds, has significantly increased.

Research work was carried out on the basis of the SPK «Poultry farm Gornomariyskaya» of the Mari El Republic. The objects of research were 3 groups of young chickens, 500 heads of the Dekalb White cross, formed according to the principle of analogues. Chickens of the first experimental group were given Immunoflor from the first to the 21st day of life at the rate of 15 g/t of water. Chickens from the second experimental group included Immunoflor in the main diet at the rate of 15 g/t of feed. The chickens of the control group did not receive the indicated preparation.

In the course of the research work, it was found that the use of the probiotic preparation Immunoflor does not affect the clinical and physiological state of the body of young chickens, but at the same time reduces the incidence, mortality and increases the safety of the chickens by enriching and balancing the poultry diet, reducing the conversion feed, optimization of digestion, stimulation of the development of positive microflora in the gastrointestinal tract.

The use of the complex probiotic preparation Immunoflor in the diet of young chickens at a dose of 15 g/t of water and 15 g/t of feed contributes to an increase in the number of erythrocytes, leukocytes and hemoglobin concentration, activation of cellular and humoral factors of nonspecific resistance of the body of chickens, providing a normal physiological state and homeostasis.

Keywords: young hens, probiotic preparation Immunoflor, physiological status.

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DEVELOPMENT OF A COMPLEX PREPARATION FOR PREVENTION AND TREATMENT OF RADIATION DAMAGE TO ANIMALS

[1]Cand. Konstantin Vagin, [1]Cand. Timur Gainutdinov, [1]Cand. Airat Idrisov, [1]Cand. Yagafar Kurbangaleev, [1]Cand. Gulnaz Rachmatullina, [1]Cand. Kamil Ismuchametov, [1]Cand. Farit Kalimullin, [1]Cand.Valentina Gurianova, [1]Pg. Marina Gallyamova, [1]Dr. Rustam Nazimov, [1]Dr. Nikolay Vasilevskiy, [2]Dr. Vldimir Semenov
[1]Federal Center for Toxicological, Radiation and Biological Safety, Russia
[2]Chuvash State Agrarian University, Russia
vnivi.@mail.ru

The paper presents the results of the development of a complex drug for the prevention and treatment of radiation injuries to animals based on radiomodified strains of microorganisms.

Living organisms are constantly exposed to radiation in nature [*El-Shanshoury H et al. 2016 Journal of Radiation Research and Applied Sciences 9*]. Depending on the radiation dose and biochemical processes, damage can be rapid or delayed. The quality of radiation, dose and its power are all factors contributing to the occurrence of various symptoms of radiation injury [*Sanzari J K et al. 2013 Gravitational and Space Research 1*] Based on this, the development of drugs for the prevention and treatment of radiation injury is relevant for veterinary science and practice.

The work used industrial strains of E. coli PL-6 and lyophilized preparation "Bifidobacterin" (B. bifidum 1), containing up to 107-108 live bifidobacteria in 1 ampoule. The growth of microorganisms was carried out in Blaurock's medium, mesopatamia broth and mesopatamia agar, cultivation of microorganisms was carried out in a thermostat at 37°C under aerobic conditions for 1 day (E. coli PL-6), anaerobic - 4 days (B. bifidum 1). For the purpose of directed changes in the metabolism of E. coli PL-6 and B. bifidum 1, the bacteria were subjected to external gamma-irradiation in sequentially increasing doses from 1 to 20 kGy, studying the interaction of microorganisms in the consortium, as well as the harmlessness of microbial preparations made from them.

Irradiation of bacteria in doses not sufficient to destroy their DNA molecules, but acceptable for rearrangement of the sequence of nucleotide chains, leads to changes in the phenotypic properties of microorganisms. Sequential irradiation of E. coli PL-6 and B. bifidum 1 cultures in increasing doses led to an increase in radioresistance with the induction of enhanced synthesis of radioprotective enzymes superoxide dismutase, catalase and peroxidase activity involved in the formation of the body's resistance to the lethal effects of ionizing radiation. The drugs made from radiomodified bacteria were not toxic.

Keywords: Radiation injuries, animals, E. coli, «Bifidobacterin».

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USE OF GOLSHTINSKY BULLS IN IMPROVEMENT BLACK-AND-MOTHER BREED

Natalia Ignatieva, Inna Voronova, Elena Nemtseva, Gerald Toboev
Faculty of veterinary medicine and animal science, Chuvash State Agrarian University, Russia
ignatieva_natalia@mail.ru

To create new dairy breeds and types, to increase the genetic potential of domestic breeds in Russia, the Holstein breed is widely used *[I. Dunin, et al. 2020 Zootechnics 2*]. The advantages of the Holstein breed are obvious. However, its use to improve other breeds should be limited, since highly specialized Holstein cattle are often characterized by a delicate constitution, low adaptive abilities, demands on the level of feeding and maintenance, and a decrease in reproductive abilities *[I. Voronova, et al. 2021 Bulletin of the Ulyanovsk State Agricultural Academy 1 (53)]*. A large amount of deep frozen semen from imported Holstein bulls is imported into the country *[N. Ignatieva, et al. 2011 Bulletin of the Ulyanovsk State Agricultural Academy 3 (15)]*. The huge variety in the selection of Holstein bulls does not always have a positive effect on the quality of the improved domestic livestock [*N. Ignatieva, et al. 2020 IOP Conference Series: Earth and Environmental Science 604]*.

Based on the foregoing, it is necessary to evaluate the results of using Holstein bulls of different breeding.

Experimental studies were carried out in the conditions of the "Privolzhskoye" UOH on Holsteinized black-and-white cows. Formed 4 groups of experimental cows (15 heads in each): daughters of bulls-producers of Canadian, Danish, Dutch and domestic selection.

An objective complex assessment of the articles of conformation and constitution of cows on a 100-point scale showed that cows descended from Dutch bulls, compared to their peers from other groups, received a higher complex assessment and were classified as "good". The analysis of the productivity of the daughters of bulls of different breeding showed that the female ancestors of the bulls of Dutch origin had a more significant superiority in milk yield. The highest fat content in milk was distinguished by their contemporaries of Danish origin, the highest protein-milk content - by Danish selection. The amount of milk fat is higher in the milk of cows of Dutch origin, the amount of milk protein in the milk of cows of Danish and Dutch origin. Cows of Dutch root were distinguished by a high coefficient of completeness of lactation. The revealed high correlation coefficients between the main economically useful traits in the offspring of foreign breeders make it possible to conduct effective selection of cows and is a favorable factor in increasing the milk productivity of cows.

Keywords: bulls, Holstein breed, cows.

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POWDER MEAT PRODUCTIVITY AND PORK QUALITY WHEN USING PROBIOTIC PREPARATIONS

Dr. Vladimir Semenov, Pg. Anastasia Obukhova, Dr. Dmitry Nikitin,
Pg. Aleksey Uspeshnyy, Pg. Maria Evdokimova, Pg. Nikolay Mikhailov,
Dr. Anatoly Tikhonov, Dr. Renata Mikhailova
Chuvash State Agrarian University, Russia
semenov_v.g@list.ru

The results of scientific studies of the use of probiotic preparations A_2 and Immunoflor in the diet of young pigs are presented.

Currently, the requirements for the biological value and safety of pig products have increased, since many new generation drugs have appeared that are used in animal feeding and medical practice [*E Barba-Vidal et al. 2019 Livestock Science 223*]. An alternative to unsafe drugs has become the use of probiotic drugs in feeding young pigs, which help to regulate the normal composition of microflora, increase nonspecific resistance and immune reactivity, while meeting safety requirements for animals and humans [*A Rybarczyk et al. 2020 Livestock Science 241*].

The research work was carried out in the conditions of the pig farm of OOO Krasnoe Sormovo, Krasnoarmeyskiy district of the Chuvash Republic. The objects of research were 3 groups of young pigs, 10 animals in each, formed according to the principle of analogues. The animals of the 1st and 2nd experimental groups received probiotic preparations A_2 and Immunoflor with feed during the feeding period (up to 210 days) - from 128 to 141 days at the rate of 0.25 kg and 0.1 kg per 1 ton of feed respectively. Animals of the control group did not receive these preparations.

In the course of the research work, it was found that the use of these drugs contributed to an increase in meat productivity, and the quality of pork in terms of organoleptic, biochemical and spectrometric indicators of both experimental and control groups of animals was almost identical. The pork complied with the requirements of SanPiN 2.3.2.2401-08, which indicates the environmental safety of the tested probiotic preparations and the good quality of meat carcasses.

The use of probiotic preparations A_2 and Immunoflor in the diet of young pigs at the rate of 0.25 kg and 0.1 kg per 1 ton of feed, respectively, increases the pre-slaughter weight, the weight of the fresh carcass, the length of the carcass and the area of the "muscle eye".

Keywords: young pigs, probiotic preparations, meat productivity, veterinary and sanitary assessment of meat.

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VETERINARY AND HYGIENIC METHODS OF DIRECTED REPRODUCTION IN FORMATION OF HEALTHY HERDS OF COWS

Dr. Vladimir Semenov, Pg. Agzhan Maykotov, Cand. Svetlana Kondruchina, Pg. Tatyana Ivanova, Pg. Svetlana Tolstova, Pg. Daria Biryukova, Pg. Sayat Musaev, Pg. Adilbek Abdullayev, Pg. Alexey Semenov, Pg. Emilia Matveeva
Chuvash State Agrarian University, Cheboksary
semenov_v.g@list.ru

Intensive animal husbandry involves annually updating the dairy herd with young animals by 25-30%, therefore, science and practice have always been faced with the task of obtaining the maximum number of calves in offspring. One of the modern methods used in animal husbandry is the use of sexed seed [*Cardoso Consentini C E et al. 2021 Animals 11*].

For accelerated repair of herd and increase of number of highly productive cows in large-scale farms for production of milk, sexed seed is used in the first and second insemination of primates obtained from highly productive mothers. According to scientific data, the efficiency obtained from using this technique is 65-95% of individuals of the desired sex [*Paul A K et al. 2015 Journal of Advanced Veterinary and Animal Research 2*]. Insemination was carried out by recervical method using a tool AlphaVision frozen-thawed seed divided by sex. The highest results of the fruitfulness of insemination with a sexed seed in SEC PZ Almaty, IP Karimov and Kakpatas Kordai were obtained in the autumn-winter period and ranged from 58.1 to 65.2%, with an insemination index of 1.58-1.72. When using the technology of artificial insemination of calves with a sexed seed, in comparison with a seed not divided by sex, the economic efficiency, taking into account the costs of insemination, amounted to 10 040,2 thousand tg. When using a sexed seed, an average of 92% of calves were obtained from primates. Less insemination costs, the profit from calf production amounted to 76 109,2 thousand tg. With a comparative analysis of the results for all farms, the highest indicators of the fruitfulness of insemination were noted in calves during natural sexual hunting. Against the background of hormonal stimulation of sexual hunting, there is a decrease in the fruitfulness of insemination by an average of 4.72% (51.43 versus 56.15%) [*Baruselli P S et al. 2018 Animal 12:S1*]. During the medical examination of cows and calves, 202 heads with impaired reproductive functions were detected, of which 176 heads (87.13%) were cured, with endometritis – 81.25%, with follicular cyst – 86.79%, with ovarian hypofunction – 91.76%.

Keywords: cows, seed divided by sex, fertilization, reproducing qualities.

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EFFICIENCY OF BREEDING OF MAIN DAIRY BREEDS OF COWS OF KAZAKHSTAN

Dr. Aleidar Alentayev[1], Dr. Vladimir Semenov[2], Ug. Kanat Zhumanov[1], Cand. Talgat Karymsakov[1], Ug. Aydar Baimukanov[3]
[1]Kazakh Scientific Research Institute of Animal Breeding and Fodder Production, Almaty
alentaev55@mail.ru
[2]Chuvash State Agrarian University, Cheboksary
semenov_v.g@list.ru
[3]Russian Timiryazev State Agrarian University, Moscow

Currently, the main task of zootechnical science and practice is to further intensify the industry, aimed at increasing the genetic potential of the productive qualities of animals of domestic breeds and the degree of its implementation [Oliveira Junior G A et al. 2021 Journal of Dairy Science 104]. Conducting comprehensive research work on the development of breeding programs to improve the economic and useful features of domestic cattle and the development of animal assessment methods are extremely relevant for the agro-industrial complex from both scientific and practical points of view [Harlap S Yu et al. 2020 IOP Conference Series: Earth and Environmental Science 613].

The indicators of dairy productivity were monitored, linear belonging of cows and the age of the first calving of the first calves of Alatau, black-sand and Holstein black-sand breeds was determined. In 2020, the wood of the pioneer of the Alatau breed (n = 449) amounted to 5176 kg of milk; 3.92% and 3.40% by fat and protein content in milk, respectively. For black-moth rock (n = 210), the level of milk was at the level of 5761 kg, with a fat and protein content in milk of 3.85% and 3.33%, respectively. The first-born cows of the Holstein (n = 1880) breed were superior in animal yield to the Alatau breed by 1958 kg and the black and sand breed by 2373 kg. The average indicators for the dairy productivity of the primates of this breed were: yield of milk – 7134 kg; milk fat content – 3.60%; protein content in milk – 3.14%. Analysis of the research results made it possible to establish that earlier calves provided an increase in the productivity of cows to 10-15%. With an increase in the level of milk productivity, there is a decrease in the fat and protein content in milk to the second, and an increase to the fourth lactation in all analyzed rocks [*Bakharev A A et al. 2021 IOP Conference Series: Earth and Environmental Science 624*].

Keywords: milk productivity, selection, selection, selection, breeding value.

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PRACTICAL IMPLEMENTATION OF IMMUNOGENETIC MONITORING IN BREEDING DAIRY CATTLE

Cand. of agricult. sciences Elena Nemtseva, Dr. Nikolay Evdokimov, Dr. Anatoly Lavrentiev, Cand. of agricult. sciences Natalia Ignatieva, Cand. of agricult. sciences Inna Voronova, Dr. Valerian Alekseev, Ms. Lilia Mikhailova
Faculty of Veterinary Medicine and Animal Science, Chuvash State Agrarian University, Russia
EUNemtzeva@yandex.ru

In livestock breeding one of the main areas of immunogenetic research is to control the reliability of the origin of breeding animals [*M Prokopieva, et al. 2020 Earth and Environmental Science 012022; N Ignatieva and E. Nemtseva 2020 Earth and Environmental Science 012042; I.V. Voronova, N.L. Ignatieva and E.Yu. Nemtseva. 2021 Bulletin of the Ulyanovsk State Agricultural Academy 164*]. When identifying animals by genetic blood markers, the direction of selection is determined [*N Evdokimov, E Nemtseva, et al. 2019 Earth and Environmental Science 012052*]. In this regard, the study of the genotypic assessment of cows and bulls by blood groups is relevant.

The aim of our research was to study the polymorphism of erythrocyte antigens in the blood of cattle. The studies were carried out on the blood groups of 27 breeding bulls and 120 heads of Holsteinized black-and-white cows. Analyzing the blood groups of bulls, it was found that most heads have blood group systems ABCFSZ (15 heads), BCFS (6 heads), BCFSZ (3 heads), ABCF (2 heads), ABCZ (1 head). Antigens A1, A2 (A-systems), B_1, G_2, Y_2, A_1', A_2', D', E_2', Q ', G' ', O4 (B-systems), C_2, L' (C-systems), F (FV system), U' (S-system). The frequency of spread of antigens varies from 0.1 to 59.16%. Genotypes of the locus of blood groups B - EAB alleles $E'_2E'_3Q'$, $Y_2A'_1A'_2$, $B_1G_2O_3O_4Y_2A_1'A_2'$, G"are found with a high frequency. Animals carriers of the G" allele have an advantage in milk yield by 244 kg, and fat content by 0.02% ($P < 0.01$). Cows carriers of this $A_2'E_2'Q$ 'surpass in milk yield by 215 kg, and in fat content by 0.11% in comparison with cows of other genotypes. The obtained data on the reproductive ability of bulls indicate that animals with the $Y_2E'Q$ genotype (B-systems) excreted significantly more ejaculate than bulls with other genotypes. Seed obtained from bulls with genotype J_2Y_2E 'was reliably with high activity in comparison with genotype J" ($P < 0.01$). Blood group data is recommended to be used as an additional test in cattle breeding.

Keywords). Blood group, alleles antigens, livestock breeding

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DETERMINATION OF EFFECTIVE REGIMEN OF CATS RHINOTRACHEITIS TREATMENT

Nikitina A.P., Kosyaev N.I., Tikhonova G.P., Efimova I.O., Dimitrieva A.I., Sergeeva N.S.
Faculty of veterinary medicine and animal science, Chuvash State Agrarian University, Russia
anyutka020691@mail.ru

Infectious rhinotracheitis is an acute viral infectious disease that is characterized by inflammation of the eyes and damage to respiratory organs *[S.Binns, et al.2000 J Feline Med Surg, 2000, No. 2]*. Rhinotracheitis occurs in cats as a result of infection with the cat herpes virus FHV-1 (Feline Herpes Virus type -1) - DNA containing the virus of the herpesviruses subfamily (Herpesviridae) *[D.Burgener, et al. Am J Vet Res*., 1988, Oct, 49(10)*]*.

Among cat owners, it is known as cat flu or cat pneumonia. Common disinfectants kill the virus instantly. Morbidity is 50%, mortality is 5-20%. Fatality among adult cats is quite low, but this disease poses a great danger to animals due to complications caused by the virus and secondary pathologies. The main source of infection is sick or sick animals.

More susceptible animals include immunocompromised cats, with their boring content (cross-retort), with an unbalanced diet, kittens and young cats from 2 months to 1 year old. The disease can occur acutely, subacute and chronically in the cat*[A. Nikitina, et al. Mat. Vseros. Student scientific. prakt. conferences with the participation of students of 10-11 classes. In 2 parts. 2019*].

The diagnosis in sick cats is made comprehensively on the basis of clinical, epizootological data, as well as on the basis of the results of laboratory studies of blood and oral flushes according to ELISA and PCR.

Currently, this disease is widespread among domestic cats, regardless of breed, sex and age predisposition. Therefore, the identification of effective treatments for this infection is a very urgent task today. In this work, we describe the etiology, pathogenesis, clinic and diagnostics, give a treatment scheme for the disease, determine their effectiveness.

The experimental part of the research was carried out in the conditions of the veterinary clinic of the UOC "Veterinary Clinic" Mustache, Paws, Tail, "Cheboksary and at the Department of Epizootology, Parasitology and Veterinary and Sanitary Examination of the Federal State Educational Institution VO Chuvash GAU.

The paper presents the results of studies using two regimens for the treatment of cat rhinotracheitis. Of the two proposed treatment regimens, treatment regimen No. 2 is most effective, using the antiviral drug Maksidin 0.4 and Maksidin 0.15.

Keywords: rhinotracheitis, treatment regimen, antiviral drug.

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DEPENDENCE ON THE PRODUCTIVITY OF DAUGHTERS FROM GREAT MILK PRODUCTIVITY OF MOTHER MARES

Dr. Evgeniy Chirgin[1], Dr. Vladimir Semenov[2]
[1]Mari State University, Russia
chirgindmitrievich@gmail.com
[2]Chuvash State Agrarian University, Cheboksary
semenov_v.g@list.ru

Currently, dairy horse breeding in Russia is a dynamically developing industry, where intensive technologies are introduced and mastered with a simultaneous increase in product production. The specificity of this industry of horse breeding suggests that the success of dairy horse breeding should be directly dependent on the rational use of the productive potential of animals. Unresolved in the industry are the problems of increasing the production of mare milk by increasing the level of dairy productivity of horses with maximum use of animal genetic resources. The widespread use of highly productive animals in tribal work contributes to the accumulation of the most valuable genetic potential of mares, increases the possibility of obtaining even more highly productive breeding herds of horses. Despite the fact that, according to some reports, 60-70% of genetic progress is due to stallions, the assessment of the influence of mother mares on the milk and the quality of the milk of offspring is one of the leading prerequisites for breeding dairy horses, which meets the modern requirements of intensive dairy horse breeding.

The issue of the influence of the highest productivity of mother mares on the milk and milk composition of the daughter mares of the Lithuanian heavy breed was studied. Mare groups were formed by the method of balanced groups depending on the highest productivity of mother mares: group I – by the weight for the highest lactation of mother mares less than 3000 kg of milk; Group II – from 3000 to 3999 kg; group III – from 4000 to 4999 kg; Group IV – from 5000 to 5999 kg; V group – 6000 to 6999 kg; Group VI – from 7000 to 7999 kg; Group VII 8000 kg milk or more. Daughters whose mother did not finish lactation were not taken into account. It was established that the high level of milk productivity of mothers during the period of the highest lactation (more than 7,000 kg of milk) made it possible for their daughters to become leaders already during the period of the first lactation in $P \leq 0{,}001$. The productivity of the mares-daughters of group VI was higher than that of groups I, II, III, IV and V, respectively, by 2100.0 kg (49.14%), 1562.0 kg (32.46%), 1905.0 kg (42.63%), 1656.0 kg (35.10%) and 1253.0 kg (24.47%). Daughter mares with highly productive ancestors (more than 7,000 kg for maximum lactation) showed their highest productivity on average at the stage of 5.6 lactation, while their mothers – at 7.1 lactations. The difference in this case was 1.5 lactations at $P \leq 0{,}001$. The milk of mother mares in the range from 3000 to 5000 kg of milk was repeated with maximum success in offspring. The daughters of mothers who had record dairy productivity of more than 5,000 kg could not reach the level of productivity of their mothers. Daughters obtained from mother mares with the highest productivity for lactation of more than 8,000 kg of milk showed a decrease in the highest milk productivity for lactation and a decrease in their productive longevity compared to daughters of less productive ancestors.

Key words: dairy horse breeding, mare, dairy productivity, daughter mares.

INFLUENCE OF THE TYPE OF HIGHER NERVOUS ACTIVITY ON MILK AND PRODUCTIVE LONGEVITY OF MALE

[1]Dr. Evgeniy Chirgin, [2]Dr. Vladimir Semenov
[1]Department of Livestock Production Technology, Mari State University, Russia
[2]Department of Morphology, Obstetrics and Therapy, Chuvash State Agrarian University, Russia
semenov_v.g@list.ru

Breeding and selection based on the high genetically determined resistance of the organism to stress is one of the most important ways to improve breeds and lines in dairy horse breeding in order to suit them for the requirements of modern intensive livestock breeding. Stress, inhibiting growth processes, reproductive and lactation functions, reduces reproduction and all types of productivity.

These processes are based on the physiological regularity of the relationship between the types of the higher nervous system and the reactivity and stress resistance of the organism. Animals with high stress resistance for the most part are animals of a strong balanced mobile type of the nervous system, the strength and mobility of the nervous processes of which, causing a higher reactivity to stimulating and low to inhibitory effects of the environment, provide a high intensity of the milk flow reflex and the completeness of milking the udder.

Studies were carried out on the influence of the types of higher nervous activity (HNI) on milk productivity and the duration of productive use of mares of the Russian heavy draft breed. All animals were divided into four groups according to their type of GNI: 1. strong, balanced, mobile; 2. strong, unbalanced; 3. strong, balanced inert; 4. weak type. The largest number of mares with a milk yield per lactation above 5000 kg belonged to type 2 - 36.37%, among animals of the first type such mares were 27.09%, of the third type - 14.29%. Among the mares of the weak type, there were no animals with a milk yield of more than 5000 kg. The average record productivity in the second group was the highest and amounted to 4594.55 kg, which is 328.97 kg (7.72%) more than in the first group, 561.98 kg (13.94%) more than in the third group and 882.78 kg (23.79%) exceeds the milk yield of the fourth group.

For mares as late-maturing animals, the duration of economic use and life-long milk yield are of great importance. According to these indicators, the mares of the first group had an advantage with a strong, balanced, mobile type of IRR. The second place according to these characteristics belonged to the second group, the duration of economic use was 0.56 years (6.35%) less and the lifetime milk yield was 1808.91 kg (7.47%) lower. The third place was taken by mares of the fourth, weak type, their period of productive life and life-long milk yield were inferior to the first group, respectively, by 0.61 (6.96%) years and by 3708.73 (16.61%) kg. The lowest indicators in terms of the duration of economic use and life-long milk yield were in the animals of the third group, they were inferior to the leaders, respectively, by 1.52 (19.34%) years and by 5872.16 (29.13%) kg.

Keywords: Mares, higher nervous activity, productivity.

THE EFFECT OF STIMULATING EXTRA NUTRITION ON THE FUNCTIONAL ABILITIES OF QUEEN BEES OF THE CARPATHIAN SUBSPECIES

[1]Cand. Odilchon Ulugov, [2]Dr. Abdurashit Sharipov,
[3]Dr. Vener Sattarov, [4]Dr. Vladimir Semenov, [4]Cand. Anatoly Skvortsov
[1]Tajik state university of finance and economics, Tajikistan
[2]Tajik agrarian university named after Sh. Shotemur, Tajikistan
[3]Bashkir state pedagogical university named after M. Akmulla, Russia
[4]Chuvash State Agrarian University, Russia
semenov_v.g@list.ru

In connection with the deterioration of the ecological situation in the countries, the destruction of local populations of aboriginal bees, the lack of completely effective drugs and, as a consequence, the death of families, it is urgent to conduct research on the use of environmentally friendly and affordable stimulating feedings in beekeeping.

The studies were carried out in the conditions of Central Tajikistan. The object was bee colonies of the Carpathian subspecies (Apis mellifera carpatica). Four groups of families were formed. Experimental and control bees each had 3.5 kg of bees, 8 kg of forage honey, a queen at the age of one year, a closed brood on three frames and two frames with an open brood. The 1st group of bee colonies was the control one. As a stimulating feeding, these bee colonies were given sugar syrup (1: 2), in small portions of 700 ml, every other day, 7 times, using a ceiling feeder.

Bee colonies of the second experimental group (experimental No. 2) were fed with sugar syrup, with the addition of a homogenate of drone larvae. The third experimental group (experimental No. 3) was fed with sugar syrup with the addition of the feed mixture "Similak", the fourth group (experimental No. 4) - sugar syrup with the addition of a composite form consisting of the feed mixture "Similak" and a homogenate of drone larvae. A homogenate of drone larvae (HTL) was obtained by pressing (squeezing) pieces of honeycomb with drone larvae, only sealed or still open. GTL was used as a bioadditive to sugar syrup and kandy in spring and autumn feeding of bees and for their growth. Bees in all groups were fed at the same time, with the same frequency, but with different preparations. To account for the egg production of queens, a 5x5 cm frame was used and the amount of printed brood was determined. The mesh frame holds 100 bee cells. The printed brood (hundreds of cells) was counted by imposing a grid frame on the brood combs.

The effect of stimulating feeding on the functional activity of the queen bees was established. At the same time, the greatest efficiency was revealed when using a composite form consisting of sugar syrup, a feed mixture "Similak" and a homogenate of drone larvae. In the experimental groups, in contrast to the control group, an increase in the egg production of queen bees and the reflex of brood rearing by 1.3 - 1.44 times was found. It is noted that to replenish the protein deficiency and stimulate the physiological processes of the body of queen bees, to increase the growth and development of bee colonies in the spring, it is necessary to use stimulating feeding with sugar syrup in combination with a homogenate of drone larvae and a feed mixture "Similak" in a dose of 700 ml.

Keywords: honey bee, *Apis mellifera carpatica*, queen bee, stimulating extra nutrition, egg-laying capacity and brood.

INTRAUTERINE PATHOLOGY OF FARM ANIMALS

Tikhonova G.P., Tikhonov V.K., Kosyaev N.I., Nikitina A.P., Efimova I.O., Grigorieva V.V.
Faculty of veterinary medicine and animal science, Chuvash State Agrarian University, Russia
mariuy-2008@mail.ru

Livestock breeders currently face great challenges in increasing food production for the population. Success in this matter largely depends on the organization of the cultivation of young farm animals. And undoubtedly, this is one of the most difficult problems in animal husbandry. Growing calves without loss is a rather difficult task, but in our opinion it is feasible, requiring certain knowledge of the features of the growth and development of the young body, as well as the main diseases most common at an early age, and the causes of their manifestation. *[F. Petryankin, et al. Manual for practical veterinary doctors. PART 2009]*. Veterinary specialists should not only know, but also be able to correctly plan a set of curative and preventive measures for these diseases, which are multifactorial in nature and require quite a lot of attention *[V.* Lysov, *et al. Monograph. Kazan. 1988]*.

In recent years, quite a lot of data has been collected by scientists and practitioners on the cultivation of healthy young people in conditions of large-scale specialized farms. However, these data are not always unambiguous, they are sometimes even contradictory in some matters, which is understandable by the change in natural and climatic conditions, the method of farming, the varying degree of intensity of growing young animals and a number of factors. All this prompted us to express our views on this very difficult problem so that veterinary specialists, zoo engineers, students would expand their knowledge and use the materials in their daily work. *[N. Kirillov, et al. Monograph. PART 2006]*

Pathology is the process of deviation from a normal physiological state or development process. Pathological processes include deviations from the norm, processes that violate the constancy of the internal environment, diseases that disrupt the work of internal organs. At the present stage of livestock development, the intrauterine pathology of various animal species is widespread, so the search for effective ways to eliminate these disorders remains relevant.

In this paper, we present the most common pathologies of young farm animals on the example of calves associated with intrauterine development. We also offer the most effective methods to eliminate these causes. We note that in the first place are the optimal conditions for keeping and feeding farm animals at various periods of fetal development, as well as the possibility of using effective methods to increase animal resistance, which should be based on comprehensive knowledge of its morphological, functional and biochemical features.

The research task also included the study of active drugs that prevent the emergence of intrauterine pathologies.

Keywords: etiological factor, young, disease, embryopathies, newborn

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PREVENTION OF METABOLIC DISORDERS IN NEW COWS

Inna Voronova, Natalia Ignatieva, Elena Nemtseva, Gerald Toboev
Faculty of veterinary medicine and animal science, Chuvash State Agrarian University, Russia
voinn1978@mail.ru

New high-yielding cows that do not receive a diet appropriate to their milk production before calving and during the milking period become predisposed to ketosis with all the negative consequences *[Voronova I., et al. Compound feed. - 2021. - No. 3. - S. 52*]. Ketosis is a metabolic disorder in the body that occurs when there is a violation of the processing of fats in the liver against the background of a lack of carbohydrates *[I. Voronova, et al. 2021 Bulletin of the Ulyanovsk State Agricultural Academy 1 (53)]*. This disease usually manifests itself within the first 10-40 days after calving: cows lose weight very sharply and reduce milk production, they have many problems during calving and during milk production *[Voronova I. V. et al. 2020 Current state and prospects of development of veterinary and zootechnical science: mat. Vseros. nauch. - prakt. konf. s mezhdunar.participation. R. 423]*. The inclusion of propionates in the diets of cows helps to reduce the formation of ketone ketone bodies in their bodies.

The studies were carried out in the conditions of LLC "Krasnoe Sormovo" on highly productive cows with a daily milk yield of 25 kg and more. Formed 2 groups of cows, control and experimental, 100 heads each. The control group of cows was fed the rations of dry and dairy cows of the highly productive group, adopted on the farm. The cows of the experimental group in the dry period, two weeks before calving, in addition to the diet included 150 g of propylene glycol per head per day and for four weeks after calving - 250 g. Diagnosis of ketosis was carried out by monitoring the nutritional status, state and activity of experimental animals, dynamics of productivity and eating feed, as well as with the help of special indicator strips for the presence of ketone bodies and the ratio of fat and protein in milk.

The research results showed that all cows in the experimental group were healthy, the dynamics of milk production showed a stable increase in the lactation curve, and the results of the indicator strips for the determination of ketone bodies were negative. In the control group of the total livestock, 7% of cows were found to have ketone bodies. Thus, the use of propylene glycol in feeding high-yielding cows has been shown to be effective in preventing ketosis during the milking period.

Key words: highly productive cow, propylene glycol, ketosis.

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SILICON-CONTAINING NATURAL ZEOLITES IN THE FEEDING OF YOUNG PIGS

Lavrentiev A. Yu., Evdokimov N. V., Larionov G. A.,
Nemtseva E. Yu. , Mikhailova L. R., Zestyanova L. V.,
Chuvash State Agrarian University,
lavrentev65@list.ru,
Sherne V. S.,
LLC "Natural products of the Volga region", v.sherne@mail.ru

The purposeful use of silicon-containing zeolite in animal feeding as a preventive and therapeutic additive can increase the productivity of animals. It is able to change and correct the pericellular space in a positive way. Silicon-containing zeolites, entering the gastrointestinal tract of the animal, are digested and absorbed.

To identify the influence of silicon-containing zeolite on changes in live weight, feed costs, and metabolic processes, scientific, economic, and physiological experiments were conducted on young pigs of large white breed. Young pigs of the control group I were fed with household compound feed, without the content of silicon-containing zeolite. Experimental animals of the II experimental group received mixed feed with 3 %, animals of the III experimental group received mixed feed with 4% and animals of the IV experimental group with 5% of silicon-containing zeolite.

The addition of silicon-containing zeolite in the second and third experimental groups did not affect the feed consumption, and in the fourth experimental group there was a decrease in feed consumption. During the experiment, the absolute increase in live weight had some differences between the groups and was in the I control group 56.7 kg, in the II experimental group-64.4 kg, in the III experimental group-60.8 kg, in the IV experimental group-54.2 kg. In the second experimental group, this indicator increased by 13.5%, in the third group by 7.2%, and in the fourth experimental group it decreased by 4.41% compared to the control group. A slight decrease in the growth of pigs in group IV was due to the high (5%) content of silicon-containing zeolite in the feed. Feed consumption in the experimental groups decreased by 12.1%, 6.7% and 0.3%, respectively. The digestibility of nutrients in the II and III experimental groups was higher for dry matter by 5.8% and 4.7%, for crude protein-by 6.6% and 5.5%, for crude fat-by 6.5% and 5.3%, for crude fiber-by 7.7% and 4.7%, and for Nitrogen-free extractives-by 7.4% and 5.7% than in the control group. The digestibility of dry matter in the IV experimental group was lower by 4.51%, crude protein by 8.8%, crude fat by 7.67%, crude fiber by 8.5%, Nitrogen-free extractives-by 7.5% in comparison with the control group. At the same time, the experimental animals of the II experimental group assimilated nitrogen contained in the feed more than in the control – by 12.7% of the accepted and 7.76% of the assimilated.

The use of silicon-containing zeolite in the composition of compound feeds in an amount of 3% by weight increases the dynamics of live weight gain, reduces feed costs in the EC, and improves metabolic processes in the body of experimental pigs.

Keywords: silicon-containing zeolite, young pigs, growth, feed costs.

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RAISING SUCKLING PIGS WITH THE USE OF SPECIAL COMPOUND FEEDS AND IMMUNOSTIMULANTS

Lavrentiev A. Yu., Larionov G. A., Mikhailova L. R., Zestyanova L. V.,
Chuvash State Agrarian University, lavrentev65@list.ru,
Sherne V. S.,
LLC "Natural products of the Volga region", v.sherne@mail.ru

One of the main tasks in the cultivation of suckling pigs is to teach them early to feed or special compound feeds. the sooner suckling pigs begin to use top dressing in the form of special compound feeds, the better they will prepare for weaning. They have a better and faster developing digestive system, increased body weight. To study the effect of special compound feeds as top dressing and feeding for suckling piglets, as well as the use of an immunostimulator to maintain their health, better growth and development, a scientific and economic experiment was conducted on suckling piglets of a large white breed aged from birth to 60 days of age. Suckling pigs of the control group received prestarter feed from the 7th day of life, used in the farm. Suckling pigs of the experimental groups were fed with special compound feeds: at the age of 3-14 days-superstarter, 15-40 days-prestarter, 41-60 days-starter. In addition, the piglets of the 2 experimental group were intramuscularly injected with an immunostimulator: at birth — 0.3 ml, at the age of 10 days-0.5, 21 days-0.7, 45 days-1, 60 days — 1.5 ml per head.

The multiplicity of experimental sows was good and ranged from 10.17-11.83 heads depending on the group. The safety of piglets up to 21 days of age was 86.94% in the control group, and 6.97% in the 1 experimental group, and 7.3% more in the 2 experimental group than in the control group. The safety of piglets at the end of the experiment was the highest in the 2 experimental group and amounted to 92.96%, which is higher than in the control group by 9.5% and in the 1 experimental group by 3.5%. By weaning, the live weight of piglets of the 2 experimental group significantly exceeded the control. The deviation between the experimental suckling pigs of the control and 1 experimental group for this indicator was 8.35 kg or 17.4% in favor of the 1 experimental group. The largest nest weight during weaning of piglets was in the 2 experimental group, which is more than in the control group by 54.88 kg or 38.7% ($P<0.01$) and more by 23.81 kg or 13.9% compared to the 1 experimental group. The weight of the nest in the 1 experimental group exceeded this indicator in the control group by 30.47 kg or 21.7%.

Suckling pigs that received special compound feeds depending on their age, as well as young animals that were additionally intramuscularly injected with an immunostimulator, were characterized by a higher growth rate. But at the same time, preference should be given to the use of special compound feeds together with the injection of immunostimulstor.

Keywords: compound feed, suckling pigs, milk content, safety, growth.

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THE INFLUENCE OF STALLIONS ON THE PROPERTIES OF THE UDDER OF DAUGHTERS

[1]Dr. Evgeniy Chirgin, [2]Dr. Vladimir Semenov, [3]Dr. Vladimir Tyurin
[1]Mari State University, Russia
[2]Chuvash State Agrarian University, Russia
[3]All-Russian Research Institute veterinary sanitation, hygiene and ecology – branch of FSC VIEW, Russia
semenov_v.g@list.ru

The shape and size of the udder and nipples, the duration and intensity of milking, as well as the uniformity of giving out different halves of the udder are the main technological features that characterize the suitability of mares for machine milking. Research carried out on koumiss farms shows that the daughters of different stallions-producers differ significantly in both dairy productivity and in the shape and functional properties of the udder. In connection with the gradual restoration of the dairy horse breeding industry in the Russian Federation, the formation of high-tech milk farms, the increase in the number of horses in productive horse breeding, the importance of mares selection issues and the relevance of studies related to the study of the suitability of mares-daughters of different stallions to the machine technology of mares milking. The efficiency of machine milking depends not only on the shape of the udder, but also on the shape and size of the nipples. Modern milking plants impose serious requirements not only on the shape, but also on the size of the nipples, and their location. The assessment of nipples, first of all, should be considered in terms of their compliance with the parameters of nipple rubber and teatcup. The most convenient for machine milking mares are vertically downward nipples, conical or cylindrical, 6-8 cm long, 2.5-3 cm in diameter, the distance between the nipples should be at least 6 cm and no more than 20 cm.

Studies were conducted on the influence of stallions-producers of the Russian heavy breed on the properties of the udder of their daughters. The object of research was the mares of the Russian heavy breed in the farm of ZAO Plemzavod "Semenovsky," belonging to the following lines of this breed: Karaul, Larchik, Podenshchik and Svist. The properties of udder and nipples were evaluated, as well as the adaptability of the udder to machine milking according to a five-point system. The best estimates of udder, nipples and fitness for machine milking were in the daughters of stallions of the Karaul line, respectively, 3.94; 4.42 and 4.41 points. The udder score of the daughters of the stallions of the Svist line – 3.92 points exceeded the corresponding indicator of the daughters of the stallions of the Podenshchik line – 3.79 points. But the daughters of the stallions of the Podenshchik line had better developed nipples – 4.39 points compared to the nipples of the daughters of the stallions of the Svist line – 4.25 points. The assessment of adaptability to machine milking of mares-daughters of stallions of the lines of Svist and Podenshchik was almost the same. The worst indicators for assessing udder, nipples and fitness for machine milking were in the daughters of stallions of the Larchik line, which amounted, respectively, to 3.56; 4.00 and 4.00 points. The score of the udder of mares is interconnected with the functional properties of the udder and the productivity of animals. Mares with a higher udder score showed a higher rate of milk excretion from the udder and higher milk productivity.

Key words: stallions-producers, properties of udder of daughters.

THE INTENSITY OF FORMATION AND PRODUCTIVE QUALITIES OF BOARS-PRODUCERS

Dr. Nikolay Evdokimov, Dr. Anatoly Lavrentiev, Dr. Valerian Alekseev, cand. of agricult. Science Elena Nemtseva, postgraduate Lilia Mikhaylova, postgraduate Lyudmila Zhestianova
Department of General and Private Animal Science, Chuvash State Agrarian University, Russia
evdonikvit@mail.ru

For studying the influence of the intensity of growing boars on their breeding qualities, subsequently in production conditions, three groups of boars, 15 heads each, were formed, taking into account the level of average daily gain and the age at which they reached 100 kg. At the first stage of the study was analyzed the indicators of sperm production of boars from the formed groups, the results of which indicate the existence of a certain relationship between the intensity of formation of boars, on the one hand, and indicators of sperm production, on the other.

So, the boars of the first group (with a low level of formation) have significantly low indicators both in terms of volume, and in terms of concentration and activity of sperm. The indicators of boars in this group were also lower than the other two groups in terms of the total amount of sperm taken (by 8 and 12 samples). The best indicators for all the studied indicators were in the boars of the third group, whose indicators exceed those of the boars of the first group in terms of ejaculate volume by 16.8 ml, in concentration by 10.9 mln / ml and activity by 0.3 points, also higher the indicators of boars of the second group turned out to be 5.5 ml in volume than first group, 10.6 mln / ml in concentration and 0.1 points in activity. The study of the dependence of the reproductive qualities of boars with different intensity of formation was carried out on the number of queens in the amount of more than 30 heads. There was revealed a significant difference in multiple pregnancy of queens, piglet survival by 2 months of age, depending on the insemination of boars with different intensity of formation. Comparison of the duration of the productive use of boars, depending on their formation intensity was showed the boars that had a low growing intensity, the age of stay in the herd was 40.3 months, while boars with a high intensity of formation were kept in the herd for 47.3 months, with an average the value of boar indicators, equal to 44.2 months.

In this way, there is a positive relationship between the intensity of the formation of brood boars with their subsequent productivity and the duration of their productive use.

Keywords: boar, sperm production, duration of use.

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FUMARIC ACID, DIPROMONIUM AND VITAMIN C INFLUENCE ON THE PRODUCTIVE PERFORMANCE, PHYSIOLOGICAL STATUS AND BODY RESISTANCE OF THE SOWS

[1]Dr. Alexander Solyanik, [2]Dr. Vladimir Semenov, [3]Dr. Vladimir Tyurin,
[4]Dr. Anatoly Kuznetsov, [5]Dr. Vladimir Sofronov, [5]Dr. Ali Volkov,
[6]Dr. Valery Solyanik, [6]Mr. Sergey Solyanik, [1]Mr. Vitaly Solyanik
[1]Belarusian State Agricultural Academy, Belarus
[2]Chuvash State Agrarian University, Russia,
[3]All-Russian Research Institute veterinary sanitation, hygiene and ecology – branch of FSC VIEW, Russia,
[4]Saint-Petersburg State Academy of Veterinary Medicine, Russia,
[5]Kazan State Academy of Veterinary Medicine named after N.E. Bauman, Russia,
[6]Research and Production Center of the National Academy of Science for Livestock Breeding,Belarus,
semenov_v.g@list.ru

Our aim was to study if it was possible to increase the productive performance of suckling piglets by feeding fumaric acid (FA), dipromonium (D) and vitamin C (C) in different combinations to their mothers.

Forty primiparous sows that had their litter-size equalized to 10 to 11 piglets were randomly assigned to the following dietary treatments: 1) Diet 1 - Basal control (BD), 2) Diet 2 - BD plus 4 g of fumaric acid and 0.1 g of vitamin C per kilogram of dry matter (FA + C), 3) Diet 3 - BD plus 0.4 g of dipromonium and 0.1 g of vitamin C per kilogram of dry matter (D + C), and Diet 4 - BD plus 4 g of fumaric acid and 0.4 g of dipromonium per kilogram of dry matter (FA + D). The treatment diets were fed during the first 20 d of the lactation, afterward the basal diet was fed to all sows.

When supplementing the diet with fumaric acid and vitamin C (Gr. 2) or dipromonium and vitamin C (Gr. 3) the milking ability of the sows was increased by 21.1-30.0%. Percentage of pigs reared to 21 d was onlynumerically increased for all treatment groups compared with controls. Also, the growth rate of piglets after weaning was better than that of controls by 4.0-32.0 and 3.0-36.0% at the age of 70 days and during the period from 21 to 70 days of life, respectively.

Sows fed diets containing dipromonium (D + C and FA + D) had a higher concentration of hemoglobin in the blood than controls. To the contrary, sows fed fumaric acid and vitamin C had a lower concentration of hemoglobin than controls. Sows fed FA + C had a higher concentration of glucose in blood serum compared with controls. It would be noticed that the level of crude protein in blood serum of experimental sows was lower when compared to that of control ones.

The level of leucocytes in the blood of experimentl piglets was lower and the level of glucose was higher than that of control ones, the level of glucose being higher in serum blood of those piglets which had higher productivity (Gr. 2 and 3). As for the humoral factors of body resistance, the piglets of the 3rd and 4th groups had the higher level of serum bactericidal activity, but at the same time, they had a lower level of IgG. Hence, feeding of fumaric acid, dipromonium and vitamin C to the primiparous gilts during the first 20 days of lactation affects not only the biochemical processes in their body but in their piglets as well.

Keywords: fumaric acid, dipromonium, vitamin C, pigs.

DAIRY PRODUCTIVITY OF KAZAKH HORSE MARES

Dr. Dastanbek Baimukanov[1], Dr. Vladimir Semenov[2], Cand. Hamit Aubakirov[3], Cand. Kairat Ishan[4], Pg. Makpal Kargaeva[5], Mr. Aydar Baimukanov[5]
[1]Kazakh Scientific Research Institute of Animal Breeding and Fodder Production, Almaty
dbaimukanov@mail.ru
[2]Chuvash State Agrarian University, Cheboksary
semenov_v.g@list.ru
[3]Taraz Regional University named after M.Kh. Dulati, Taraz
[4]Kazakh National Agrarian Researcher University, Almaty
[5]Russian Timiryazev State Agrarian University, Moscow

Currently, horse breeding in the territory of the Republic of Kazakhstan is considered an intensively developing industry of productive animal husbandry [*Sataev E T et al. 2018 Research, results 2*]. The study and use of the relationship of dairy productivity of mares with other economic and useful features is relevant for breeding scientists and owners of kumys producing farms [*Lv J P and L M Wang 2009 In Bioactive Components in Milk and Dairy Products 5*].

The purpose of the work is to establish the influence of morphometric parameters of udder of milking mares of the Kazakh horse on the formation of dairy productivity and the intensity of foal development in the dairy period (from birth to 6 months of age).

The highest peak in commercial dairy productivity in milking mares is observed at the 2nd and 3rd months of lactation (9.2, respectively; 9.0 and 7.2; 6.9 liters). Mares with a cup-shaped udder in all periods of experience have a greater milk yield than peers with a rounded udder shape. So, according to the results of four months of milking from mares with a cup-shaped udder, only 1051.0 liters of commercial milk were obtained, which is 227.4 liters more than from peers with a rounded udder form.

The results of the observation showed that the largest indicators of absolute – 42.7 kg, average daily – 1.42 kg and relative growth – 107.3% were noted in the offspring of animals with a cup-shaped udder. In foals obtained from mares with a rounded form of udder, growth rates (39.9, respectively; 1.33 kg and 100.7%) were slightly lower. The high rate of foal growth in the first months of life is explained by the fact that with the mother's milk they receive all the necessary nutrients [*Park Y W et al. 2008 In Handbook of Milk of Non-Bovine Mammals 5*].

Keywords: Kazakh horse, mare, udder form, udder measurements, milk productivity, foals, living mass, timing.

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EFFECT OF IMMUNOPROPHYLAXIS ON REPRODUCTION FUNCTION OF HIGHLY PRODUCTIVE COWS

[1]Cand. Svetlana Kondruchina, [1]Dr. Vladimir Semenov, [2]Dr. Vladimir Tyurin, [3]Dr. Anatoly Kuznetsov, [4]Dr. Leonid Leontyev, [1]Dr. Gennady Larionov, [1]Pg. Tatyana Ivanova, [1]Pg. Svetlana Tolstova, [1]Pg. Daria Biryukova, [1]Pg. Anna Stepanova, [1]Pg. Alexey Semenov
[1]Chuvash State Agrarian University, Russia
[2]All-Russian Research Institute veterinary sanitation, hygiene and ecology – branch of FSC VIEW, Russia
[3]Saint-Petersburg State Academy of Veterinary Medicine, Russia
[4]Russian Timiryazev State Agrarian University, Russia
semenov_v.g@list.ru

Postpartum diseases, high productivity as stress factors contribute to the long-term restoration of the reproduction function of cows, the reduction of their dairy productivity and profitability up to the culling of the animal, which today is a significant problem in cattle breeding [*Cardoso Consentini C E. et al. 2011 Animals 11*].

The purpose of our work was to study the comparative efficacy of electropuncture and immunotropic preparations Prevention-N-C and Salus-PE in preventing reproductive disorders in highly productive cows.

The objects of research were cows located in the dry period 45 days before calving. According to the principle of analogues, we formed four groups of insect dry cows (control, 1st, 2nd, 3rd experienced) with 10 heads each. Immunotropic preparation Prevention-N-C was injected into animals of the 1st experimental group three times within 45-40, 25-20 and 15-10 days before calving intramuscularly in dose 10 ml/goal, and to cows of the 2nd experimental group according to the same scheme and at the same time – Salus-PE. In the third experimental group, immediately after childbirth, electropuncture sessions were carried out using the Vocal-B device according to the prescription worked by us, BAT No. 7, 4, 5, 6, 15, 16, 17, 18. The duration of one session was 15 minutes, three times, with an interval of 48 hours.

Comparative analysis showed that after the application of the Salus-PE biopreparation intramuscularly at a dose of 10 ml 45-40, 25-20 and 15-10 days before the calving of animals of the 2nd experimental group, the period from childbirth to fruitful fertilization was reduced by 28.4 days ($P < 0.01$) compared to the control group and was 58.6±1.50 days, 100% of cows were fertilized, of which 60% were fertilized in the first sexual hunt, 40% in the second. The insemination index was 1.4. Therefore, intramuscular injection of the Salus-PE biopreparation to cows at a dose of 10 ml 45-40, 25-20 and 15-10 days before calving prevents obstetric-gynecological diseases, helps to reduce the period of involution of the sexual apparatus in the postpartum period, increases the percentage of fertilization and increases the function of reproduction of cows.

Keywords: cow, postpartum complications, immunoprophylaxis, electropuncture.

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VETERINARY AND SANITARY INDICES OF BROILER MEAT WHEN USING SEA BUCKTHORN EXTRACTION CAKE IN FEED

[1]Cand. Ivan Seryogin, [2]Dr. Sergey Kozak,
[3]Dr. Vladimir Semenov, [4]Cand. Yulia Kozak
[1]Moscow State University of Food Production, Russia
[2]All-Russian Research Institute of the Poultry Processing Industry, Russia
[3]Chuvash State Agrarian University, Russia
[4]All-Russian Research Institute veterinary sanitation, hygiene and ecology – branch of FSC VIEW, Russia
sereginig40@gmail.com

The article presents the results of research on the effectiveness of using sea buckthorn extraction cake as an additive to the main diet, which contains many substances valuable to the chicks.

Modern poultry farming requires further optimization of poultry maintenance and feeding conditions in order to obtain the maximum amount of products at the lowest cost [*Vakili R. et al, 2017*]. At the same time, an intensive breeding of broilers provides for the use of well-balanced feed and biological active drugs, taking into account the species, breed and age of the bird [*Hess J.B., 2017*]. Given the above, it is of particular scientific and practical interest to search for and study natural feed additives that increase the meat productivity of chickens.

To study the effectiveness of adding sea buckthorn extraction cake to the main diet of broilers, the authors conducted experiments on chickens of the «Smena 8» cross-country. An optimal dose of sea buckthorn extraction cake was previously determined for fattening broilers. Then, on the principle of analogues, two groups of broiler chickens were formed (control and experimental), 30 heads each. The first group of chickens (control) received a basic diet, without supplements. The second group of birds (experimental) was given an basic diet with a buckthorn extraction cake for 35 days. The preparation was added to the feed from 14 days to 49 days of age at a rate of 0.6% with respect to the main diet. Chickens were grown in accordance with all the prescribed zoo-hygiene and technological regimes. They were fed according to the standards recommended for premises for cultivation.

It was found that the increase in live weight and blood values of chickens receiving sea buckthorn extraction cake were favorably different from the control. Analysis of the growth dynamics of broilers showed that the introduction of sea buckthorn extraction cake in a dose of 0.6% to the main diet contributed to an increase in daily growth and live weight of the carcass by 9.9%. The safety of the number of chickens in the test was 100%. In terms of physicochemical indicators, the meat of broilers of the experimental group was also superior to the meat of control chickens.

The results of the studies concluded that the addition of 0.6% sea buckthorn extraction cake to the main diet over 35 days provides a daily increase in the mass of chickens by 13 g, or 9.9% more, and improves the quality of meat.

Keywords: broiler chickens, sea buckthorn extraction cake, meat quality indicators.

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PREVENTION OF TRANSPORT STRESS IN THE REALIZATION OF THE ADAPTIVE POTENTIAL OF PIGS

Cand. Lyubov Gladkih, Dr. Vladimir Semenov, Dr. Vladimir Tyurin, Dr. Dmitry Nikitin, Dr. Alexey Yakimov, Dr. Nikolai Evdokimov, Pg. Alexey Uspeshnyi, Pg. Nikolai Mikhailov,
Chuvash State Agrarian University, Cheboksary
semenov_v.g@list.ru

The pig transportation is an integral part of the work of modern pig breeding enterprises [*Dankwert S A et al. 2018 Zuchtungskunde 90*]. Transportation of animals, changing conditions of maintenance and feeding, diagnostic and preventive measures during quarantine have a negative impact on the pig body, reducing productive and reproductive indicators [*Lee S I et al. 2017 J Appl Anim Res 45(1)*]. In such conditions, if it is impossible to exclude the effects of stress factors, the primary task is to increase the adaptive ability and resistance of the pig body [*Xiong X et al. 2015 Livest Sci 171*].

The purpose of this work is to realize the adaptive and productive potential of pigs with immunoprophylaxis of transport stress. Studies were carried out on piglets-detachments imported into the pig complex from the reproductive enterprise. 3 groups of animals of 100 heads each were formed. Piglets of the 1st experimental group for prevention of transport stress were used immunotropic preparation PigStim-C, piglets of the 2nd experimental group - PigStim-M.

Among young pigs of the control group, diseases occurred in 21 animals during the growth and fattening periods, which is 5 and 4 more than among young people of the 1st and 2nd experimental groups, respectively. Therapy was effective in only 18 sick animals of the control group, which amounted to 85.7%, 3 heads fell. In the 1st experimental group, 15 out of 16 sick animals were cured, and in the 2nd experimental group - 16 out of 17, 1 head fell. Therefore, the use of PigStim-C and PigStim-M provides the prevention of diseases of young pigs during the growth and fattening periods and improves the effectiveness of therapeutic measures. More pronounced positive effect of application of PigStim-C in respect of diseases characterized by respiratory damage, and PigStim-M - gastrointestinal tract.

Prevention of transport stress by immunotropic preparations PigStim-C and PigStim-M contributed to an increase in the live weight of pigs at the end of the growth period by 1.61 kg and 1.23 kg more than the control values, and at the end of the fattening period - by 2.55 kg and 3.17 kg. In animals of the 1st and 2nd experimental groups, the average daily increases in living weight in the whole experimental period were higher than in control peers by 17.0 and 21.2 g, respectively.

Keywords: piglets, immunotropic preparations PigStim-C and PigStim-M, transport stress.

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IMMUNOCOREGRATING PROPERTIES OF PROPOLIS AND THEIR COMPOSITE FORMS

[1]Cand. Zuleikha Ilyasova, [2]Dr. Ramzia Mannapova, [1]Dr. Rinat Mudarisov, [3]Dr. Vladimir Semenov, [4]Dr. Ismagil Hakimov, [2]Dr. Natalia Kulmakova
[1]Bashkir State Agrarian University, Russia
[2]Russian Timiryazev State Agrarian University, Russia
[3]Chuvash State Agrarian University, Russia
[4]Samara State Agrarian University, Russia
Zuleicha@yandex.ru

Diseases of young cattle of the first months of life in the livestock farms of the country exceeds 35%. Gastrointestinal and respiratory diseases occupy the greatest percentage among all diseases of young. Currently, vaccines have been developed and successfully applied to the specific prevention of diseases of infectious etiology, but it is not always possible to develop immunity of sufficient tension, because Vaccination without immunostimulation does not contribute to sufficient anti-heinee [*Dementyev E P et al. 2018 Journal of Engineering and Applied Sciences 13*].

One of the important tasks of practical veterinary is the identification of environmentally friendly immunocorrective substances that do not provide the suppressive impact on the body.

The purpose of the work was to study the immunocorrective properties of the propolis and their composite forms with the additions of enterosim, organic compound of iron ferrran against the background of immunization of calves against salmonellosis.

The studies used 36 calves of the black-and-motley rock, with 5 day age, which, on the principle of analogs, were divided into 6 groups, 6 goals in each. All animals were vaccinated by a concentrated formolkvasque vaccine against salmonellosis calves. Telight of the first group – control, animals of the second group were used by enterosim, the third – propolis, the fourth – enterosim in the complex with propolis, fifth – ferran, 6 group – Ferran in the Enterosim complex.

As a result of research and analysis of the obtained data, it was established that the drug Ferran (5 group) auxizes the hematopoietic reactions of the body. Ferran in the enterosim complex (6 group) restore immunopoese and erythropoes to the indicators of physiological norms. The integrated use of enterosym with propolis (4 group) has a high immunostimulating effect, enhance the productive phase of the immune response, the suppressive effect of the vaccine is removed and the factors of the natural and colonization of the intestine increase.

Keywords: animal husbandry, young, immunocorrection, propolis.

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MILK PRODUCTIVITY OF GOLSHTINSKY COWS AT OPTIMIZATION OF FAT LEVEL IN THEIR DIETS

Dr. Oleg Petrov,
Department of Agriculture and Technology, Mari State University, Russia
tmspetrov@yandex.ru
Dr. Vladimir Semenov,
Department of Morphology, Obstetrics and Therapy, Chuvash State Agrarian University, Russia
semenov_v.g@list.ru
Dr. Valerian Alekseev
Department of General and Private Animal Science, Chuvash State Agrarian University, Russia

Among the factors that increase the productivity of farm animals, their full-fledged feeding is of great importance. This is possible when animals are provided with all the food elements in diets. The level of productivity of cows largely depends on the availability of feed and the full effectiveness of feeding, which should satisfy the animal body with enough energy, lipids, protein, carbohydrates, minerals and vitamins. Despite the large role of lipids in the body of farm animals, many issues of their exchange and optimization of lipid nutrition of highly productive cows have not been studied enough.

The work is devoted to determining the optimal level of fat in concentrate-senage diets for high-yield cows and studying the effect of various levels of fat in the dry matter of the diet on milk productivity and chemical composition of milk.

The studies we conducted showed the insufficiency of household diets of highly productive cows with a living weight of 600 kg and an average daily intake of 22-24 kg of milk in terms of raw fat content.

This inhibited the manifestation of the potential of milk productivity, especially in terms of the content of fat, dry matter and ash in milk, revealed in cows that received 3.2% of raw fat in dry matter.

The degree of expression of the genetic potential of productivity of highly productive cows depends on the quality of their feeding, on the amount and ratio of nutrients supplied to the body, their digestibility and the degree of use for the formation of products. Therefore, optimization of their lipid nutrition makes it possible to direct the metabolism towards a more active use of energy and nutrients of feed for the synthesis of milk and obtaining from cows a maximum amount of production and higher quality.

In this regard, the addition of fat in the rations of cows by equivalent energy and protein replacement of part of the grain mixture and wheat bran with rapeseed cake to a level of 4.2% of dry matter in group II provides an increase in milk productivity in relation to the control group receiving 3.2% fat.

Optimizing the fat level in the dry matter of the diet up to 4.2% in the nutrition system of cows increases the functional activity of the breast in their body, even during physiological strained periods of the production cycle (lactation and steeliness), which is expressed in an increase in breast productivity by 6.78%, an improvement in the chemical composition and technological properties of milk. The content of SOMO in milk significantly increases and the ratio of fat: SOMO improves by 10.53%, this allows the production of a number of dairy products with a normalized content of SOMO with raw materials, and the protein: SOMO ratio corresponds to the norm and indicates that it is quite raw.

A further increase in dietary fat to 5.2% has a less pronounced effect on the change in milk productivity.

Keywords: Cattle, feeding, fat, milk production.

EFFECT OF NATURAL ANTIXIDANT ON HUMORAL FACTORS OF IMMUNE PROTECTION OF POULTRYS ORGANISM

Pg. Nadezhda Kuzmina,
Department of Agricultureand Technology, Mari State University, Russia
kuzmina221995@mail.ru
Dr. Oleg Petrov,
Department of Agricultureand Technology, Mari State University, Russia
tmspetrov@yandex.ru
Dr. Vladimir Semenov,
Department of Morphology, Obstetrics and Therapy, Chuvash State Agrarian University, Russia
semenov_v.g@list.ru
Pg. Valery Boronin
Department of Morphology, Obstetrics and Therapy, Chuvash State Agrarian University, Russia
boronin.v@mail.ru

One of the main conditions for the successful cultivation of young poultry in industrial conditions is to maintain its high resistance to negative environmental factors. The creation of only an optimal microclimate is insufficient to neutralize the negative effects of anthropogenic factors. It is therefore necessary to use environmentally friendly adaptogens to stimulate the immune system of chickens when growing.

The quality of poultry meat and its ecological cleanliness have recently become of particular importance. Food products can be the source and carrier of a large number of potentially hazardous toxic substances of chemical and biological nature. In this regard, an urgent problem of the consumer market of our country is the development of ways to obtain environmentally friendly and safe poultry products. To this end, modern biotechnology centers make it possible to obtain various biologically active preparations available for use and the use of substances of natural origin is of greatest interest. One of them is a natural antioxidant of plant origin - dihydroquercetin.

Studies are devoted to the study of the influence of the modern antioxidant of the flavonoid group "Dihydroquercetin" as part of the feed combination on the hematological indicators of broiler chickens of cross KOBB-500. The results indicate that the blood values of the chickens of the experimental groups were within the physiological norm. The content of hemoglobin and red blood cells in the blood of broilers treated with dihydroquercetin increased and indicates an increase in the intensity of redox processes in the body. The number of white blood cells in all groups was normal, but in the experimental groups their decrease was noted, which indicates the therapeutic and immunostimulating effect of the drug. The lymphocyte content increases, within normal values, due to the use of an antioxidant, and in the chicks of the control group they were below normal. The use of dihydroquercetin provided an increase in platelet levels within normal limits. The assessment of protein metabolism by the content of the total protein and albumin fraction in blood serum showed its positive dynamics within normal physiological values, which characterizes the increase in the intensity of assimilation processes in the poultry body. Carbohydrate metabolism was assessed by its glucose content and a decrease in its level indicates its increased consumption as an energy component for metabolic processes associated with intensive chick growth. An increase in alkaline phosphatase activity of 1.3-1.8 times is associated with active chick growth. Studies have found that the content of mineral substances in the serum of chickens of all groups was within the physiological norm, confirming that dihydroquercetin does not negatively affect the poultry body.

Keywords: Poultry, "Dihydroquercetin", blood corpuscles, metabolism.

EFFECT OF PREPARATION «DIHYDROQUERCETIN» ON GROWTH-WEIGHT INDICES OF BROILERS

Pg. Nadezhda Kuzmina,
Department of Agriculture and Technology, Mari State University, Russia
kuzmina221995@mail.ru
Dr. Oleg Petrov,
Department of Agriculture and Technology, Mari State University, Russia
tmspetrov@yandex.ru
Dr. Vladimir Semenov,
Department of Morphology, Obstetrics and Therapy, Chuvash State Agrarian University, Russia
semenov_v.g@list.ru
Pg. Valery Boronin
Department of Morphology, Obstetrics and Therapy, Chuvash State Agrarian University, Russia
boronin.v@mail.ru

Poultry farming is one of the most cost-effective agricultural industries in Russia, the first to enter the path of industrialization and provide the population with dietary foods. The poultry differs from other farm animals with a greater intensity of exchange processes, which is closely related to its speed and preservation. Domestic and world experience on poultry farming issues convincingly indicates that the full realization of the genetic potential of modern breeds and crosses can be achieved with a balance of feed combinations not only in amino acids, fats and carbohydrates, but also in vitamins, mineral substances and other biologically active additives that help to obtain maximum productivity. At the present stage of the development of domestic poultry farming, in order to solve the problem of improving the physiological condition and productive qualities of broiler chickens, a special role is given to the use of biologically active substances. Quite effective preparations include the natural antioxidant "Dihydroquercetin," which has a wide spectrum of effects on the poultry body and the functional and technological properties of the obtained meat raw materials. In this regard, our research aimed at a comprehensive study of the effectiveness of the use of the drug "Dihydroquercetin" in combination with full-nutritional feed of broiler chickens, namely, live mass gain, livestock safety, meat productivity and meat quality, are relevant and of great scientific and practical interest.

Research is devoted to the study of the feasibility of using a natural antioxidant of plant origin as a biologically active additive to the main, standard diet and assessing the effectiveness of its use to increase the meat productivity of broiler chickens.

To achieve the goal, the following tasks were solved: to develop formulations of compound feed using various doses of the drug "Dihydroquercetin" together with the main diet; study the growth and development of broiler chickens, the safety of the livestock when using the drug "Dihydroquercetin" in diets; establish the amount of feed consumed and its costs per unit of production; to study the effect of the test drugs on the productivity and quality of broiler chicken meat.

Based on the studies carried out, optimal levels of addition of the preparation "Dihydroquercetin" to feedstuffs were established, enabling to increase the safety of broiler chickens by 20-30%, live mass by 12,05-33.13%, mass of ripped carcass - by 15.41-38.06%, muscle tissue - on average by 3,23%, thoracic muscles - by 0.27-2.13%, edible parts of carcass - by 2,30-5.80% and reduce feed consumption by 1 head during the fattening period by an average of 46.09 g compared to the control.

Keywords: Broiler, "Dihydroquercetin", growth, development, safety.

FORMATION OF COLOSTRAL IMMUNITY IN CALFS ON THE BACKGROUND OF THE APPLICATION OF IMMUNOSTIMULATORS TO COWS

[1]Dr. Vladimir Semenov, [2]Dr. Vladimir Tyurin, [1]Pg. Emilia Matveeva, Pg. Svetlana Tolstova, [1]Cand. Svetlana Kondruchina, [1]Pg. Darya Biryukova, [1] Pg. Agzhan Maykotov, Pg. Sayat Musaev, [1]Pg. Muratbek Zhuirikbaev, Pg. Adilbek Abdullayev

[1]Chuvash State Agrarian University, Russia
[2]All-Russian Research Institute veterinary sanitation, hygiene and ecology – branch of FSC VIEW, Russia,
semenov_v.g@list.ru

The article presents the rationale for research on the use of immunostimulants to increase colostral immunity in calves.

At birth, the calf is agammaglobuliemic (does not have its own Ig) and therefore needs a sufficient amount of good quality colostrum [*L. Turini et al. Livestock Science 238*]. Colostrum is a major factor in the early postnatal period for the healthy growth and development of a strong immune calf. Therefore, it is important to observe the hygienic regimes of feeding and keeping mother cows before and during pregnancy, the timing, quantity and quality of colostrum fed to newborns. The state of immunological insecurity of calves changes after receiving colostrum, which is the only source of protective antibodies for the newborn [*S. N. Langel et al. Journal of Dairy Science 98*].

Experimental studies were carried out in the conditions of the APC "Bronevik" in the Vurnarsky district of the Chuvash Republic. The objects of the study were 3 groups of black-and-white cows of the dead period and calves of the rearing period up to 180 days, formed according to the analogous principle. To realize the productive potential of calves, biological products were used: PS-2 and Prevention-N-A. The cows of the 1st experimental group were injected intramuscularly PS-2 at a dose of 10 ml three times 45-40, 25-20 and 15-10 days before the expected calving date, the 2nd experimental group - Prevention-N-A at the indicated dose and timing, cows of the 3rd control group - biological products were not administered. Calves of groups 1 and 2 were injected intramuscularly with PS-2 and Prevention-N-A twice on days 2-3 and 7-9 at a dose of 3 ml. In the course of research work, it was found that the use of PS-2 has a more pronounced stimulating effect on protein and carbohydrate metabolism, and Prevention-N-A normalizes the acid-base state of the body and mineral metabolism. When choosing a drug, it should be borne in mind that PS-2 activates mainly humoral, and Prevention-N-A - cellular factors of nonspecific resistance.

Keywords: calves, colostral immunity, immunostimulants.

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INFLUENCE OF BIOPREPARATIONS ON THE POSTNATAL PERIOD OF HIGHLY PRODUCTIVE COWS

[1]Dr. Vladimir Semenov, [1]Pg. Elena Simurzina, [1]Cand. Svetlana Kondruchina, [2]Dr. Vladimir Tyurin, [3]Dr. Anatoly Kuznetsov, [4]Dr. Vladimir Sofronov, [4]Dr. Ali Volkov, [5]Dr. Rinat Mudarisov, [6]Dr. Natalia Kulmakova, [1]Pg. Sayat Musaev
[1]Chuvash State Agrarian University, Russia
[2]All-Russian Research Institute veterinary sanitation, hygiene and ecology – branch of FSC VIEW, Russia
[3]Saint-Petersburg State Academy of Veterinary Medicine, Russia
[4]Kazan State Academy of Veterinary Medicine by N.E. Bauman, Russia
[5]Bashkir State Agrarian University, Russia
[6]Russian Timiryazev State Agrarian University, Russia
semenov_v.g@list.ru

The article presents the results of studies of the effectiveness of the use of biopreparations based on the polysaccharide complex of yeast cells PS-2 and Prevention-N-E in comparison with the drugs PDE and E-selenium widely used in veterinary medicine in the technology of reproduction of dairy cattle.

In conditions of intensive milk production technology, the growth of herd reproduction rates and the profitability of livestock breeding are hampered by barrenness and gynecological diseases of cows [K Devender et al. 2019 Microbiol 8]. The optimal expression of the animal's defenses against the pathological process is promoted by immunoprophylaxis of the body with biological products [M Catanzaro 2018 Molecules 23].

Research work was carried out on the basis of the livestock complex of JSC "Agrofirma "Oldeevskaya"of the Chuvash Republic. The objects of research were 4 groups of pregnant (45-40 days before calving) and fresh (3-5 days after calving) cows of the Holsteinized black-and-white breed, 10 animals each. The cows of the 1st and 2nd experimental groups were injected with PS-2 and Prevention-N-E at a dose of 10.0 ml three times 40, 20 and 10 days before calving, animals of the 3rd experimental group were injected subcutaneously with the biopreparationPDE at a dose of 20.0 ml and intramuscularly E-selenium at a dose of 10.0 ml 20 days before calving, biopreparations were not used in the control group. In the course of the research work, it was found that the inclusion of biopreparationsin the flow chart of preventive measures for pregnant and fresh-calving cows helps to reduce the risk of diseases of the reproductive organs of the postpartum period, improve reproductive qualities, activate metabolic processes and fully realize the biological resource potential of productive qualities, with a more pronounced effect of Prevention-N-E. The approved biopreparations stimulated hematopoiesis; caused physiological eosinophilia, moderate neutrophilopenia with a shift of the neutrophilic nucleus to the right and lymphocytosis; selective mobilization of serum cytolytic enzymes; increased protein metabolism, activated nonspecific resistance of the organism.

Keywords: cows, biopreparations, postpartum diseases.

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ATROPHY OF QUARTER UDDERS AS A CONSEQUENCE OF UNTIMELY THERAPY OF COW MASTITIS

Dr. Vladimir Semenov, Pg. Anna Stepanova, Cand. Svetlana Kondruchina, Pg. Tatyana Ivanova, Pg. Nadezhda Lukina, Pg. Svetlana Tolstova, Pg. Alexey Semenov, Pg. Daria Biryukova, Pg. Emilia Matveeva, Cand. Alexey Aldyakov
Chuvash State Agrarian University, Russia
semenov_v.g@list.ru

The article presents the results of a study of the number of cattle in order to propose methods for preventing mastitis of cows, as well as atrophy of udder shares, using immunomodulators.

Inflammation of cattle udder covers a significant number – 15-25% of the total herd, and according to some data – up to 50%. With late and prolonged antibiotic therapy of mastitis, necrosis of the secretory epithelium develops in the alveoli part, secretion of the alveoli stops and the normal epithelium is replaced by connective tissue. In this case, the secretory epithelium will no longer recover and after recovery, milk productivity will decrease by an average of 10-15%. The search for new methods for preventing and treating mastitis without the use of antibiotics is gaining popularity [*Cardoso Consentini C E et al. 2021 Animals 11*].

Research work was carried out on the basis of Pobeda LLC in the Yalchik district of the Republic of Chuvashia. We studied the prevalence of clinical mastitis in cows in the farm. As a result of the study of 325 animals of the milking herd, 42 cows of patients with clinical mastitis were identified at the same time, which is 12.9%. Atrophy of udder lobes was observed in 41 heads, which is 12.6%, of which 35 cows have a loss of one lobe (85.4%), 5 – two lobes (12.2%), 1 – three lobes (2.4%). Ten cows with atrophy will be rejected. It should be noted that at the time of the study, another 16 animals underwent antibiotic mastitis therapy, of which 10 are at the stage of complicating the course of the disease, the inflamed proportion of which is soon atrophied.

In carrying out research work, it was found that successfully conducted treatment to maintain the former productivity of cows is not enough. Untimely detection and treatment of sick cows leads to complicated forms of mastitis and ends with the atrophy of the inflamed quarter.

Thus, the introduction of pathogenetic therapy using drugs that activate the natural mechanisms of "antimastitic" udder protection (immunomodulators) is the most important, modern and effective approach that can be used in our economy.

Keywords: mastitis, cattle, atrophy, immunostimulants.

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THE INTENSITY OF GROWTH OF THE LINDOV BREED GOSLINGS DEPENDING ON THEIR WEIGHT AT THE DAILY AGE

G. M. Toboev, N. S. Sergeeva, I. V. Voronova, N. L. Ignatieva
Chuvash State Agrarian University, Russia
tgeorg1931@mail.ru

One of the reserves for increasing the production of high-quality poultry products is the cultivation of geese. For economically viable production of goose products, it is necessary to breed highly productive breeds and lines of geese. One of such breeds that allows competing in the domestic and foreign markets is the Lindov breed of geese [1].

Egg weight is one of the most important productive indicators. The weight of eggs is affected by the live weight of geese, feeding conditions, and biological characteristics of the breed. Even within the same line, the mass of eggs in geese that are close in live weight is not quite the same. Therefore, during breeding, it is necessary to conduct selection for the equalization of the mass of hatching eggs for the biological cycle. It should be noted that the age of geese strongly affects the weight of hatching eggs and the weight of the daily goose depends on its value. The task of our research was to estimate the growth rate of the Lindow goslings depending on the weight of the eggs laid in the incubator.

The objects of research were geese of the parent herd of the Lindov breed. To perform the tasks set, the daily goslings of the Lindov breed, bred from eggs of different weights, were divided into 4 groups and raised in separate sections. During the period of the experiment, the goslings in the daily, 7-, 14-, 21-, 28-, 35-, 42-, 49-, 56-, 63--, 70- In the daytime, the live weight was determined by the method of individual weighing. Based on the results of weighing, the absolute and average daily gains of the goslings were calculated.

In our studies, we obtained positive results of the growth of experimental goslings when growing them from the daily to 70-day age. The live weight of goslings at the daily age was the highest in group 4 and it was 115 g at 3 weeks. the young goslings of the 3rd group had the highest indicators of live weight – 1385 g.. A similar trend persisted by the age of 70 days. At the end of cultivation at the age of 70 days, the experimental goslings of groups 1, 2, 3 and 4 reached a live weight of 4588, 4798, 4926 and 4795, respectively. The goslings kept in group 3 were superior to their counterparts from other experimental groups in terms of live weight at the end of cultivation.

According to the indicators of absolute and average daily gains, the goslings of the 3 experimental group also had better indicators in comparison with other groups. It was revealed that the average daily increase in group 3 from the daily age to 70 days was 1.9 g more than in groups 2 and 4, and 4.9 g more than in group 1.

The conducted studies allowed us to establish that the Lindov breed goslings, bred from eggs weighing 160-179. 9 g, were characterized by more intensive growth in comparison with other groups. According to the indicators of absolute and average daily gains, the goslings of groups 2 and 3 had more intensive growth in comparison with groups 1 and 4. It was revealed that the average daily increase in the 2 and 3 experimental groups was the greatest.

Keywords. goslings, dynamics of live weight, absolute gain, average daily gain

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VETERINARY AND SANITARY ASSESSMENT OF EDIBLE EGGS AFTER DISINFECTION OF THE SHELL WITH THE DISINFECTING AGENT «AQUALYTE (NEUTRAL ANOLYTE)»

[1]Dr. Sergey Kozak, [2]Dr. Vladimir Semenov, [1]Tatyana Egorova, [2]Pg. Valery Boronin
[1«]All-Russian Scientific Research Institute of Poultry Processing Industry» — Branch of FSC ARRTPI RAS (ARSRIPPI), Moscow region
[3]Chuvash State Agrarian University, Russia
vniippkozak@gmail.com

The content of freshly laid eggs is usually free of microflora. At the same time, bacteria from the contaminated shell can penetrate through the shell into the egg during the implementation process. Egg contamination cannot be completely eliminated due to the natural origin of this product [1]. In the production of egg products, there is a possibility that pathogenic and opportunistic microflora will enter the finished product. Washing eggs with drinking water to some extent reduces microbial contamination of the shell, but can ensure its complete release from microflora, including pathogenic [Muhammed Yüceeretal.; Terrence O'Keefe, 2019].

To prevent the ingress of extraneous microflora into egg products, scientists are developing ways to inactivate pathogenic microflora on the surface of the shell of edible eggs. Currently, a number of physical and chemical methods have been proposed for the disinfection of edible eggs. Nevertheless, the search for ways to inactivate foreign microflora on eggshells is still an urgent task. In this regard, the disinfectant "AQUALYTE / AQUALYTE (neutral anolyte)" is of interest, in which the concentration of highly active metastable (electrochemically activated) oxidants in terms of active chlorine is not less than 0.5 g/l (0.05%).

Research work was carried out in the laboratory of sanitary and hygienic assessment of raw materials and products of VNIIPP. The S. enteritidis strain was used as a test culture. The study of the disinfectant activity of the means "AQUALITE (neutral anolyte)" was carried out using test objects made of cambric cloth. To study the disinfectant efficacy of the agent in laboratory conditions, an experimental contamination of the surface of the shell of edible eggs with a test culture was carried out.

It was found that solutions of the "AQUALITE (neutral anolyte)" (according to the preparation): 50% concentration (exposure 5 min), and 100% concentration (exposure 2 min) bactericidal effect on S. enteritidis in experiments with cambric tests objects. In case of experimental contamination of the egg shell surface, solutions of the "AQUALITE (neutral anolyte)" agent at room temperature (according to the preparation): 50% concentration (exposure 5 min) and 100% concentration (exposure 2 min) bactericidal effect on S. enteritidis. Qualitative and microbiological indicators of eggs treated with "AQUALITE (neutral anolyte)" and stored for 15 days. at (4 ± 2) ˚C, they correspond to GOST "Edible chicken eggs".

Keywords: disinfection, shells, egg quality.

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RAISING CALVES WITH THE USE OF CONIFEROUS ENERGY SUPPLEMENTS IN THEIR DIETS

Sherne V.S.,
LLC "Natural Products of the Volga Region",
v.sherne@mail.ru
Lavrent'ev A.Yu., Larionov G.A., Semenov V.G., Zhestyanova L.V., Mikhailova L.R.
Chuvash State Agrarian University,
lavrentev65@list.ru.

In recent years, promising are studies related to the use of bioregulatory products in the practice of zootechnics and veterinary medicine, which are found in large quantities in the greenery of a part of coniferous trees. This paper presents the results of studies on the use of a coniferous energy additive (CED) in raising dairy calves. The experimental part of the work was carried out on purebred young calves of the black-and-white breed. Normally developed, healthy calves were used as material. For experiments on the principle of groups of analogs, four groups of calves, 10 heads each, were formed. The calves were 90 days old when tested. The duration of the experiment was 90 days. The microclimate parameters in the calf barn during the scientific and economic experiments met the established zoohygienic standards. The feeding of the experimental animals in the course of the experiments was two times a day and was carried out according to the daily routine adopted in the farm. The diets of the animals were compiled in accordance with the recommended detailed norms of the Russian Academy of Agricultural Sciences, taking into account the age, live weight and chemical composition of local forages. The calves of the control group received the basic diet. Analogues from the 1st experimental group were given CED in a dose of 25 g 1 per head per day to the main diet, the 2nd experimental group - 50 g per 1 head per day and the 3rd experimental group - 75 g per 1 head per day. Productivity control was carried out by studying live weight and average daily gains, by individually weighing them at the beginning, at the end and during the experiment at every certain time interval.

The study found that the addition of CED to the rations had a positive effect on the dynamics of the live weight of calves. Thus, the greatest live weight of animals at the age of 180 days was observed in the 2nd experimental group 166.1 ± 041, which was 6.41% higher compared to the control group, by 1.96% compared to the animals of the 1st experimental groups and by 0.85% in comparison with calves of the 3rd experimental group.

Comparison of measurements by groups showed that different doses of the drug had an effect on the proportions of the physique of the experimental calves. It should be noted that the animals of the 2nd experimental group at 6 months of age, who received a coniferous supplement at the rate of 50 g per head per day, exceeded their counterparts from the control category in height at the withers by 6.1%, oblique body length - 6, 2%, chest girth - by 5.66%.

Thus, it was found that the use of CED in the diet at a dose of 50 g per head per day helps to increase the absolute and average daily gains in live weight of calves, blood biochemical parameters and favorably affects the formation of body types for further use in the technological process.

Key words: coniferous energy supplement, calves, live weight, growth, measurements.

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POLYMORPHISM MILK PRODUCTIVITY AND MILK QUALITY OF COWS WITH DIFFERENT GENOTYPES BY THE IGF1 GENE

I.O. Efimova
Chuvash State Agrarian University, Russia
inna.efimova76@mail.ru
L.R. Zagidullin, I.Yu. Gilemhanov, T.M. Akhmetov
Kazan State Academy of Veterinary Medicine named after N.E. Bauman, Russia
zaglenar@yandex.ru
R.R. Shaidullin
Kazan State Agrarian University, Russia
tppi-kgau@bk.ru
S.V. Tyulkin, Kh.Kh. Gilmanov
V.M. Gorbatov Research Center for Food Systems RAS, Russia
tulsv@mail.ru

Introduction. The analysis of the literature sources showed that the gene of the insulin-like factor (denoted as IGF1) is a marker of milk productivity, in particular, the genotypes of this gene affect milk yield in cows, the mass fraction of fat and protein, the amount of milk fat and protein. Along with this, the IGF1 gene has an effect on the reproductive qualities of cows, such as the length of the service period, the number of inseminations for fertilization, etc.

The aim of the research is to study the milk productivity and milk quality of cows with different genotypes for insulin-like factor (IGF1) gene.

Research methods. The object of the study was cows of the Kholmogorsky breed Tatarstan type in the agricultural enterprise "Agrofirma Rassvet" (n = 79) and LLC "SHP "Tatarstan" (n = 139) Kukmorsky and Baltasinsky districts of the Republic of Tatarstan. The genotypes for IGF1 gene in cattle were determined by PCR-RFLP.

Keywords: Gene, genotype, allele, IGF1, cow, dairy productivity.

Results. On average, the milk yield of cows for lactation in groups of animals with different genotypes for IGF1 gene was 6470-7063 kg (IGF1/AA genotype), 6651-7119 kg (IGF1/AB genotype) and 7070-7435 kg (IGF1/AA genotype). Cows carrying the IGF1/B allele in their genotype exceeded their peers of the IGF1/AA genotype in different farms in milk yield by 56-372 kg and 181-600 kg, respectively. The mass fraction of fat in milk ranged from 3.66-3.78 % (IGF1/AA genotype) to 3.73-3.85 % (IGF1/BB genotype). According to the mass fraction of fat in milk, cows with the IGF1/BB genotype outperformed their peers with the IGF1/AA genotype by 0.07 % ($P<0.01$-0.001). Animals with IGF1/AB and IGF1/BB genotypes (252.7-260.6 kg and 272.2-277.3 kg) were characterized by a higher amount of fat in milk during lactation, which is more than in cows of the IGF1/AA genotype by 2.1-8.1 kg and 18.8-27.6 kg, respectively. According to the mass fraction of protein in milk, the intergroup differences of animals with different genotypes of the IGF1 gene were insignificant, their indicators were in the range of 3.18-3.23 %, the difference was in the range of 0-0.02%. It was also found that the higher amount of protein in milk during lactation was typical for animals with genotypes IGF1/AB (211.5-229.9 kg) and IGF1/BB (225.5-239.4 kg), which is higher than in first-born heifers with the IGF1/AA genotype by 3.2-5.1 kg and 12.7-19.1 kg, respectively. At the same time, in one farm, the difference in this indicator was significant ($P<0.05$) and amounted to 19.1 kg of milk protein.

IMAGE SEGMENTATION SYSTEM OF LABORATORY MICROPREPARATIONS BASED ON MACHINE LEARNING ALGORITHMS

A.V. Stepanov, A.P. Popov, A. V. Kovalenko, D.S. Yumanov
Laboratory of Hematology, Chuvash State Agrarian University, Russia
for.anton_step@edu.academy21.ru

Currently, in veterinary clinics most often resort to the microscopic method of research, in this regard, we carried out work aimed at accelerating this study and increasing its accuracy by using machine learning algorithms. An algorithm based on the calculation of the Laplacian variation from the OpenCV2 library [Bradski G 2000 Journal of Software Tools] was used to estimate the image blur. The resulting photomicrographs are passed as an input file to deep neural network software [Islam M M, Islam M T 2019 Healthcare Technology Letters], which performs automatic segmentation of the blood cell image. Next, the white blood cell differential is calculated. The neural sit is developed based on TensorFlow [Abadi M 2016 Proc. 12th Symposium on Operating Systems Design and Implementation]. The neural network architecture was built on the basis of the YOLO v2 architecture, trained on its own datasets, including 13,000 images of blood cells. The neural network recognizes three classes of objects (blood cells) erythrocytes (RBC), leukocytes (WBC), platelets (PLT). The system used makes it possible to automate the process of calculating the white blood cell differential and to reduce the time of blood analysis with an accuracy of 88% and a specificity of 90%. A software prototype was created in Python 3 using the TensorFlow framework for the recognition and classification of blood cells.

Keywords: machine vision, convolutional neural network, laboratory diagnostics, blood cell segmentation, deep learning.

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FEATURES OF CULTURAL SIGNIFICANCE OF ANIMAL SCIENCE

Dr. Renata Mikhailova, Dr. Vladimir Semenov, Dr. Anatolii Tikhonov, Mrs. Nadezhda Sergeeva, Mrs. Valentina Stepanova, Mrs. Olga Fedorova, Mrs. Marina Chernoyarova,
Department of General Education, Chuvash State Agrarian University, Russia
neti-mix@yandex.ru
Dr. Eleonora Barkova
Department of History and Philosophy, Plekhanov Russian University of Economics, Russia
barkova3000@yandex.ru
Mr. Mikhail Pronin
Department of Humanitarian Expertise and Bioethics,
Institute of Philosophy of Russian Academy of Sciences, Russia
mapronin@gmail.com

The relevance of the research is due to the needs of the development of modern animal breeding. In this regard the problem concerns, on the one hand, a person (consumer of animal products) as the main element of the global food system, and, on the other hand, the quality of life of an animal, which is reflected in the problem of "protecting animals "from farm to fork." The relevance of the research is also explained by the peculiarity of the modern stage of science development which focuses on the specifics of a world commensurate with man. This specific feature is characteristic of objects of the animal world including farm animals. Animal science studies the problems of farm animals including their maintenance, feeding, breeding and proper use. The "twists" and "depths" of reflection on animal science pose a problem that is of value for modern man and society.

The aim of the paper is to reveal the features of cultural significance of animal science for the society and humans. The theoretical and methodological prerequisites for the study of the peculiarities of cultural significance of animal science serve to reveal this goal.

The paper reveals the concept of culture with spirituality as its essence and considers a cultured man with a high degree of spiritual maturity. In the process of interacting with nature, a cultured person is able to act as per its laws and to treat it responsibly. We are talking about the noosphere - coordinated interaction of man with nature, which presupposes the measure of man in this interaction. The paper analyzes the factors of cultural significance of animal science such as nature, society, subjective factor.

The authors refer to farm animals specifically as living beings. On the one hand, this attitude is caused by the person's attitude to them as an object to meet their various needs. On the other hand, it is determined by the attitude towards them as to a specific subject who needs a favorable life, protection from suffering and humane treatment.

Conclusion. The entire system of social relations set the features of cultural significance of animal breeding, which include: 1) farmer's specific local attitude towards animals, which takes into account the reasons of their presence in his life; 2) the existence of many forms of animal breeding based on the variety of forms of adaptation of farm animals to various natural and geographical conditions; 3) the rootedness of farmer's consciousness, which forms in him a "sense of place" depending on the specifics of the surrounding natural habitat of certain species of farm animals.

Keywords: animal science, farm animals, nature, man, cultural significance.

SAFETY AND QUALITY OF FEED FOR PIGLETS

[1]Dr. Nataliya Kulmakova, [1]Dr. Taram Magomadov,
[1]Dr. Nikolay Kostomahin, [2]Dr. Vladimir Semenov,
[3]Dr. Rinat Mudarisov
[1]Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Russia
[2]Chuvash State Agrarian University, Russia
[3]Bashkir State Agrarian University, Russia
nkylmakova@rgau-msha.ru

The article presents the results of research on the safety and quality of feed for pigs of domestic producers. The main indicators of safe and high-quality feed are general toxicity, microbiological indicators (total bacterial contamination, the presence of opportunistic and pathogenic microflora), the content of toxic elements, mycotoxins, harmful impurities.

The materials for the study were 4 samples of the starting complete feed for piglets SK-3 of domestic producers: the 1st sample-LLC "NTK" (New feeding technologies, Krasnodar Territory), the 2nd sample - LLC "Athens-Volga" (Volgograd region), the 3rd-sample of the feed mill "VEGA" (Novosibirsk), the 4th – sample of CJSC "Tosnensky feed mill" (Leningrad region). Complete feed SK-3 is intended for piglets aged from 10 to 42 days.

Organoleptic characteristics of mixed feed for piglets SK-3 met the requirements of GOST 34109-2017: cylindrical granules with a glossy surface without foreign impurities and traces of mold. The color is light brown. The smell is characteristic of the set of ingredients included in the recipe, without musty, musty and other foreign odors. The granule size of all feed samples ranges from 5.9% to 16.1%; the granule length is not more than 6 mm and the diameter is not more than 4 mm.

The assessment of the total bacterial contamination showed that sample No. 3 has the maximum level of contamination, and the lowest level in sample No. 1. The total bacterial contamination of the analyzed samples ranged from 1.5×104 to 4.2×104 CFU/g, which did not exceed the norm (according to GOST 31708-2012 (ISO 7251:2005) – 5.0×104 CFU/g) and indicates the safety of the feed produced. Pathogenic escherichia and salmonella were not detected in the presented samples.

The content of toxic elements in mixed feeds did not exceed their maximum permissible level and met the requirements of GOST 34141-2017: the amount of mercury varied from 0.002 to 0.007 mg/kg (according to GOST no more than 0.1 mg/kg); cadmium - from 0.005 to 0.01 mg/kg (according to GOST no more than 0.4 mg/kg); lead – from 0.005 to 0.01 mg/kg (according to GOST no more than 5.0 mg/kg); arsenic-from 0.002 to 0.007 mg/kg (according to GOST no more than 1.0 mg/kg).

The level of radionuclides in compound feeds did not exceed their maximum permissible level and corresponded to the standards provided for in the instructions on radiological quality control of feed of the Ministry of Justice No. 831 on 14.04.1995. The amount of strontium-90 was in the range from 25 to 52 Bq / kg (according to GOST no more than 65 Bq/kg), caesium-137 - from 12 to 61 Bq/kg (according to GOST no more than 600 Bq/kg).

Thus, the analysis of samples of the starting complete feed for piglets SK-3 of domestic producers on organoleptic, physico-chemical, bacteriological and sanitary-mycological indicators, for the presence of toxic elements and radionuclides showed that all samples meet the requirements of safety and quality.

Keywords: feed, piglets, quality, safety.

PREVENTION OF THE SPREAD OF FOCI RABIES IN THE MOSCOW REGION

Cand. Irina Leonteva
Timiryazev State Agrarian University-Moscow State Agricultural Academy, Russia
irina.leonteva.88@list.ru

The article presents the results of the research in the veterinary services algorithm of actions aimed at preventing the spread of rabies focus in the Moscow region.

The causative agent of rabies is an RNA-containing rhabdovirus of the genus Lyssavirus (Rabies virus), of the family Rhabdoviridae of the order Mononegavirales. The causative agent is resistant to temperatures below 0°C, is destructed at a temperature of 60°C in 10 minutes, at a temperature of 100 °C - instantly. The incubation period of the disease is from 14 to 60 calendar days [1].

The disease is observed in many countries of the world, including the Russian Federation.

The rabies epidemic situation among domestic and wild animals on the territory of the Moscow region remains tensed. It has zoonotic character, the main reservoirs of rabies are wild canine foxes and raccoon dogs.

In particular, animal rabies in 2020 was registered in such urban districts as Domodedovo, Lotoshino, Lukhovitsy, Mozhaisk, Naro-Fominsk, Odintsovo, Orekhovo-Zuevo, Ruza, Serpukhov, Stupino, Chekhov, Shatura, Yegoryevsk. A total of 42 cases of rabies were identified, both in wild and domestic animals [2].

For the prevention of rabies, veterinary specialists vaccinate susceptible animals with vaccines according to the instructions for their use. In 2020, 469,280 pets were vaccinated, of which 177,395 were cats and 291,885 dogs. Also, stray animals were vaccinated, 20386 animals without owners were vaccinated. The vaccine was laid out ("Rabivak-O / 333") manually and using small aircraft for oral immunization of wild carnivores. Organized sanitary and educational work with the involvement of the media, made speeches on radio and television, and also marked up information on the official websites of the administration of municipalities.

The issues of prophylaxis and prevention of rabies among humans are under constant control of the Rospotrebnadzor in the Moscow region.

Keywords: Moscow region, rabies, prevention.

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PHYSIOLOGICAL STATE AND NONSPECIFIC RESISTANCE OF CALVES UNDER THE ACTION OF ANALOGUE OF ESTRONE AND RONCOLEUKINUM ON THE BODY OF DOWN-CALVING COWS

Klyapnev A.V. cand. of biol. science, ass. prof;
Velikanov V.I. doct. of biol. science, prof;
Sletov A.O. postgraduate
Dunaevskaya A.A. postgraduate
Trunova E.A. postgraduate

Department of Anatomy, Surgery and Internal Noncommunicable Diseases,
Nizhny Novgorod State Agricultural Academy

Previously, was studied the effect of thymogen dipeptide on the formation of colostral immunity and nonspecific resistance in newborn calves [1].

The aim of the study was to assess the physiological state, formation of colostral immunity and nonspecific resistance of calves in the early postnatal period of ontogenesis after injection analogue of estrone (Synoestrol 2%) at a dose of 0.8 ml and recombinant interleukin-2 (Roncoleukin) at a dose of 0.8 ml for pregnant cows 3-9 days before calving. In cows of the experimental group, before calving, an increase in the immunoreactivity of the body occurred, as a result of which the formation of immunoglobulins occurred, the level of which increased in the colostrum of the first milk yield by 41.3%. The calves of the experimental group had an increase in the level of total immunoglobulins in the blood serum of one day after birth by 35.3%. Studying the level of individual classes of immunoglobulins G, M, A, their increase was found, respectively, by 39.2; 10.0 and 15.4%. It is not excluded that, in addition to the quantitative increase in immunoglobulins in the fed colostrum, there was an increase in the intensity of pinocytosis of its components by the cells of the mucous membrane of the small intestine. The level of nonspecific resistance in the calves of the experimental group was higher, which was manifested by an increase in the bactericidal, lysozyme activity of blood serum; phagocytic activity of neutrophils and phagocytic index, respectively, by 17.6 and 9; 16.8 and 11.5%. The content of leukocytes in the blood of calves of the experimental groups was higher by 9.7 and 12.9%, respectively, 1 and 10 days after birth. The content of certain types of leukocytes in the calves of the experimental groups was similar one day after birth, and on the 10th and 30th days of life there was an increase in the level of blood lymphocytes in the calves of the experimental group. The index of lymphocytes / segmented neutrophils was higher in such calves, it indicates an improved adaptation of animals to environmental conditions. The calves of the experimental group had a higher average daily body weight gain over a 4-month rearing period due to stimulation of digestion, increased synthesis of proteins and carbohydrates, increased nonspecific resistance and better adaptation to environmental conditions.

Keywords: down-calving cows, newborn calves, Synoestrol 2%, Roncoleukinum.

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AGRO ENGINEERING: STATE AND PROSPECTS

MATHEMATICAL MODEL OF ANIMAL COLOSTRUM DEFROSTATION IN A MICROWAVE INSTALLATION WITH QUASI-STATIONARY TOROIDAL RESONATORS

Dr. Irina Ershova,
Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM", Moscow, Russia
eig85@yandex.ru
Dr. Mariana Prosviryakova
Russian State Agricultural University-MTAA named after K. A. Timiryazev, Moscow, Russia
prosviryakova.maryana@yandex.ru
Dr. Mikhailova Olga
Nizhny Novgorod State University of Engineering and Economics, Knyaginino, Russia
ds17823@yandex.ru
Dr. Novikova Galina
Nizhny Novgorod State University of Engineering and Economics, Knyaginino, Russia
NovikovaGalinaV@yndex.ru
Dr. Storchevoy Vladimir,
Department of Automation and Robotization of Technological Processes named after Academician I. F. Borodin, Russia
energo-air@rgau-msha.ru

The article is devoted to the development and study of the parameters of a two-resonator microwave installation of continuous-flow operation with quasi-stationary toroidal resonators, which make it possible to separate the processes of defrosting and heating of animal colostrum, ensuring electromagnetic safety and high electric field strength. The methodology for the development of a microwave installation provides for the construction of mathematical models of defrosting and heating of animal colostrum by the action of an electromagnetic field of ultrahigh frequency (EMFUHF) taking into account phase transitions, their study, development of the structural design of the working chamber of the installation with effective operating modes [3, 4].

The scientific novelty is represented by mathematical models of defrosting and heating of animal colostrum by the influence of EMFUHF taking into account the phase transition in the microwave installation; the structural design of the installation with quasi-stationary resonators with a common base, allowing to separate the processes of defrosting and heating of animal colostrum for exposure to EMPWS in different doses. Low-power air-cooled magnetrons with a shift of 120 degrees are installed on the surfaces of the resonators, in the area of the capacitor parts [1, 2].

Keywords: mathematical model, quasi-stationary resonators, animal colostrum, electromagnetic field strength.

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TECHNOLOGY OF MACHINE CLEANING UP OF CABBAGE PILING OF HEADS IN CONTAINERS

Dr. S.S. Alatyrev, Dr. I.S. Kruchinkina, Dr. A.S. Alatyrev
Engineering faculty of the Chuvash State Agrarian University, Russia
S_Alatyrev1955@mail.ru

Last years in our country and abroad (in Canada, Germany, Denmark, Italy, China, Japan of and other) began to show enhanceable interest in mechanization of cleaning up of head cabbage [1]. At the same time in connection with introduction of the mechanized technologies sharply the problem of maintenance of commodity type of cabbage became from the mechanical damages of heads [2]. Considerable damages heads get at shipping in the basket of transport vehicle ton of and in the process of transloadings at the bookmark of them on storage.

In this connection the aim of researches is development of new flowsheet of cleaning up of head cabbage and technical equipments for her realization, allowing substantially to bring down her повреждаемость in the process of cleaning up and bookmark on storage.

Here, unlike the traditional method of cleaning up, in combine the stream of heads is distributed by means of longitudinal conveyer along a light cart with the containers of accompanying transport vehicle. Then working, being on the special ground envisaged on the lateral side of light cart by means of clamps, select commodity heads for the longitudinal conveyer of combine and pass to the workers being in containers, for the careful piling them, since his distant end. In the end, when in a container practically there will not be available space, a worker passes to the nearby empty container, and дозагрузку of previous container conducts worker being on the special ground. Thus a cabbage foliage and other wastes are shipped on earth at the end of longitudinal conveyer.

After filling with of all containers heads the special ground for workers is translated in a transport position (above containers) by means of a worm mechanism. Further a transport vehicle is directed in a vegetable store, where a cabbage in containers is mortgaged on storage by means of fork loader, passing transloadings, and in the basket of transport vehicle set empty containers. A duty cycle recurs further.

This technology is investigational on the basis of theory of mass service. The optimal number of workers busy on piling of heads at maintenance of combine of one row is educed as a result, equal four.

Keywords: head cabbage, machine cleaning up, careful piling of heads in containers.

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DIRECTIONS FOR IMPROVING THE EFFICIENCY OF A WHEEL DRIVE WITH A BUILT-IN DIFFERENTIAL

Yuriy F. Kazakov, Vladimir N. Batmanov, Vladimir S. Pavlov, Vladimir I. Medvedev
Department of Transport and Technological Machines and Complexes, Chuvash State Agrarian University, Russia
ura.kazakov@mail.ru

The operation of the drive wheel is influenced by structural, operational and technological factors. The structural factors include: the parameters and properties of the tire, the ratio of the profile width to its height, the tire design (diagonal or radial), the elastic properties of the tire [1]. Mode factors include rolling on the surface, leaning on the treadmills of the tire or sinking, forming a track. Technological factors are the properties of the support surface, which allow the maximum value of the rolling coefficient to be realized with different probabilities. These also include the ratio of the input torque and the vertical load. To increase the efficiency of the wheel, it is necessary to reduce the rolling resistance coefficient and the slip coefficient, and increase the coupling mass utilization coefficient. These coefficients depend on the normal load on the wheel, on the coupling weight, which implies ballasting and leads to over-compaction of the soil at the depth of the arable layer and the sub-arable horizon [2]. Therefore, the search for ways and methods of influencing and controlling the structural, operational and technological factors that affect the operation of the wheel is an urgent scientific task.

We have proposed the concept of improving the wheel propulsion by separating the points of application of the payload, the longitudinal pushing force and the driving torque from the axis of rotation [3]. The separation of the point of application of the external load (the gravity of the transported load and the longitudinal pushing force) from the center of rotation of the wheel allows you to control the rolling coefficient of the wheel. As soon as the height of the application point exceeds the radius of the wheel, the rolling resistance coefficient becomes less than the same indicator of the "classic" wheel. If the point of application of the torque is separated from the axis of rotation, and it is supplied to the carrier satellite of the built-in planetary gearbox, then the turning moment and the lever moment are formed, and the automatic transition of the planetary gearbox to the wheel differential mode is provided. Due to the continuous change in the height of the axis of the driving satellite, the wheel has the functions of a ground clearance regulator, which automatically reacts to the irregularities of the support surface. The wheel rim, represented by a combination of a central circular treadmill and side incompletely circular tracks, contributes to the formation of a high tangential force.

Keywords: wheel drive, wheel differential, wheel efficiency.

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UV TREATMENT OF SEEDS BEFORE SOWING IN FORESTRY PRODUCTION - AN ENVIRONMENTAL AND PROSPECTIVE METHOD

Doct. of Techn. Sc. Nadezhda Petrovna Kondratyeva[1] *,
Cand. of Agricult. Sc. Iteshina Natalia Mikhailovna[1],
Cand. of Agricult. Sc. Dukhtanova Nadezhda Vasilievna[1],
Cand. of Agricult. Sc. Bolshin Roman Gennadievich[1],
Doct. of Techn. Sc. Kirillin Nikolay Kirillovich[2],
Cand. Of Techn.Sc. Krasnolutskaya Maria Gennadievna [1]
Doct. of Techn. Sc. Ovchukova Svetlana Aleksandrovna[2],
Doct. of Techn. Sc. Zaitsev Petr Vladimirovich[2],
[1] Izhevsk State Agricultural Academy
*aep_isha@mail.ru
[2]Chuvash State Agrarian University, Russia

Annotation: Research carried out on the treatment of Scots pine (Pinus sylvestris L.) and Finnish spruce (Picea abies f. Fennica (Regel) Lindm.) before sowing seeds.

The article presents the results of UV treatment of seeds before sowing in forestry production. Previous studies on other crops showed a positive result [1, 2]. Laboratory tests on irradiation of seeds of Scots pine (Pinus sylvestris L.) and Finnish spruce (Picea abies f. Fennica (Regel) Lindm.) UV radiation were carried out in May 2020. Experimental sowing of seeds was carried out in the nursery "Zavyalovoles" of the branch of the Autonomous Institution of the Udmurt Republic of Udmurtles on May 12, 2020. Control over seed germination and assessment of soil germination were carried out at intervals of 14 days.

The results obtained indicate that depending on the type of woody plants, their bioecological characteristics, the class of seed quality, the response to UV irradiation can be different. In general, the use of UV treatment of seeds improves their sowing qualities, thereby increasing the energy of germination, germination, and further stimulates growth processes. Based on the foregoing, UV treatment of coniferous seeds in forestry production can be considered one of the innovative, energy-efficient, environmentally friendly, electrically safe and effective methods.

Key words: UV irradiation, forest crops, pre-sowing seed treatment

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ELECTRICITY PRICE CATEGORY AND PHOTOPERIOD OF LIGHTING SYSTEMS AFFECT THE EFFICIENCY OF VERTICAL FARMS

Dr. Sc. Nadezhda Kondrateva,
Department of Automated Electric Drive, Izhevsk Agricultural Academy, Russia
aep_isha@mail.ru
Dr. Sc. Svetlana Ovchukova,
Department of Mechanization, Electrification and Automation of Agricultural Production,
Chuvash State Agrarian University, Russia
aep_isha@mail.ru
PhD. Dmitry Filatov,
Department of Agricultural electrification, Nizhny Novgorod Agricultural Academy, Russia
filatov_da@inbox.ru

One of the key challenges in the ongoing urbanization around the world is transporting large quantities of food to serve large populations. One solution to this problem is the vertical truss model. Vertical farms can make food production efficient and sustainable. It is possible to get a crop all year round without interruption due to climate change, season or adverse natural events. Controlled vertical vertical farms provide 4-6 times higher yields per unit area than traditional greenhouses and require less irrigation. However, vertical truss technology requires several times more energy. The most efficient light sources are LEDs. The advantages of LED irradiators in comparison with other artificial light sources for use in photoculture are the ability to form a more efficient radiation spectrum, flexible control, and low dependence of electrical characteristics on the deviation of the supply voltage. An important parameter for the efficiency of vertical trusses is the operating mode of the lighting system. The purpose of the study is to determine the most effective operating mode of the lighting system by the price category for electricity when growing vegetables in vertical farms with a controlled environment. In Russia, there are currently six price categories for the payment of consumed electricity. Price categories have different electricity price charts throughout the day. For the calculations, the limit levels of prices for electrical energy (power) supplied to consumers with a maximum power of energy receivers of less than 670 kW were used. The calculations were carried out for a farm with an electric power of 0.5 MW for growing microgreens. The growing period is 10 days. Continuous and periodic modes of operation of the lighting system with a total operating time of 16 hours / day are considered. For growing plants in vertical farms with a controlled environment in Russia, the most economically profitable is the II price category with a differentiated electricity tariff for three zones of the day for a periodic operation of the lighting system. The periodic mode of operation should provide a change of light and darkness in the ratio of 8/4 hours (two cycles) during the day. The periods of operation of the lighting system are 11.00-19.00 and 23.00-7.00..

Keywords: Vertical farms mode of the lighting system, the electricity price

EFFECT OF PULSE RADIATION OF MERISTEMIC ROSE PLANTS

Doct. of Techn. Sc. Kondratyeva Nadezhda Petrovna[1],
Cand. of Techn. Sc. Bolshin Roman Gennadievich[1],
Cand. of Techn. Sc. Krasnolutskaya Maria Gennadievna [1]
Baturin Andrey Ivanovich[1],
Baturina Kristina Andreevna[1],
Doct. of Techn. Sc. Kirillin Nikolay Kirillovich[2],
Doct. of Techn. Sc. Ovchukova Svetlana Aleksandrovna[2],
Doct. of Techn. Sc. Zaitsev Petr Vladimirovich[2],
[1] Izhevsk State Agricultural Academy
*aep_isha@mail.ru
[2]Chuvash State Agrarian University, Russia

Annotation: The results of a study on the irradiation of a meristem rose of the climbing variety "Camelot" (Scandere Rosa) by a phyto-installation operating in a pulsed irradiation mode are given.

Key words: Pulse irradiation, meristem plants, climbing rose, LED phytoinstallations

The article presents the results of the study of the growth of green mass of the meristem rose of the climbing rose variety "Camelot", which is under the irradiation of a phyto-installation operating in a pulsed mode. The use of LED phyto-irradiators for various crops was recently justified. The experiments have shown good results. [1, 2] Studies on the irradiation of the meristem rose of the climbing climbing variety "Camelot" (Scandere Rosa) with a phyto-installation operating in a pulsed irradiation mode were carried out from March to April 2018. Measurements and processing of readings were carried out every 5 days.

For comparison, in parallel with the pulsed irradiation, the climbing rose was irradiated with an LED lamp with a cold irradiation spectrum and fluorescent lamps. Studies have shown that the growth of green mass (leaf surface area) differs from the nature and method of irradiation of meristemic rose plants. A phyto-plant operating in a pulsed mode showed that its use led to a higher growth rate of leaves, which significantly reduces the time for transferring meristem plants to the rooting stage, and then to the adaptation stage. There is also a noticeable difference in electricity consumption due to intermittent irradiation.

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TOWARDS A MATHEMATICAL MODEL OF PLANT GROWTH

Prof. Ivan Maksimov,
Chuvash State Agrarian University, Russian
maksimov48@inbox.ru
Graduate student Aleksei Apaseev
Chuvash State Agrarian University, Russian
Ph.D Vladimir Maksimov
Chuvash State Agrarian University, Russian
Ph.D Evgeny Alekseev
Chuvash State Agrarian University, Russian
zhenia_alex@mail.ru
Ph.D Nikolai Puchkarenko
Chuvash State Agrarian University, Russian
stl_mstu@mail.ru
Student Nikita Maksimov
Chuvash State Agrarian University, Russian

Annotation. To assess the functioning of the «plant– soil–air» system, the concept of plant growth potential is introduced, which is the ratio of the power spent on the formation of a unit of dry mass of vegetation.

Introduction. Operational management of crop yield formation is an important task in crop production. Evaluation of the functioning of the system «plants–soil-air» (P-P-V) is carried out by dimensionless coefficients, which are the ratio of the substance mastered by plants to the incoming one. The product of these coefficients in terms of light-heat-food-gas-and moisture supply represents the reliability of the P–P-B system.

Results. The growth potential of plants is determined by the expression:

$$\xi = \frac{\Delta N}{\Delta m} \quad (1)$$

where ΔN is the power spent on forming a unit of plant mass Δm.

The power spent on the formation of a unit of plant mass can be roughly determined from the fundamentals of non-equilibrium thermodynamics of irreversible processes, since kinetic equations of the form are performed near the equilibrium state for irreversible processes

$$I = \sum_{j=1}^{n} L_{ij} X_j \quad (i = 1,2, \dots, n), \quad (2)$$

where I_i - thermodynamic flows, X_j-thermodynamic forces, L_{ij}= const-phenomenological coefficients.

Since 1919, a number of equations have been created for the mathematical description of the growth of an individual plant organ, an entire plant, or the entire vegetation cover. The most effective one should be considered, in our opinion, the equation of Yu. K. Ross

Depending on the biological time t of plant development (seed germination, seedling formation, tillering, stemming, ear formation, earing, flowering, development of milk ripeness, development of wax ripeness, development of full ripeness for cereals; it is possible to consider for other types of agricultural crops), the values of the coefficients are variable, then the entry will be more fair.

$$H_{рпв}(t) = m_э(t) \cdot n_э(t) \cdot p_э(t) \cdot r_э(t) \cdot s_э(t). \quad (4)$$

THE TECHNIQUE OF DETERMINING PARAMETERS AND OPERATION MODE OF THE TILLAGE UNIT DISC-MOVERS

Dr. Yuriy Konstantinov,
Department of Engineering, Chuvash State Agrarian University, Russia
konstantinov@polytech21.ru
Dr. Aleksander Akimov
Department of Engineering, Chuvash State Agrarian University, Russia
akimov_mechfak@mail.ru
Dr. Vladimir Medvedev
Department of Engineering, Chuvash State Agrarian University, Russia
if7@academy21.ru

About 20–55% of the total tractor power of arable unit is lost due to excessive slippage of its driving wheels, deformation of tires and soil. Power losses due to excessive slippage can be reduced by using the combined plows with disc-movers (driving discs), which receive power from the tractor's PTO shaft and reduce the draft force on its drawbar. Wheeled tractors work with the greatest efficiency if the slippage of the driving wheel is in the optimal range, namely, in the range of 8–12%.

Traction indicators of the tractor can be estimated by the dimensionless dependence of the coefficient of use of the coupling weight φ on the slippage δ of the tractor driving wheels. These dependences φ(δ) are determined experimentally [1]. By definition of the coefficient φ, the draft force on tractor drawbar is $P = G\cdot\varphi$, where G is the coupling weight of the tractor. According to the allowable slippage value δ_a using the mentioned dependence, it is easy to determine the allowable tractive effort $P_a = G\varphi(\delta_a)$.

The total traction resistance of the plow can be determined according to the simplified formula $R = Kabn$, where K is the specific draft of the plow determined by dynamometry, a is the plowing depth, b is the plow working width, and n is the number of plow bottoms.

Let us denote by m the number of disc-movers of the arable unit. Then, in the case of its uniform motion, the equilibrium condition of the forces applied to the unit is satisfied

$$G\varphi(\delta_a) = Kabn - mR_d,$$

where R_d is the driving force of the disc-mover. In the mode of maximum efficiency of the disc-mover, the R_d value is expressed through the relative depth $\xi = h/r$ (h – the disc cutting depth, r – the disc radius), according to the previously developed technique. Thus, we obtain an equation for ξ:

$$mR_d(\xi) = Kabn - G\varphi(\delta_a).$$

Solving this equation by one of the well-known numerical methods, we will determine the depth of cut of the disc-movers $h^* = \xi^*\cdot r$, which ensure the allowable slippage value δ_a.

Keywords: disc-mover, plowing unit, energy saturated tractor.

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EQUATION OF MOTION OF A WHEEL WITH A BUILT-IN DIFFERENTIAL

Yuriy F. Kazakov, Vladimir N. Batmanov, Vladimir S. Pavlov, Vladimir I. Medvedev
Department of Transport and Technological Machines and Complexes,
Chuvash State Agrarian University, Russia
ura.kazakov@mail.ru

The type of transmission of the vehicle determines the smoothness of the transmission of torque. This helps to reduce the dynamic impact on the ground and thereby increase the cross-country ability of the car. The elastic slip loss of the tire is proportional to the square of the supplied torque. Wheeled mobile power vehicles are equipped with inter-axle and inter-wheel differentials. The use of wheels with integrated differentials will improve the performance of vehicles. The main design feature – one of the satellites of the built-in planetary gearbox is the carrier and the drive [1].

The purpose of the research is to establish the relationship between the driving moment and the rolling resistance moment, the moments of inertia of the driving gear and the wheel, as well as to assess the impact on the wheel operation of the eccentric application of vertical load and longitudinal pushing force. Based on the provisions of theoretical mechanics, the theory of motion of the automobile wheel, the equation of motion is obtained. The balance of moments for the uniform movement of the wheel and during acceleration is presented. During the two-stage acceleration, the planetary gearbox automatically switches to differential mode, gradually reducing the amount of driving torque on the wheel rim, preventing the wheel from slipping on the support surface[2].

Due to the movement of the drive gear axis under the action of the supplied torque, the load increases in the incoming zone of the wheel. As the driving torque on the wheel increases, the ground shifts at a certain distance from the contact surface, and the effect of increasing the actual diameter of the wheel is achieved. If the coupling properties of the ground do not change in depth, the wheel's coupling with the ground increases due to a more uniform distribution of pressures and vectors of tangential forces in contact. But since the effect of increasing the outer diameter occurs due to the peculiarities of the interaction of the wheel with the ground, and not actually, so there is no negative consequence of increasing the diameter-an increase in the mass and moment of inertia of the wheel, an increase in the center of gravity of the machine. In large-diameter wheels, the use of a differential allows you to reduce the required power of the power plant, its coefficient of adaptability.

The equations for different modes of operation of the wheel are presented: free rolling, neutral mode, uniform rotation and acceleration.

Keywords: wheel with integrated differential, equation of motion, wheel acceleration

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MATHEMATICAL MODEL OF INTERACTION WITH SOIL OF A POWERED DISC WITH A BLUNT BLADE

Dr. Yuriy Konstantinov, Dr. Aleksander Akimov, Dr. Vladimir Medvedev
Department of Engineering, Chuvash State Agrarian University, Russia
konstantinov@polytech21.ru
Department of Engineering, Chuvash State Agrarian University, Russia
akimov_mechfak@mail.ru
Department of Engineering, Chuvash State Agrarian University, Russia
if7@academy21.ru

The experience of using disc cultivators shows that their discs become blunt and lose their cutting ability. As a result, the quality of soil cultivation decreases, stubble and weed cutting worsens. In addition, the traction resistance of blunt discs is 12–37% higher than that of sharp discs [1].

Therefore, the problem of theoretical determination of the force characteristics of a blunt blade of disc coulter is relevant. The purpose of this study is to build a mathematical model of the interaction of a blunt blade of a powered disc coulter with a soil. Such a model for a sharp disc blade was developed earlier [2].

In the case of a blunt blade, the interaction of the blade edge with the soil must be taken into account. If the velocity vector of some point of the blade makes with the normal to it an angle less than the angle of friction of the soil against the blade, then the vector of the soil reaction to the elementary section of the blade adjacent to this point is directed against the velocity vector of this point. And if this angle is greater than the angle of friction, then the mentioned above reaction vector makes with the normal to the blade an angle equal to the angle of friction.

It has been shown that, in general, the cutting part of a blade edge consists of three segments. For the points of the lower and upper segments of the blade, the velocity vectors of the points of these sections make angles with the normals less than the friction angle, and for the points of the middle section the corresponding angles are greater than the friction angle.

The operation mode of the disc coulter is determined by two dimensionless parameters: the kinematic coefficient equal to the ratio of the peripheral speed of the disc to the forward speed, and the relative depth equal to the ratio of the disc cutting depth to its radius.

Depending on the specified parameters the expressions for the principal vector of elementary reactions of the soil to the edge of the blade of the powered disc coulter and their principal moment about the center of the disc are obtained and analyzed.

Keywords: disc coulter, blunt blade disc-soil interaction.

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JUSTIFICATION OF THE EFFECT OF VOLUMETRIC HEATING OF FROZEN COLOSTRUM OF ANIMALS IN A TWO-RESONATOR INSTALLATION

Dr. Novikova Galina,
Nizhny Novgorod State University of Engineering and Economics, Russia
NovikovaGalinaV@yandex.ru
Dr. Ershova Irina
Federal Research Agroengineering Center VIM, Russia
eig85@yandex.ru
Dr. Mikhailova Olga,
Nizhny Novgorod State University of Engineering and Economics, Russia
ds17823@yandex.ru
Dr. Prosviryakova Mariana,
Nizhny Novgorod State University of Engineering and Economics, Russia
prosviryakova.maryana@yandex.ru
Dr. Storchevoy Vladimir,
Department of Automation and Robotization of Technological Processes named after Academician I. F. Borodin, Russia
energo-air@rgau-msha.ru

The article is devoted to the substantiation of the effect of volumetric heating of frozen animal colostrum in a two-cavity installation [1]. The dielectric parameters of colostrum were analyzed in the temperature range from minus 12 ° C to plus 40 ° C. Theoretical studies of changes in the absorption coefficient of the electromagnetic field and the depth of penetration of a wave with a length of 12.24 cm in the process of defrosting and heating of cow colostrum with a fat content of 6.4% have been carried out [2]. The penetration depth of the electromagnetic field into the frozen raw material is less (0.2-1.0 cm) than at its positive temperatures (1.0-2.17 cm), this is explained by an increase in dielectric losses in the region of negative temperatures. With such a significant difference in their dielectric characteristics and the depth of penetration of an electromagnetic field of ultrahigh frequency (EMPHF) into colostrum, their heating rate is significantly different. Therefore, the installation should contain two cavity resonators, which provide different doses of the effect of EMPHF on colostrum, which differs in its state of aggregation. The installation contains a vertically located annular resonator of rectangular cross section without a lower annular base, docked with a rotating base of a conical resonator directed with its apex downward, where a ball valve is installed. Opposite the window and above the dielectric partition, a dielectric guide bar is attached to the inner side surface of the ring resonator [3].

Keywords: animal colostrum, ultrahigh frequency, dielectric parameters.

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REVIEW OF PROMISING TECHNICAL MEANS FOR STORING VEGETABLE PRODUCTS AND MAINTAINING A MICROCLIMATE

Mr. Dmitrii Poruchikov, Dr. Andrei Grishin, Dr. Irina Ershova

Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM"
dv.poruchikov@yandex.ru
5145412@mail.ru
eig85@yandex.ru

This article presents devices for regulating the temperature of a potato storage using a heat pump, which contain a potato storage; heating object; low-grade energy source; circuits of a low-potential source of energy, refrigerant, heat carrier, coolant; compressor; capacitor; throttle valve; evaporator; temperature sensor; automation elements, characterized in that it contains an additional evaporator installed on the refrigerant circuit, the input of which is connected to the condenser through an electronic three-way valve and a throttle valve, the output is connected to the main evaporator [1]. And also, an installation containing a solar energy source, a generator, an evaporator, a condenser, a turbine with a low-boiling working substance, a heating object, an absorption refrigeration machine, a low-grade energy source, it additionally contains a heat pump, the input of which is connected to a low-grade energy source, the output through an electronic three-way a faucet, an evaporator, connected to a turbine, a heating object and an absorption-refrigeration machine [2, 3].

Thus, the system for maintaining the temperature regime of the potato storage using a heat pump with modernized electrical regulators produces heat, and through the use of an additional evaporator - cold, which is used in the warm season, as a result of which the optimal temperature regime in the potato storage is maintained throughout the year.

The upgraded heat pump has the following advantages:

- the potato storage is cooled and heated to maintain the temperature during long-term storage;
- efficiency - the cost of producing 1 kW / h of thermal energy is 3 ... 5 times lower than that of other sources;
- energy saving - the system allows to produce heat and cold using renewable energy - a low-potential source of soil energy, while traditional energy sources are not used;
- environmental friendliness and safety - poisonous, environmentally dirty, explosive and fire hazardous coolants and heat carriers, and refrigerants are not used;
- reliability - the modernized heat pump has a minimum of moving parts with a long service life.

Thus, due to the design of this device, it is possible to maintain the temperature regime for storing potatoes, which leads to a decrease in its losses during long-term storage.

Keywords: heat pump, vegetable storage, microclimate.

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ECONOMICS AND MANAGEMENT: CHALLENGES AND AREAS OF DEVELOPMENT

AGRICULTURAL DEVELOPMENT AS A FACTOR OF ENSURING IMPORT SUBSTITUTION AND STRENGTHENING FOOD SECURITY OF THE COUNTRY

N.Z. Zotikov, E.G. Lyubovtseva, A.F. Savderova,
FSBEI HE "Chuvash State University named after I.N. Ulyanov "
zotikovcontrol@yandex.ru

Annotation. The question of the need to develop agriculture and import substitution has become especially relevant after the start of the massive application of economic sanctions against Russia by the West, the fall in oil prices, and the reduction in budget revenues from the sale of energy resources. Awareness of the fact that Western sanctions are serious and for a long time, forced the Government of the Russian Federation to adopt long-term programs to support the agricultural sector of the economy, since it is influenced by factors of seasonality and duration of the production cycle.

Study. Based on the results of the analysis, the following was established.

1. Agriculture occupies an insignificant share in the total sales proceeds. Meanwhile, the profitability of agricultural production is higher than in the economy as a whole.

2. With an increase in the population, the share of the rural population decreases, including, to a large extent, the share of those employed in agriculture. Accrued wages in agriculture, despite their growth, are far behind the level of wages in the economy as a whole.

3. The growth in the production of basic food products at an accelerated pace provided the country with import substitution for basic types of food. In addition, Russia has become a leader in the export of wheat and entered the top 5 world pork producers.

4. The share of gross value added created in agriculture increases annually, which is facilitated by investments in the industry. Unlike other industries in agriculture, most organizations are profitable.

5. In the volume of agricultural production, the share of agricultural organizations prevails, the share of peasant (farmer) households is insignificant.

6. The role and importance of the agricultural sector is that it forms one third of the consumer basket.

Key words: import substitution, food security, financial investments, investments, gross value added, consumer basket, living wage.

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DIGITAL TECHNOLOGIES AND INNOVATIONS AS FACTORS OF GREENING AND SUSTAINABLE DEVELOPMENT OF AGRICULTURE

Olga Litvinova,
Department of Economics, Management and Agricultural Consulting, Chuvash State Agrarian University, Russia
ov.litvinova.cheb@gmail.com
Olga Vasilyeva
Department of Mathematics, Physics and Information Technologies, Chuvash State Agrarian University, Russia
olech.vasiljeva@yandex.ru

The current situation in the context of a pandemic has shown that external factors can quickly bring the world economic system and national economies out of balance if they do not have inclusive sources of sustainability and development, deepening the problems of food, economic and environmental security, inequality, social insecurity, etc. At the same time, digital technologies and innovations, possessing significant potential, can contribute to solving a number of problems in the economic, social, and ecological subsystems of society. The concept of responsible production and consumption implies the development of a resource-saving approach to preventing losses and waste generation, which lead to an increase in society's disposal costs and can have a negative impact on the environment. Producers and consumers of agricultural products and food can make a significant contribution to achieving SDG Goal 12 - Responsible Production and Consumption.

Currently, two vectors of transformation of production systems have emerged - the transition to a "green" economy and the formation of circular economy models. Technologies that ensure resource conservation and waste prevention include: point farming, improving the balance of production and consumption by improving food chain processes based on digital technologies, using biotechnology in the production of environmentally friendly packaging, separate waste collection and increasing the share of use and recycling. raw materials, etc. The components of ecologically oriented agriculture are organic farming and city farming. The introduction of innovations and digital technologies into the activities of the participants in the food chain will increase the efficiency of producers, reduce losses and waste, and reduce the burden on the environment.

Keywords: digital technologies, responsible production and consumption, agriculture.

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SOCIO-ECONOMIC PARADIGM OF DIGITALIZATION OF AGRICULTURAL TERRITORIES

As. Prof. Tanzilya Sozaeva,
Department of Economics, Kabardino-Balkarian State Agrarian University, Russia
sozaytanzilya@yandex.ru
As. Prof. Valid Rasumov,
Department of State and Municipal Administration, Chechen State University, Russia
valid9191@mail.ru

The impact of socio-economic transformations and geopolitical factors on the agro-industrial complex led to an increase in the indicators of the agricultural sector of the domestic economy, which was not a high-tech industry and did not show a significant increase in labor productivity and efficiency. The problem of digitalization of agricultural territories requires taking into account a number of important factors: 1) the paradigm of digitalization of agriculture is hampered by the lack of system data, so, due to the level of computer literacy, most of the data is available only for the country as a whole. In rural and remote settlements, there is not enough information about government support for digitalization and the availability of electronic government services; 2) a significant gap in the introduction of digital technologies in the agricultural sector of developed and developing countries, as well as in global companies, in local and family farms; the introduction of IT technologies is due to the availability of financial resources and the level of education; 3) the introduction of digital technologies in agriculture takes into account the factor of economies of scale, the larger the scale of the enterprise, the easier it is to introduce technologies, while large farms have an advantage over small ones, which generates inequality between large and small farms.

The digitalization of agricultural areas will provide significant growth in agriculture and food production. The result of its implementation can be a significant increase in economic, environmental and social benefits, but in parallel - the creation of various kinds of problems. The unequal accessibility of digital technologies and services is significantly increasing the digital divide. Many rural residents, based on their level of education and income, run the risk of not keeping up with the reforms. In this regard, the effectiveness of digitalization, especially in rural areas, very much depends on the activity and orientation of the activities of social, economic and political systems, which will have to provide the basic conditions for its implementation. The creation of IT platforms for agricultural territories, reflecting the peculiarities of the macroregions of the Russian Federation, will make it possible to determine the specifics of the integration of various industries and spheres of activity into the digital economy. Russia has a significant reserve for increasing the efficiency of agricultural production (approximately 3-5 times) and the potential for growth in agricultural turnover through the introduction of digital technologies in crop and livestock production, an increase in labor productivity using IT platforms for management at all levels of production. The process of digitalization of the economy has led to an inevitable change in the socio-economic paradigm, society and its individual spheres. Using cutting-edge technologies, digital transformation is reshaping the picture of competition, blurring boundaries, and changing business models.

Keywords: agricultural territories, agriculture, digital platforms

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THE SYSTEM OF INDICATORS FOR A COMPREHENSIVE ASSESSMENT OF THE EFFICIENCY OF THE COSTS INCURRED IN HOP GROWING

Danilova N. L.,
Chuvash State Agrarian University, Russia
yadannad@yandex.ru
Ivanov E. A.,
Chuvash State Agrarian University, Russia
ivanoveacoop@gmail.com
Hristolyubov S. N.,
Chuvash State Agrarian University, Russia
hsn08@yandex.ru

In the process of a comprehensive assessment of the economic efficiency of the organization as a whole and the costs incurred, in particular, the following indicators are considered in the economic literature.

1. Profitability indicators. Due to the fact that profitability is a relative indicator, it allows you to evaluate the efficiency of the use of enterprise resources. In addition, profitability indicators are determined on the basis of the profit indicator, which is formed under the influence of the organization's income and expenses, primarily revenue and expenses for ordinary activities. To evaluate a complex indicator of profitability, a factor model should be built, which reveals the order of its formation and the impact of factors on it.

2. Indicators of a comprehensive assessment of the efficiency of economic activity, which assume a system of calculations: the increase in the total resource by 1% of the increase in sales of products, the share of the impact of intensification on the increase in sales, taken as 100%, the sum of relative savings in production and financial resources. This will allow you to determine the return on the costs incurred.

3. Comprehensive indicators for assessing the risk of financial insolvency. They are necessary for assessing the prospects for the development of the organization, the possibility of implementing the principle of business continuity.

4. Key performance indicators. Performance describes the level of achievement of the planned indicators, and efficiency-how the results obtained relate to the resources spent. The system of key performance indicators should be adapted to a specific organization, taking into account its structure, type of activity, current and strategic goals, since it is on their basis that the effectiveness of implemented management decisions will be evaluated.

Keywords: efficiency analysis, system of economic indicators, cost analysis, hop growing.

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PRACTICAL ISSUES OF ENSURING THE ECONOMIC SECURITY OF THE ORGANIZATION BASED ON INCREASING THE EFFICIENCY OF ECONOMIC ACTIVITIES

Ass. prof. Artur A. Semenov,
Department of Finance and Credit, Chuvash State Agrarian University, Russia
semyonov-artur@yandex.ru
Ass. prof. Natalia V. Alexeeva
Department of Finance and Credit, Chuvash State Agrarian University, Russia
ferkel93@mail.ru
Ass. prof. Tatiana A. Medvedeva
Department of Finance and Credit, Chuvash State Agrarian University, Russia
mta7788@yandex.ru
Ass. prof. Anatoly A. Semenov,
Department of Social and Humanitarian Disciplines, Russian University of Cooperation, Russia
semyonov-artur@yandex.ru

In modern economic conditions, any commercial organization defines its mission and long-term development goals, for the achievement of which economic potential is required, including the totality of property (material and material and financial potential). To assess the potential of a company, different indicators are used. In particular, with the help of economic assessments, the efficiency of the use of various resources is characterized and measured.

The multidimensionality of the concept of enterprise efficiency has recently also been associated with such characteristics as the stability and safety of conducting financial and economic activities of an economic entity. It was rightly noted that if an organization works effectively, then it is a priori capable of developing mechanisms to respond and counteract emerging threats and risks, and, accordingly, the level of economic security will be high. And vice versa.

In order to give quantitative characteristics to economic phenomena, indicators are used, because they are the most effective way to describe the object of analysis. Information and analytical support of a commercial organization contains data and information, the nature, content and frequency of processing of which depends on the purpose of the organization's functioning, the type of economic activity, the content of general and specific functions for the development and control of the implementation of the development strategy, the strategic and current tasks arising from this, and to a large extent on how the organization's management understands the importance of information and analytical support for management decisions. And here a number of practical problems arise that determine the relevance of the choice of the research topic. In particular, the problem of choosing the appropriate analytical tools for assessing the effectiveness of financial and economic activities as an integral component of ensuring the economic security of an economic entity is updated.

Keywords: economic security, financial condition, solvency.

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DIGITALIZATION OF AGRICULTURE IN THE CONDITIONS OF PROVIDING FOOD SECURITY

Svetlana Filippova,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
Sveta-fp@mail.ru
Larisa Gordeeva,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
lara.gordeeva2010@yandex.ru

The article discusses the key areas for the development of agriculture using digital technologies. The current problems of the introduction of digital technologies in agriculture are revealed: the lack of free financial resources, the fear of introducing new technologies, the unsatisfactory state of the machine and tractor fleet, the lack of a sufficient number of highly qualified personnel. Nevertheless, according to the Ministry of Agriculture, our country is in 15th place in the world in terms of the digitalization of agriculture. The program «Digital Economy of the Russian Federation» is being implemented in Russia.

Today, the agro-industrial complex already uses systems of geolocation, precision farming, management of the material and technical base of production. The digitalization of the agro-industrial complex is an inevitable necessity for the efficient operation of the agricultural sector of the economy, in the context of ensuring food security. In this regard, the role of digital technologies in solving the problems of hunger and malnutrition in the world and achieving global food security has been determined. An increase in the volume of supplies of food and agricultural raw materials abroad creates a real basis for strengthening the agricultural sector.

The world demand for food is constantly increasing, so, according to scientists, by 2050, the real need for food should reach 70%, which makes it necessary to envisage in the country's agricultural policy, on the one hand, ensuring food security, meeting domestic needs, on the other hand, selling surplus agricultural products for milestone taking into account the emerging demand.

The strengthening of export policy in the country is due to the continued growth of agricultural production in recent years, which can lead to oversaturation of the domestic market, a decrease in the profitability of domestic producers, and there is also an objective need to search for new sales markets, including in foreign countries.

Trends in the development of international food trade were investigated, and the potential for food production growth through the introduction of digital technologies was assessed and it was concluded that the main contribution to solving the global food problem in the future will continue to be made by countries that are able to provide food not only to their citizens. but also the population of other countries.

Keywords: agriculture, digitalization, food security

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FEATURES OF COST ACCOUNTING AND CONTROL IN HOP GROWING

L.Yu. Malinina,
Chuvash State Agrarian University, Cheboksary
malina_180@bk.ru
E.A. Ivanov,
Chuvash State Agrarian University, Cheboksary
ivanoveacoop@gmail.com
N.L. Danilova
Chuvash State Agrarian University, Cheboksary
yadannad@yandex.ru

The organization of cost accounting in crop production (hop growing) has its own characteristics, determined by the conditions of agricultural production. The first feature is that in the field of crop production, the main means of production is land, which in turn requires additional investments, improvement of its cultivation and other measures that should contribute to increasing the fertility of the land. The second feature is that the duration of the production cycle is determined by the natural conditions of growth and development of hops, where the agricultural work itself is carried out in a strict sequence. Since hops belong to perennial plantings, the production period lasts longer than the working period (natural and biological processes).

The profitability of the agricultural sector largely depends on the level of cost and quality of crop production, where an important condition for the growth of economic benefits and possible expansion of production is to reduce the cost of producing the agricultural product. In this regard, the role of accounting for production costs in hop growing is significantly increasing.

In the course of economic activity, current and capital costs arise. Current costs arise in the production process and are associated with the performance of technological works, where the differentiation of costs should be ensured by adjacent years of production, in the context of main industries and crops, by types of work performed, by the nomenclature of elements and cost items. Capital expenditures are expenditures on the acquisition, creation, and improvement of fixed assets.

In view of the variety of types of costs and their impact on the financial result of the organization, there is a need to organize an appropriate system of production and management accounting. The resulting costs in hop growing are uneven and seasonal. Thus, in crop production, a significant amount of work is performed during the periods of sowing and harvesting of agricultural crops. In this regard, there is a need to account for and control the costs of agricultural crops (hops) and the main technological processes of its production.

Keywords: costs, production accounting, cost control.

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ACCOUNTING SUPPORT FOR THE JUSTIFICATION OF CURRENT AND CAPITAL COSTS IN HOP PRODUCTION WITH STATE SUBSIDIES

E.A. Ivanov,
Chuvash State Agrarian University, Cheboksary
ivanoveacoop@gmail.com
N.N. Pushkarenko,
Chuvash State Agrarian University, Cheboksary
Stl_mstu@mail.ru
A.V. Korotkov,
Chuvash State Agrarian University, Cheboksary
tolya.korotkov.62@mail.ru

The modern development of the domestic agro-industrial complex is characterized by strong state support for the revival of hop growing through the provision of appropriate grants and various forms of subsidies to agricultural entities.

Hop growing is currently one of the main strategic priorities of agriculture in the Russian Federation. The country's annual demand for hop production is 9-10 thousand tons. At the same time, the supply of domestic raw materials is only 2-3%. Monitoring of global hop production indicates that the share of the Russian Federation is 0,3%. For comparison, the share of Europe – 51,8%, the United States – 41,8%, China – 4,8% and other countries -1,3%.

Among the regions of the Russian Federation, the Chuvash Republic is considered the traditional historical producer of hops. It should become one of the main regions specializing in the production and processing of hops of the modern Russian agro-industrial complex.

Despite the fact that favorable conditions have been created for doing business in hop growing and the relevant regulatory framework is available, the problems of justification, accounting and control, and evaluation of the economic efficiency of the costs produced by agricultural entities have not been fully solved.

In the regulatory system today there are no complete industry documents regulating the process of collecting, processing and providing financial and production information on hop growing. There are no methodological recommendations approved by the Ministry of Agriculture of the Russian Federation on the organization of accounting of current and capital expenditures in hop growing and approved standards for the technological stages of hop cultivation.

It is accounting as the main information space formed at the level of the subject of the agricultural orientation that will allow you to record all economic operations in a documented manner, to conduct current cost control in comparison with technological standards, and to form appropriate industry reports on the assessment of the effectiveness of expenditures for receiving state subsidies.

Keywords: hop growing, costs, accounting

Acknowledgments. The article is prepared within the framework of the topic of the research work «Development of methodological recommendations for accounting for current and capital costs, including laying, for the production and sale of products of perennial hop plantations (including nurseries of perennial hop plantations)», carried out at the expense of the federal budget by order of the Ministry of Agriculture of the Russian Federation in 2021 (approved by the Ministry of Agriculture of the Russian Federation on 25.12.2020).

STATE AND IMPROVEMENT OF THE STATE SUPPORT SYSTEM FOR AGRICULTURAL ENTERPRISES

Marina Abrosimova,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
amsik_74@mail.ru
Natalia Nesterova,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
nesterova-67-21@mail.ru

The agro-industrial complex is the most important component of the Russian economy, where products vital for society are produced, and a huge economic potential is concentrated. The most important condition in solving the problem of providing the country with food and agricultural raw materials is the rational development of the agro-industrial complex. The purpose of this study is to analyze the methods of state support for agricultural enterprises and factors that negatively affect the industry as a whole.

Among the main problem elements of the agro-industrial complex of the republic are connected, such as: lack of own activity means for managing the formation of circulating factors and basic activities of funds of organizations of the agro-industrial complex, being (farms) farms; deficiencies in legal normative acts establishing the procedure for registering property rights, establishing or using land plots for agricultural purposes; a high degree of deterioration of the material, technical and technological base of the retail of many organizations of the trade, food and processing commercial industries; use of non-producer fully represent livestock breeding and seed breeding; lack of distribution mechanisms and sufficient funds also to support sustainable development sites of rural first territories; insufficiently high dependence of the level of competitiveness of demand for agricultural products, the degree of raw materials and food; being in a difficult distribution of the situation of such demand of promising branches of agriculture, elements of the Chuvash Republic, developing as hop growing, information production of the technical stage of crops, cattle breeding.

Despite the extensive range of government assistance in organizing and developing business in the countryside, there are still moments that require additional attention. Modern forms of stimulating the productivity of the agro-industrial complex should be created in accordance with the level of socio-economic development of a particular region and be based on combining market mechanisms and government influence, as well as supporting small and medium-sized businesses and protecting the poor. Competently selected management tools can create effective satisfaction of the economic interests of the population and the entire agricultural production.

Keywords: agriculture, measures of state support, mechanism of regulation of agroindustrial complex.

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HUMAN POTENTIAL OF THE AGRO-INDUSTRIAL REGION

Veronika Maslikhina,
Department of Management and Law, Volga State University of Technology, Russia
Maslihina_nika@mail.ru
Aleksandr Maslikhin
Department of General Education Disciplines, Chuvash State Agrarian University, Russia
maslikhin@yandex.ru

Human capital is one of the main factors that determine the level of economic development of any region according to the theories of spatial development. In the theories of growth poles, center-peripheral theories, the theory of "new economic geography", a large place is given to such factors as innovation, human capital and urbanization in spatial development. Human capital produces “new” knowledge, which is embodied in innovation. The agglomeration effect is manifested in the concentration and interaction of many resources, including human capital, which usually leads to an increase in the quality of human capital and demographic growth in local areas, an increase in the share of urban population. The human potential of a region is a combination of demographic, social and labor, intellectual and cultural potentials that can be used to form high-quality human capital in the region. The human capital will become a driver of innovative economic growth.

The Mari El Republic is an underdeveloped agro-industrial region, therefore, the issue of improving human capital as a factor of economic growth is relevant for it. An analysis of the four components of the human potential of the Mari El Republic revealed certain features. The demographic potential is deteriorating: the population is decreasing, health indicators are deteriorating, the proportion of the population with higher education has decreased. The social and labor potential of the Mari El Republic is specific due to the high share of agriculture in the economy and the high share of the rural population, which are usually a constraining factor for economic growth. For example, there is a negative correlation between the volume of agricultural production per capita and per capita GRP for all regions of the Volga Federal District and Russia as a whole. The level of per capita income of the population is below the average Russian level. Intellectual potential is manifested in the effectiveness of research and development, as well as in the professionalism of personnel. According to the indices of innovative development, the Mari El Republic is consistently in the fifth ten regions out of 85 regions of the Russian Federation, however, this is not enough for the factor of innovation and intellectual potential to become significant for the economic development of the region. The socio-cultural potential is at a high level: the main scientific, educational and cultural activities are concentrated in Yoshkar-Ola, which is the administrative capital of the republic.

Thus, an analysis of the four components of human potential revealed negative trends in its development in the Mari El Republic.

Keywords: human potential, agro-industrial region, Mari El Republic

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DEVELOPMENT OF INNOVATIONS IN THE ACTIVITIES OF JSC ROSSELHOZBANK AS AN ELEMENT IN THE SYSTEM OF IMPROVING THE FINANCIAL AND CREDIT MECHANISM OF SUPPORTING THE AGROINDUSTRIAL COMPLEX

Natalia Alekseeva, Tatiana Medvedeva, Arthur Semyonov,
Andrey Valerianov, Lyudmila Kornilova
Department of Finance and Credit, Chuvash State Agrarian University, Russia
ferkel93@mail.ru
Elena Antonovskaya, Maria Tolstova
Faculty of economic, I. N. Ulianov Chuvash State University, Russia
maryaleon@yandex.ru

To improve the socio-economic conditions for the functioning of the agro-industrial complex, it needs state support, which should be based on a synthesis of market and administrative methods, the proportions of which depend on the specific situation. An extremely important role in improving the effective functioning of the agro-industrial complex is played by the financial and credit mechanism of state support, including that implemented within the framework of the main areas of banking services.

In this regard, substantiation of the priority directions of development of quality management of banking services, increasing the return on banking services for entrepreneurship in the agro-industrial complex, including through the introduction of modern product and technological banking innovations, constitutes the scientific novelty and relevance of this study.

The main element of the development of innovations in JSC Rosselkhozbank is the formation of a modern ecosystem, including the introduction of product and technological innovations in banking services for the agro-industrial complex. So, in order to improve the investment and credit mechanism for supporting the agro-industrial complex, JSC "Rosselkhozbank" has developed and implemented an Ecosystem for farmers.

Scientific analysis of banking innovations, banking engineering in the field of supporting the agro-industrial complex allows for the progressive improvement of the financial and credit mechanism of interaction, the quality and efficiency of the distribution and use of credit resources in the agricultural sector, which determines the practical significance of research.

Keywords: banking service, agro-industrial complex, innovation.

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CURRENT TRENDS IN BANK LENDING TO THE AGRO-INDUSTRIAL SECTOR OF THE ECONOMY

Natalia Talanova,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
konst.2@mail.ru
Nadezhda Zaitseva,
Departament of Economics and Management, Chuvash State Agrarian Uuniversity, Russia
nad2094@yandex.ru

The article is devoted to the study of current trends in the development of lending in the agro-industrial sector of the economy, aimed at supporting the agro-industrial sector of the economy and its related industries, as well as the implementation of the state program "Development of the Agro-industrial complex". The necessity of taking measures aimed at supporting enterprises and organizations in the agricultural sector is justified. Special attention is paid to the importance of JSC "Rosselkhozbank" in the development of the agro-industrial complex of Russia. Based on the analysis of the significance, direction and effectiveness of lending to the industry, proposals are made to expand financial support for the agricultural sector of the economy. In the course of the research, the author consistently argues for the high importance and role of the credit structure in providing credit and financial support to the agricultural sector of the economy, which is as follows: the share of loans granted to the subjects of the agricultural sector of the economy in the total loan portfolio of the bank is more than 55.0%; In 2020, compared to 2019, the bank increased financial support to agricultural sector entities by 24.0%; the highest growth rates in lending volumes were shown by the segment of small and medium-sized businesses, which at the end of 2020 was provided with credit funds in the amount of 260 billion rubles, which is 44.0% higher than in 2019; the bank's priority areas of lending are the financing of seasonal field work, for which in 2020 502 billion rubles were allocated, which is 32.0% more than in 2019, and the purchase of agricultural machinery, for which 53 billion rubles were provided, which is 26% more than in the previous year. earlier.

Despite the significant increase in competition in the segment of lending to the agro-industrial sector of the economy, aggravated by the increase in the number of credit institutions participating in the mechanism of lending to the agro-industrial complex at a preferential rate and the growth of credit support, there are a number of problems that hinder the development of the mechanism of financial and credit support, in particular: lending to the industry does not take into account the features of the current financial and economic state of farmers; due to the length of the production cycle, seasonality of production and the associated nature of the formation of costs and stocks in agricultural organizations, there are no sources for continuous financing; the level of interest rates remains quite high, despite subsidizing the interest rate; in 2021, it is planned to reduction of financing of the state program "Development of the agro-industrial complex" by 17.0%.

Keywords: lending, agro-industrial complex, commercial bank

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INNOVATIVE TECHNOLOGIES IN AGRICULTURE AS A FACTOR OF ITS DEVELOPMENT AND GROWTH

Svetlana Agafonova,
Department of Management and Marketing, Cheboksary Cooperative Institute (branch) Russian University of Cooperation, Russia
temkaar@mail.ru
Marina Abrosimova,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
amsik_74@mail.ru

In all branches of the production sphere, including agriculture, there is a place for innovative solutions. Agricultural start-ups are changing the way people think about the industry. The main feature of rural startups is the lack of guarantees of return on investment and capitalization of income. The sphere of the agro-industrial complex has always been classified as risky and turns out to be beneficial when planning in the long term. It is the need for cheap and "long" investment resources that significantly limits the number of start-ups in agriculture. At present, such solutions of the agricultural sector as organic products are in special demand; the Eco prefix serves as a guarantee of quality.

In Russia, a special attitude towards innovations in the agro-industrial complex: trust arises only after testing by American or European companies. Innovative projects in Russia are supported by several structures. Among them are Skolkovo, Rusnano, Russian Venture Company (RVC). World practice has more than 150 startups in agriculture, which have managed to grow into a large business with a capitalization of more than $ 1 billion. In Russia, the most widespread innovations in agriculture are: technological (technological re-equipment of the agro-industrial complex, introduction of new technologies); marketing (introduction of various marketing tools and methods that contribute to the more efficient development of agricultural enterprises); organizational (more efficient organization of all management processes, organization of workplaces, etc.).

At present, experts identify five innovative areas that will radically change agricultural production in the next decade: the creation and cultivation of drought-resistant varieties of agricultural crops; increasing the productivity of agricultural crops; the appearance of meat products of non-animal origin; use of agrodrons; development of urban agriculture. For the successful development of innovative processes in agriculture, it is necessary to fulfill a number of conditions that make it possible to increase the investment attractiveness of the industry by increasing the growth rate of technical renewal, accelerating capital turnover, developing social infrastructure, and timely and targeted support from the authorities.

Digitalization of management in the agricultural sector of Russia will make it possible to build an optimal system of production, storage, transportation, processing and sale of products, to regulate production processes at optimal times and at the lowest costs, to use machines that are compatible with information systems and software, eliminating the negative influence of the human factor on the results. production. This will require direct support of agricultural producers who are mastering machinery and equipment with a high intellectual component, an accelerated transition to the integration of predictive modeling elements into business processes. In addition, it will be necessary to improve the system of training personnel for agriculture, focused on the adaptation of specialists to the requirements of the digital economy.

Keywords: agriculture, innovation, investment

RESTORATION GROWTH IN INDUSTRIAL PRODUCTION IN RUSSIA

Semenova A.N., Abrosimova M.S.
Department of Economics, Management and Agricultural Consulting,
Chuvash State Agrarian University
ivanova@udem.ca
Tolstova M.L.
Faculty of economic, I. N. Ulianov Chuvash State University, Russia
maryaleon@yandex.ru

Our article [A. Semenova 2021] examines the features of the post-crisis recovery of the Russian economy. It is shown that the main problems will arise in the regions. Risks of a fall in the real estate market and factors hindering recovery are noted. Rosstat recently published data on industrial output in Russia for 2020 [Rosstat 2021]. Analysis of these data allows us to specify the forecast for 2021 a little.

In general, Rosstat notes a decrease in industrial production by the end of 2020 by 2.9%, which is less than the official forecast of 4.1%. The main reason is the operation of the OPEC agreement, but not covid restrictions. The sale of minerals accounts for a significant share in GDP and amounts to about 10%. In 2020, the extraction of minerals decreased by 7%, in particular crude oil by 10.3%.

On the contrary, the manufacturing industry grew by 0.3% at the end of the year due to the fourth quarter, where there was an increase of 1.1%. There is a 2.5% decline in electricity and heat power engineering, while water supply and waste disposal have the same decline of 3.8%. The decline is also observed in the automotive industry and in the leather industry. In our opinion, this decline is due to covid restrictions and lack of funds among the population.

According to our forecast [1], economic recovery should be expected in the second quarter of 2021 due to deferred demand. We have noted that this will take place in Moscow, Moscow and Leningrad regions. Based on the above data, the rise will take place in the energy sector, water supply, the automotive and leather industries, and, of course, in the sphere of services to the population. In the regions, an increase will be observed starting from the third quarter in those areas where there is a developed production in the noted areas of industrial production or in the field of tourism. Mineral production will be constrained by the OPEC agreement, although Russia will be asking for oil production. We still believe there will be a return to 2019 indicators, but not higher.

Keywords: trajectory, economic recovery, regional risk, economic growth, anti-crisis package.

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FEATURES OF THE LOGISTICS APPROACH IN THE AGRO-INDUSTRIAL COMPLEX

Larisa Gordeeva,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
lara.gordeeva2010@yandex.ru
Svetlana Filippova,
Departament of Economics and Management, Chuvash State Agrarian University, Russia
Sveta-fp@mail.ru
Andrey Gordeev,
Departament of Transport and Technological Machines and Complexes, Chuvash State Agrarian University, Russia
gidrav.gordeev@yandex.ru

In modern conditions, the existing agricultural logistics of agro-industrial enterprises at all stages of the technological process of growing, processing and delivering products to the consumer is not effective enough. The following shortcomings in production technology can be distinguished: backward technologies of growing and harvesting products; inefficient machines, many passes of machinery across the field, high fuel costs and product losses; high energy consumption for drying grain; ineffective storage methods leading to product losses; numerous product sorting and reloading, as well as a costly multi-link delivery system and associated energy, labor and product losses.

Analysis of logistics systems in the agro-industrial complex indicates the need for their improvement.

For the first and third spheres of the agro-industrial complex, we will apply the logistics approach formed for industrial enterprises. Agriculture (the second sphere) from the point of view of the movement of material flows has specific features at the macro and micro levels. The costs of physical movement of goods in agriculture are extremely high, since in Russia there is a great distance from the places of production to the places of processing of agricultural products.

It should be noted that agrologistics, as in general logistics in general, is not universal. Agrologistics is highly dependent on agricultural products, which are at the center of their processing. Consequently, it is the marketability in these processes that makes agrologistics a logistics, and not a separate process of warehousing, transportation, and customs clearance.

In agricultural logistics, the connection between marketing, commodity science and logistics itself forms the specifics of supply chain management. However, why exactly does marketing determine the specifics? This is due to the fact that all agrology starts with demand. From what product consumers want, the supply chain of agricultural products unfolds to its production. Marketing determines the ratio of quality, cost of a product, since it is not so obvious that a consumer needs an average quality, but inexpensive product.

In general, the use of a logistic approach in the agro-industrial complex can contribute to a significant reduction in the cost of production, the development of individual farms, including peasant farms and the industry as a whole.

Keywords: logistic approach, agro-industrial complex, agrologistics

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