

AGRICULTURAL SCIENCES

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INFLUENCE OF SOME PARATYPICAL FACTORS ON THE INDICATORS OF CHICKEN EGGS INCUBATION

The influence of paratypical factors on the course of embryonic development and the results of incubation is a quite relative area of research. The following paratypical factors have been studied: the influence of the age of the chickens from the parent herd and of the shelf life on the indicators of egg incubation. Two groups were formed, which included the batch of hatching eggs of chicken crosses “Lomann-brown-classic” and “Lomann-LSL-classic”. Within each group, 3 variants were identified based on the age of laying hens. Each variant was characterized depending on the period of storage of eggs before laying into incubators. The age of the parent stock as a paratypical factor affecting the incubation rates of chicken eggs was considered in relation to their shelf life. This linkage had been dictated by the characteristics of the egg preparation process in the hatchery, based on these two factors. With the increase of the parent stock's age there significantly increases the loss of eggs' weight during incubation as 7–7,5th, and 18–18,5th day. The increase in the number of unfertilized eggs with an increase in the age of the bird has been revealed for the chickens of the cross “Lomann-brown-classic”. In chickens cross “Lomann-LSL-classic” the number of unfertilized eggs has increased, but at the age of the parent herd 42–58 weeks it has decreased, and this trend has been revealed in all the studied variants of the shelf life. The age of the parent stock of the cross-country course “Lomann-LSL-classic” did not have a significant impact on the “early embryonic mortality” and the number of “frozen” embryos. With an increase in the age of chickens, there was an increase in the category of “blood-rings” in batches of eggs stored up to 10 days. In batches of eggs stored for more than 10 days, the trend was reversed – a greater number of “blood-rings” was in the young bird and with age this figure decreased. With the increase in the age of the parent herd of cross-country “Lomann-brown-classic” improves the development of the stage of the embryonic period because of RES reduction. The shelf life of chicken eggs does not have a significant impact on the categories of “early embryonic mortality”, “frozen”, “suffocations”, cracking and the yield of the mass of chickens.

Key words: incubation, shelf life, egg, age of chickens, embryos.

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PHYSICAL INDICATORS OF FECES IN DIAGNOSTICS OF THE INTERNAL NON-TRANSMISSABLE DISEASES OF THE DAIRY COWS' DIGESTIVE SYSTEM

By the method of analysis and synthesis of data in native and foreign references, the author analyses the clinical-diagnostic role of physical indicators of the cattle's feces: their quantity, colour, texture, smell, the rate of enesis, presence of visually distinguishable impurities in them.

The above mentioned physical indicators are widely used in carrying out macroscopic non-instrumental qualitative assessment of the physical property of feces by organoleptic method and are considered as an important component of the coprological researches for dairy cows in the run of veterinary practice. The materials of the article can be a potential prompt for further drafting the table-determinant to define the position of the above-mentioned physical indicators of cows' feces for conducting its qualified organoleptic microscopic assessment in veterinary specialists' practice to carry out scientific researches of the cow's digestive system, and in educational work.

Key words: cow, buiatrics, feces, macroscopic examination of feces, physical indicators of feces.

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THE STUDY OF THE MICROBIOME SPINY STURGEON GROWN UP UNDER CLOSED WATER SUPPLY WITH THE METAGENOMIC METHODS USED

The aim of the research is to analyse the microbiome of the skin, gill plates and intestines of the sturgeons. When having the structure of the microbial family of spines bred under closed water supply (CWS) investigated, we can make a conclusion for both – physiological condition of fish, and potential pathologies. To compile a collection of samples, the latter being taken from 10 spine species (by 5 pieces from the two let-in basins №3 and №6). To study the micro flora of the skin surface some pieces of the fins, respiratory organs pieces of the gill plates, and to explore the natural micro flora of the digestive system – swabs from rectum by inserting swab through the anus were taken. The samples were placed in 96% ethyl alcohol at the collection sites. Each sample was assigned an identification number. DNA from the tissue of sturgeon were isolated using the kit reagents (MACHEREY-NAGEL NucleoSpin Soil) of the company MACHEREY-NAGEL (Germany). Processing of the sequences obtained had been performed with the use of Trimmomatic

and Fastq-Join utilities, OTU-picking had been performed using the QIIME package. In the course of studies it had been found that the greatest differences between the basins have microbiomes of the intestinal opening, and the smallest – microbiomes of the n surfaces, which means that the degree of influence of the basin on the identification of differences between the microbiomes has increased in the following series: n – gill – intestinal families.

Key words: sturgeon fish, installation of closed water supply, metagenomics, microbiome, sequencing.

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REACTION OF THE SPRING WHEAT IREN' AGROFYTOCENOSIS TO ABIOTIC CONDITIONS

In plant growing, the peculiarities of abiotic conditions are assessed by the appropriate response of a variety or hybrid of agricultural plants. Unfavorable abiotic conditions, including meteorological conditions, is one of the main reasons for strong inconsistency of crop yields. Therefore, the study of the reaction of a particular variety or hybrid of an agricultural crop to abiotic conditions by the formation of yield and product quality is quite relevant. The agrochemical indicators of the arable layer of the soil, the amount of applied mineral fertilizers, and the yield of spring wheat Iren' on the collective farm (SHPK) have been used as the informative medium. Michurin, Vavozhsky District, SD for 2013–2018 Agrochemical indicators have been determined by means of generally accepted methods of an agrochemical survey of the soil of the farm in 2015. As for the tightness and the form of communication, they have been verified by the method of correlation and regression analysis. The vegetation period of 2013 was defined as a distinguishing, by relatively hot and dry meteorological conditions. The vegetation period of May was warm and arid; June was moderately

warm, the amount of precipitation was normal, whereas July and August showed temperature and precipitation within the normal range as well. However, in 2015, May and June were warm and dry, while July and August were cool and wet. The vegetation period of 2016 was characterized as hot and extremely dry. May and June were warm and arid, in July and August there was an increase of an average air temperature, and insufficient precipitation. In 2017, the development of spring wheat plants took place at a relatively low average daily air temperature and sufficient moisture supply. May and June 2018 were warm and moderately wet. July was warm and dry. August was characterized by average daily air temperature close to normal and a relatively small amount of precipitation. In the collective farm (SHPK) after Michurin, Vavozhsky district of the Udmurt Republic, the crop yield for the wheat 'Iren' had had a weak and medium correlation with a humus content of 2,7–3,5 % in the arable soil layer, pH 5,0–6,0, with the amount of applied mineral fertilizers 84–125 kg / ha in the fertilized substance. Of the agrochemical parameters of the soil arable layer, the yield had relatively high correlation coefficients with the content of mobile forms of phosphorus and potassium. With a high degree of cultivation of the arable layer, the correlation of yield with doses of mineral fertilizers was weak ($r = + 0,24$). Relatively cool and wet weather ensured a higher yield of spring 'Iren' wheat grain. For the period of 2013–2018, the highest yield of 39,6 centners per hectare of grain had been formed, at an average daily air temperature of + 14,7 °C, thus with the active temperatures total 1613 °C, and precipitation total over this period of 337 mm during the growing season. Dry and hot weather had reduced the grain yield. With daily average temperatures of +17,5 °C, the active temperatures total 1872 °C and the amount of precipitations total 148 mm during the growing season the crop yield showed 22,8 c / ha.

Key words: spring wheat, variety 'Iren', sod-strongly-podzolic light-loamy soil, agrochemical indicators of soil, meteorological conditions.

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OPTIMIZATION OF STORAGE TIME OF CHILLED PORK THROUGH THE USE OF NATURAL ANTIOXIDANTS

Today, manufacturers of meat products are committed to the production of products of sustainable quality to have been brought to the consumer within the shelf life period stated. The intensity of the hydrolytic splitting the fat is a key element in increasing the storage capacity of meat products. In order to slow down the oxidative damage of fats in the food industry, the use of

antioxidants is recommended. The results of studies are presented actualizing the storage capacity of chilled meat raw materials (pork) treated with different natural antioxidants – rosemary extract and dihydroquercetin. The experimental samples have been processed as follows: one of the samples was a control; sample No. 1 was treated with rosemary extract; sample No. 2 was treated with dihydroquercetin in combination with vegetable oil (refined and deodorized sunflower oil). Storage of prototypes was carried out in polymer containers at a temperature of $+4\pm 2$ °C for 5 days. Organoleptic parameters (surface state, color, smell, consistency, transparency and aroma of broth) and physical and chemical parameters of meat raw materials (pH, acid number, amount of free fatty acids) have been studied for evaluation and comparative analysis of antioxidant activity of rosemary extract and dihydroquercetin on the 3rd and 5th day of storing. Established normalized values for indicators of oxidative damage (acid number – 4 mg/kg) within 5 days of storage did not exceed in none of the prototypes, although there an accumulation of oxidation products have occurred. The sample produced with dihydroquercetin and vegetable oil had had the most favorable organoleptic characteristics and pH (6,43 and 6,59), and on the 5th day had had the lowest acid number (1,63 mg/kg) and a lower percentage of free fatty acids (0,94%). Thus, it had been found that of the antioxidants studied the most effective proved to be dihydroquercetin, in combination with vegetable oil. However, for a comprehensive solution to the problem of increasing the storage capacity of chilled meat raw materials, it has been recommended that at the same time manufacturers should use drugs capable to control the peroxidation of fatty acids and the level of bacterial contamination.

Key words: antioxidants; rosemary extract; dihydroquercetin; shelf life; hydrolysis of fat; acid number.

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RESTORATION OF WORKING BELTS FOR HYDRAULIC DISTRIBUTORS' VALVE SPOOLS BY MEANS OF LASER SINTERING POWDER MATERIALS

In the present work, the main ways of restoring the performance of hydraulic distributors, in particular, the restoration of worn out working belts of the valve spools, have been analyzed. It has been revealed that the existing technologies of plasma spraying, electric-spark processing do not allow to fully ensure the performance of spool-type pairs within the hydraulic distributors. With this in mind, the most effective technology for restoring working belts of spool pairs has been proposed, thus using laser radiation and an iron-based powder composition. For the analysis of the state and performance of restoration coatings, laboratory research and operational testing have been developed. The conducted metallographic studies have revealed the presence of pores in the coating structure. The coating porosity is ambiguous, with increased fluctuation over the cross section of the layer — the coating is looser on the surface, that should be understood as the increased oxidative reaction of the components of the powder composition. Operational testings were conducted on the basis of JSC «Izhevsk Mechanical Plant». Research results have clearly demonstrated the advantage of the analyzed recovering method, in comparison with the standard surface of the spool. The volume of wear during operating time of 1500 hours has reduced by more than 25-30%. At the same time, it is necessary to note a decrease in the volume of wear during large operating time, which is opposite to the kinetics of wear of the standard surface of the spool. Thus, the results of the research provide the basis for the development of a technology for the restoration of hydraulic distributors' spool pair with the laser processing of ultra fine iron-based powder materials.

Key words: laser processing, restoration, hydraulic distributor, valve spool, sintering, porosity, wear.

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DEVELOPMENT OF MEANS OF AUTOMATICS FOR LIGHT-CONTROL MANAGEMENT IN POULTRY FARMING

Currently, there is a wide variety of means of controlling artificial lighting in the workshops of poultry farms, designed to smoothly change the lighting (formation of the “dawn – sunset” mode), and control the length of daylight depending on the age of a bird. For example, mechanical software devices for changing illumination, with imitation of sunset and dawn, such as CEP-12UT, RUS-3, and others, as well as devices operating on rigid logic. The devices presented in the article do not provide smooth change and imitation of dawn and dusk. At present, the necessity of switching to the use of, for example, software relays on PLC-type microcontrollers in connection with the progress in digital technologies, is being justified.

Goals and objectives of the study. The goal of the research is to develop a lighting program for the poultry-farming room, which takes into account the effect of the length of daylight and the intensity of illumination on the vital processes of the birds.

Materials and research methods. The lighting control program has been created in the CFC language in the CoDeSys software package, which allows it to be implemented using programmable logic controllers (PLC), for example, Aries PLC 63. To ensure the smooth control of the luminous flux of the LED lamp, a software function block such as the PID controller has been used.

The results of the development program. To improve the maintenance of laying birds, a widely spread system of forming intermittent lighting in a room has been proposed, including the creation of fairly short periods of daylight and darkness. It is based on the laws of biorhythmology and takes into account the existence of circadian rhythms in living systems.

Conclusions. Developed on the basis of this system, the intermittent lighting program allows to reduce energy costs and increase the productivity of poultry.

Key words: lighting technologies in poultry farming, programmable logic controllers, light control system, intermittent lighting system.

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DYNAMICS OF TRACTORS’ FAILURE DISTRIBUTION DEPENDING ON RUNNING CONDITIONS

Internal and external conditions affecting the tractors’ reliability have been determined. The dynamics of the quantity fluctuation for tractors’ failures of MT3-80 series has been shown, depending on the operating time at technical servicing by qualified technicians, and in actual running conditions. In the course of investigations (130 tractors, the following factors influencing the reliability have been revealed: non-compliance with the running-in time, use of oils that do not match the maintenance manual and servicing regulations, non-observance in-between specified maintenance periods in manuals, analysis of units and mechanisms under repair without the special tools; running overloaded tractors. It is shown that the most essential factors influencing reliability are: running overloaded tractors, failure during in-between technical servicing, use of oils failing to meet the manual requirements. Investigation of a failure distribution for MT3-80 tractors depending on running periods shows that at initial running stage, at 1000 m. hrs. the minimum magnitude of time for in-between failures is observed. At an operating time of 5000 m. hrs. the maximum magnitude of time for in-between failures is observed.

Key words: internal and external running conditions, reliability of work of tractors, a failure distribution of tractors, failures, in-between failure period.

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ANALYSIS OF CRUSHED GRAIN QUALITY WHEN USING CRUSHERS OF OPEN AND CLOSED TYPES

The article is devoted to the study of granulometric composition of concentrated feed produced by agricultural enterprises in the Udmurt Republic. The analysis of the design of a grain crusher used in agriculture. Zootechnical requirements are presented for the granulometric composition of concentrated feed for feeding the most common groups of animals. To grind grain at the agricultural enterprises in the Udmurt Republic, hammer crushers of the closed and open types are used. The main disadvantage of closed-type machines is that the grinding and separation processes take place in one the same chamber, that leads to grain overgrinding, inaccurate separation, wear of running

units, as well as to increased energy consumption. Analysis of the particle size distribution of the crushed grain obtained on the crushers of both types shows that in all qualitative indicators the use of closed type crushers in the feed preparation process is more efficient, in particular, the grinding module improves, the uniformity of particle size increases, the amount of whole grains in the output structure decreases. However, the operation of closed-type crushers is characterized by increased energy consumption (over 25%), in comparison with closed-type crushers. In addition, the use of closed-type crushers leads to an increased dust-like fraction in the structure of the finished product and excessive wear of the crusher's running units. Taking into account the research carried out, under the conditions of the production process of forage preparation at the enterprises in the Udmurt Republic, the authors proposed the main directions for improving the grain crushing indicators when using crushers of various types: 1) improving the design parameters of a closed type grain crusher; 2) increasing the resource of the working units of the crusher of the closed type. The conducted studies have a high practical potential, since they make it possible to significantly improve the structure of the machines used at the enterprises of the republic during fodder procurement.

Key words: open-type grain crusher, closed-type grain crusher, sieve laboratory classifier, concentrated feed, granulometric composition.

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