



**2ND MULTIDISCIPLINARY
CONFERENCE FOR YOUNG
RESEARCHERS**

**Sustainable Development Trends and Challenges
under COVID-19**

BOOK OF ABSTRACTS

**Monday-Tuesday, November 29.-30., 2021 Sumy,
Ukraine**

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Book of Abstracts



BOOK OF ABSTRACTS

In your hands you are holding Book of Abstracts, which was published both as an E-Book of Abstracts and traditional printed BoA.

We hope, you will enjoy reading through all the accepted abstracts to this conference.



WELCOME!

The core aim of this conference was to provide opportunities for early career academics from a range of disciplines to share their research through the conference podium, as well as to receive informal in-depth feedback through discussions and to enable them to establish contact with professionals and other institutions.



ABOUT ORGANIZERS

The conference is co-organized by: Czech University of Life Sciences Prague, Sumy State University, Sumy National Agrarian University, Bila Tserkva National Agrarian University, Dnipro State Agrarian and Economic University, Kharkiv National Agrarian University named after V.V. Dokuchayev and State Biotechnological University with the support from AgriSciences Platform.



VENUE

Our 2nd Multidisciplinary conference for Young Researchers took place in Sumy – at Sumy State University. In the North-Eastern part of Ukraine.





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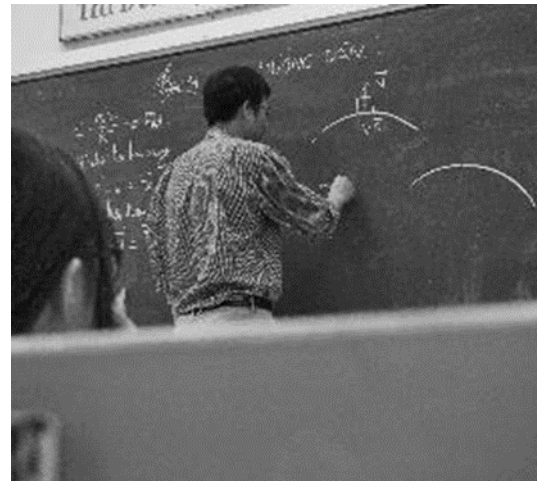
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„The important thing is to never stop questioning“

Albert Einstein



2nd Multidisciplinary Conference for Young Researchers

This years sub-topic of: Sustainable Development Trends and Challenges under COVID-19

The COVID-19 pandemic is a crisis that affects everyone; even us, researchers, therefore, we decided to provide space for identifying global challenges from multidisciplinary perspective resulting from this crisis.

The worldwide disruption caused by the COVID-19 pandemic is leading to numerous impacts on the environment. Those effects may have both positive and negative consequences. However, all of those need to be systematically and empirically described.

Therefore, it is essential to provide space for research on the Sustainable Development Trends and Challenges under COVID-19 pandemic. Some of these implications will have short-term and immediate effects, some will have medium-term effects, and there will be some that create long-term changes.

For these reasons, we were inviting this years contributions from various backgrounds. An interdisciplinary or multidisciplinary approach was encouraged and highly welcome.

About the conference and venue

This conference is organized within the framework of the project *“Interuniversity cooperation as a tool to enhance the quality of selected universities in Ukraine”* (2019-2021) by the support of the Development Cooperation of the Czech Republic through [Czech Development Agency](#).

The conference this year took place in the venue of Sumy (SumDU Congress centre, Pokrovska str, 9/1, Sumy, <https://congress.sumdu.edu.ua/>), Ukraine.

Sumy is a city in north-eastern Ukraine, and the capital of Sumy Oblast (region). The city was founded in 1660s. According to the census held in 1660 year the population of Sumy was 2740 people. Today, it is less then 300,000 people.

City has several educational institutions and museums and plays a key role in educational development in the area and in Ukraine.



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SCIENTIFIC SESSIONS

As you might remember from previous year of our conference, we always prepare sections based on the received abstracts.

This is also one of the unique approaches of our conference, that we are open opportunities to early career researchers from all various disciplines and based on each years interest and submitted abstracts, we develop the sessions and match them with appropriate experts.

This years, we identified following key disciplines:

- Agriculture Engineering
- Agrobiology
- Economics
- Environmental Engineering
- Information Technologies
- Medicine and Veterinary medicine
- Sustainable Development



Czech Republic Development Cooperation

Czech Development Agency is a state organization under the authority of the Ministry of Foreign Affairs of the Czech Republic and an implementing body of the development cooperation of the Czech Republic.

Czech Development Agency – as a donor plays important role in our activities. Especially in Ukraine.

Through [Czech University of Life Sciences Prague \(Faculty of Tropical AgriSciences\)](#) – as an implementer – we have been able to implement numerous projects in Ukraine.

Among them are worth mentioning:

- Promotion of harmonization of the Bologna higher education system of agricultural universities in Ukraine (2015-2016)
- Strengthening of capacity building in quality assurance and science at SNAU and SSU (2017-2018)
- Support of young university capacity in education and research and science activities in Ukraine (2019)
- Interuniversity cooperation as a tool for enhancement of quality of selected universities in Ukraine (2019-2021)
- Strengthening scientific capacities and cooperation of Ukrainian universities in AgriSciences (2020-2021 – Supported through Ministry of Foreign Affairs)



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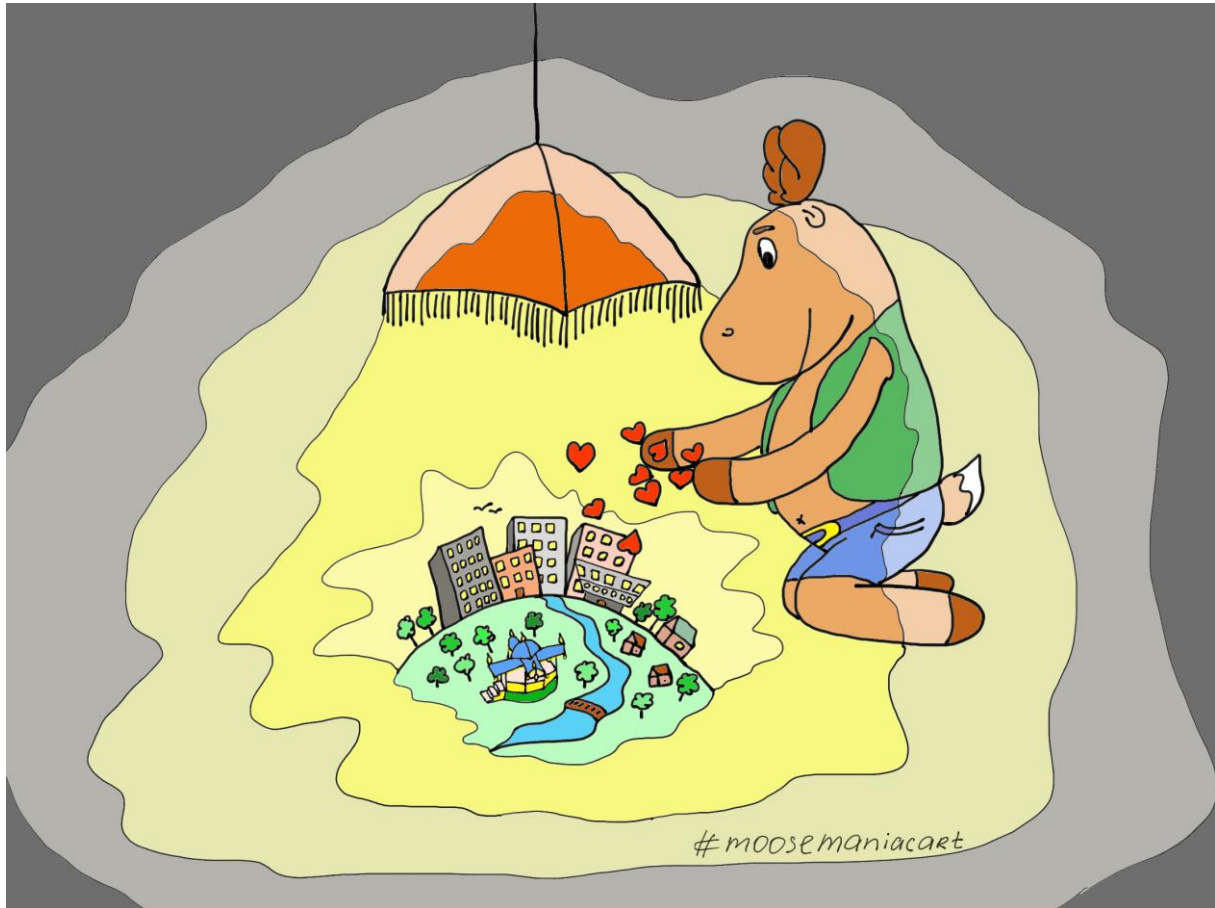
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AGRICULTURAL ENGINEERING SECTION



This space is here for you and your notes:

2nd INTERNATIONAL MULTIDISCIPLINARY CONFERENCE FOR YOUNG RESEARCHERS Sustainable Development Trends and Challenges under COVID-19

Search for compacted soil - Device development

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Abstract: Hardness is the property of natural soil to resist compression and wedging. Soil hardness provides mechanical resistance to the developing root system of plants, often causes a decrease in seed germination, affects the water, air, and thermal regime of the soil, traction resistance of tillage machines and tools. This leads to a decrease in yield and, accordingly, a decrease in farmers' income.

Today there are many different methods of measuring soil hardness, ranging from manual measurement (the cheapest) to contactless scanners. We are developing a less expensive option for measuring hardness, compared to soil scanners. Our development will allow measuring the hardness of the soil both when performing other operations with the soil, and as a separate agricultural machine.

Aim: Development of equipment for measuring soil hardness with the search for plow soles, which will have high measurement accuracy, with the possibility of forming a Database and low cost.

Empirical method used. The empirical method is the sequential implementation of the following five operations: observation, measurement, modeling, forecasting, forecast verification.

In science, the main forms of empirical research are observation and experiment. In addition, they also include numerous measurement procedures, which, although closer to the theory, are still carried out within the framework of empirical knowledge and especially experiments.

Axiomatic method - one of the ways of deductive construction of scientific theories, in which:

a) formulates a system of basic terms of science;

b) from these terms a certain set of axioms (postulates) is formed - provisions that do not require proof and are the source from which all other statements of this theory are derived according to certain rules;

c) a system of inference rules is formulated, which allows to transform the initial positions and move from one position to another, as well as to introduce new terms (concepts) into the theory;

d) the transformation of postulates according to the rules is carried out, which makes it possible to obtain from the limited number of axioms many proofs - theorems.

Our device will allow small farms to investigate soil compaction, and then take the necessary measures to loosen it. Because compacted soil leads to lower yields and, consequently, lower income of farmers. The versatility of our device allows it to work with different machines.

Keywords: Soil hardness; scanner; land productivity; Agricultural engineering

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Influence of Lozova Machinery units on crop residues incorporation

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Background: The issue of incorporating crop residues has recently become very relevant. Mankind strives for the greening of agriculture, ie the use of organic components in the cultivation of agricultural products. Plant residues are one of the sources of replenishment of the soil with the necessary macro- and microelements. For example, 1 t of straw contains 5 kg of nitrogen, 2.5 kg of phosphoric anhydride, 8 kg of potassium oxide, and in the straw of winter wheat also such trace elements as boron, copper, manganese, molybdenum, sulfur, etc. Moreover, for faster decomposition of straw, it is necessary to add nitrogen fertilizers. Another important characteristic that affects the rate of decomposition of plant residues is the degree of grinding and the amount of residues that remain on the soil surface. After all, it is known that the microorganisms that decompose them are inactive on the soil surface. Therefore, the aim of our study was the mass of plant residues left after tillage by Lozova Machinery units. **Methods:** The research was conducted near Mykolayiv, soil type: southern and heavy loamy Chernozem; culture - sunflower (hybrid R-120); the predecessor was winter wheat. The estimated biological yield was 17.79 c/ha. To determine the mass of plant remains, they were selected in tenfold repetition, arbitrarily from the surface of the field using a frame measuring 31.6 * 31.6 cm (100 cm²) and weighed using laboratory scales. The control option was CPC6.04, the studied units of Lozova Machinery were: Ducat 2.5, Ducat RST 6, Ducat UVT 6, and LIRA XL 21. **Results:** During the research, it was found that the control unit, which covered the entire area of the field, except the experimental area, showed a result of 0.052 kg/100 cm². After the Ducat 2.5 test machine, whose operating speed was 13.5 km/h, the weight of plant residues remaining on the surface was 0.041 kg/100 cm². The indicator of crop residues by the LIRA XL 21 machine (working speed 11-12 km/h) became - 0.064 kg/100 cm², for tillage Ducat UVT 6 (working speed 12-14 km/h) the indicator was 0.060 kg/100 cm², and Ducat RST 6 (operating speed 12 km/h) - 0.032 kg/100 cm². **Conclusions:** From the above results, we can conclude that the lowest rate of earnings of crop residues has a machine LIRA XL 21, but its productivity compared to other units is much higher due to the width of the capture. At the same time, the Ducat UVT 6 machine has the highest rate. However, it should be noted that the presented dynamics are typical for sunflower culture and the corresponding research conditions. A change in one of the factors can have a significant impact on the rate of incorporation of crop residues.

Keywords: soil tillage, Ducat UVT 6, Ducat RST 6, Ducat 2.5, LIRA XL 21

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Modeling the rolling of a rigid cylinder on the soil surface

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Background: Detection and removal of the plow sole is an important task. Modern contactless scanners are not available for most farms due to the high price, and our device will allow small farms to investigate soil compaction and take the necessary measures to loosen it. The peculiarity of the device we are developing is that its working body (disk or sphere) penetrates the soil to a small depth. The aim of this study is, within the framework of the used model of the viscoelastic layer, to obtain the force factors of the impact on the cylinder, ensuring its uniform rolling when penetrating the uncompacted viscoelastic soil layer. **Methods:** This work solves the problem of rolling a rigid cylinder on a viscoelastic layer of uncompacted soil, interlocked with a non-deformable half-plane that simulates a plow sole, in the presence of adhesion and slippage zones in the contact area. When formulating the problem, the compliance of the cylinder and half-plane is not taken into account, and to describe the properties of the soil layer, the Kelvin model is used, which has a limited viscoelastic creep. **Results:** A model has been built to analyze the influence of the mechanical characteristics of the intermediate viscoelastic soil layer on the contact characteristics and the friction force during the rolling of a rigid cylinder on a rigid base. The viscoelastic behavior of the soil in the normal and tangential directions is described using the Kelvin model. The existence of adhesion zones and relative slippage of the surfaces of interacting bodies in the area of their contact is taken into account. As a result of solving the problem, the distributions of normal and tangential stresses on the contact area, as well as the sizes and positions of the adhesion and slip zones in the contact area, were determined. It is shown that in the contact area, there can exist both two (slip-adhesion) and three (slip-adhesion-slip) zones. The analysis of the influence of mechanical and geometric characteristics of a thin viscoelastic soil layer, rolling speed, cylinder radius, and sliding friction coefficient on the distribution of normal and tangential stresses on the contact area is carried out. **Conclusions:** The 2D contact problem for a rigid cylinder rolling on a thin viscoelastic layer bonded to a rigid half-plane is considered. The Kelvin model is used to describe the viscoelastic properties of the soil layer. The method to calculate the normal and shear stresses within the contact area is presented. The contact stress distributions and the dependence of the traction coefficient on the relative slip are studied for various values of the coefficient of sliding friction and the layer viscosity parameters.

Keywords: plow sole, viscoelastic layer, Kelvin model, relative slip, rolling friction, friction coefficient, traction coefficient.

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Winter wheat variability by grain productivity and quality under local conditions of Ukrainian North Steppe

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Abstract: Winter wheat is an important crop, suited to the typical weather conditions in the current climate. In a changing climate the increased frequency and severity of adverse weather events, which are often localized, are considered a major threat to wheat production. The improvement of grain productivity and its components of winter wheat through exploiting of mutagens lead to the creation of new varieties with improved traits. The use of induced mutations has become an important technique to optimize plant structure for bioproductivity. The objectives of our experiments are the description of the phenotypic and genotypic variability by the main agriculture-value traits (grain productivity and grain quality) of the new winter wheat varieties according to their interactions with different environmental conditions of the Ukrainian North Steppe geographic subzone. Fifty new winter wheat varieties were investigated in field and laboratory experiments during the 2020 growing season by parameters of grain productivity and quality, winter wheat resistance, yield structure, earliness, main morphological traits, general growth and development characteristics, protein and gluten content, protein composition, gliadins structure. In complex (by quantity and quality traits) varieties Perlina Polissya, Gratsiya Bilotserkivska, Vid, Azano, Balitus, Albertus, Etana can be recommended by full prevalence on all parameters for Northern Steppe subzone (for Dnipro region) under standard, varieties Vaha, Morozko which are on the level of the standard are also suitable by agronomic-value traits complex. Two varieties (Perlina Polissya, Gratsiya Bilotserkivska) were national varieties, three (Vaha, Morozko, Vid) from Russian Federation and other four from the EU group, which in general have excellent yield qualities but sometimes not so useful by grain quality (protein and gluten content). Investigations in terms of ecological exams show that the general national exam of winter wheat varieties isn't enough for identification suitability of winter wheat varieties for growth under specific semi-arid conditions. The level of regional variability at different climatic conditions is enough for significance discrepancies in genotype-environment interaction and, thus, for unsuccessful even for varieties obtained in results of a special breeding program under conditions of the geographic zone (Steppe of Ukraine) and according to general variety model for this zone. Investigations of winter wheat grain agronomic-value traits are usually limited to a few types of climates and the limited number of varieties (without any record of variety type by special demands for realized of potential yield). The wide phenotypic variability for most of the agricultural-value traits investigated is indicative of the large diversity of the genotypes in genotype-environment interactions, mutual influences of climatic conditions, and genetic control peculiarities of agriculture-value traits.

Keywords: winter wheat; variety; grain quality; grain productivity.

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Challenges and Problems of Development of the Seed Industry in Ukraine

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Background: The global COVID-19 pandemic has drawn the attention of all countries to the problem of food security and the population's need for high-quality food, which can be fulfilled by an increase in volumes and quality of crop production on an innovative basis. This is made possible by the use of new plant varieties and the production of high-generation seeds, which by their characteristics far exceed their existing analogs. The purpose of the research is to identify challenges to the development of the seed industry in Ukraine at the present stage.

Methods: The basis of the research is the use of abstract-logical, monographic, expert methods, and a systematic approach.

Results: The main achievement of modern world agriculture is the development of the system of genetics and selection of crops. The use of new varieties has allowed farmers to increase the yield of leading crops by 30-35%, as well as significantly improve the quality of seed. Today, the seed industry remains one of the most strategically important branches of the agricultural business, as it brings almost 25% more profit than the production of marketable grain. At the same time, the production of high-generation seeds remains an important branch of the state seed system and serves as a source of transfer of new developments of domestic breeders to agricultural enterprises of the country.

However, today the Ukrainian system of selection and seed production is experiencing several problems and must focus on the constant challenges of a changing environment. Among such problems are the expansion of the Ukrainian market with seeds of hybrids of foreign selection; strengthening internal and external competition; wear and tear of the material and technical base of enterprises; unregulated institutional mechanisms for the protection of intellectual property rights to plant varieties and hybrids; low level of state support of state research and production institutions - originators of varieties and hybrids of high-yielding crops, in particular, included in the system of the National Academy of Agrarian Sciences of Ukraine, etc.

At the same time, Ukrainian seed companies are particularly sensitive to the challenges of globalization and uncertainty, as they are unable to compete with the leading seed plants, which are increasing their presence in Ukraine and other CIS countries every year.

Conclusions: The modern seed industry, in Ukraine due to globalization, competes with foreign seed producers, which is a significant barrier to its development. In our opinion, the solution of the strategic development of the Ukrainian genetics and selection branch and seed industry is possible under the condition of changing the vector of the state agricultural policy in terms of supporting domestic producers, increasing funding for scientific developments by domestic originators of new varieties and hybrids, providing transparent mechanisms for intellectual property rights. We are convinced, that these important steps will strengthen the economic potential and competitiveness of the domestic seed industry, and, as a consequence, the food security of Ukraine.

Keywords: seed production, genetics, selection, economic potential, food security, state support.

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**Investigation of the movement of moisture after
harvesting winter wheat in a ball of soil 300 mm with
different soil cultivation technologies: No-Till, Mini-
Till and classic technologies with plowing**

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Background: In modern conditions, there is a high intensity of climate change. The main factor that leads to the loss of moisture from the soil is evaporation. The intensity of this process can be reduced by plant residues and proper tillage. It should be noted that soil compaction does not allow water to pass into the deeper layers of the soil and evaporation from the upper layers increases. Also, the sealing layer delays the flow of moisture from the lower horizons. The effectiveness of the fight against compaction depends on the quality of the tillage units, especially the quality of tillage across the width and depth of the unit. This is influenced by the design of the paws and the distance between them. The no-tillage system is perfect. Each type of tillage has its advantages and disadvantages. The choice of cultivation technology should be made depending on the main factors: mechanical composition and level of humus; relief; the amount of precipitation and the sum of temperatures per year - broken down by seasons and months; technical support; the intensity of cultivation technologies; crop rotation; the biological characteristics of cultivated crops. **Methods:** 1. Weather conditions were measured using a multifunction device. Samples of plants were taken to determine the yield of the main products and by-products, moisture of grains and stems in the laboratory; the number of plants per 1 m²; stubble height; weight and thickness of the layer of plant residues; air temperature; wind strength and direction; air humidity, soil hardness in the row and the row spacing. The obtained data were recorded in the experiment log. 2. Measurements of soil hardness were conducted at a depth of 0-300 mm before harvesting winter wheat at different tillages.

Hardness determination was performed for different tillage systems using a digital hardness tester, which records the hardness in steps of 25 mm. The obtained data were recorded in the experiment log.

Study of changes in soil hardness depending on time: from the pre-harvest period and 5 days after harvesting. On the first day of harvesting, samples were taken every hour (from 9 am to 7 pm), in the next 4 days - three times a day: at 9 am, 2 pm, and 7 pm. Humidity measurements were carried out with measurements of environmental conditions. 3. Measurements of the amount of moisture in the soil at a depth of 0-300 mm before harvesting winter wheat during different tillages. Sampling was performed from a depth of up to 300 mm every 50 mm. Samples were packed in boxes and labeled with the time, place, type of processing, and the name of the person who took the samples. Using a drying cabinet, the humidity of the samples was determined. The research was conducted in the field with plant remains and without them. Machines used for tillage: No-Till; АГ to a depth of 60-80 mm; КЛД to a depth of 140-160 mm. **Results:** With all types of tillage at night, the moisture level in the soil rises at all depths by an average of 5-7%. This level during the day decreases by an average of 6-8%. The analysis

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shows that the lowest moisture level in the soil layer is 100-200 mm. It is on average 10-12% lower than in other levels. With all types of treatment, the moisture level differs by an average of 2-5%. For the first 2 days, the soil moisture with and without residues did not differ. On days 3-5, the soil covered with the remains was 6-9% more saturated with moisture. **Conclusions:** To maintain the potential of productivity in conditions of increasing aridity of the climate, tillage plays a key role in the accumulation and preservation of moisture and the creation of optimal conditions for the growth and development of the root system. It is crucial to perform two main tasks for tillage: 1) to ensure maximum accumulation and retention of moisture; 2) to ensure maximum development and penetration of the root system into the depths.

Keywords: soil tillage, No-Till; АГ; КЛД.

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Study on optimal sous vide squid (*Illes argentinus*) process

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Abstract: (1) **Background:** Sous vide (SV) differs from traditional cooking methods, where vacuum packaging prevents food oxidation, reduces flavor and moisture loss during cooking, prevents the growth of aerobic bacteria, and improves shelf life. This study determined the SV squid process by response surface methodology and determined its physicochemical indexes to provide a theoretical basis for the industrial production of SV aquatic products; (2) **Methods:** The samples and sauce (equal to squid weight) were in a plastic vacuum bag and sealed using a vacuum sealer (DZ-260, Dajiang holding group electric co. LTD, China) and using an SV machine (Anova Culinary, A3.2-120V, United States of American) heated in water baths. All the samples were soaked in ice water after cooking for 20 min and stored at -20°C until analysis. According to the principle of Box-Behnken central combination design, a three-factor, three-level response surface analysis was conducted based on a single-factor test with cooking temperature (A), cooking time (B), and sauce salinity (C) as independent variables and the sensory scores as response values; (3) **Results:** According to this model to predict the original data, the correlation coefficient of the equation was $R^2=0.9850$, and the correction coefficient of determination was 0.9656 ($0.9656>0.80$), indicating that the correlation of the model was good. Among the influencing factors of sensory evaluation, the cooking temperature had the most significant impact ($P<0.01$), followed by salinity ($P<0.05$) and cooking time ($P>0.05$); in cross-effects, Heating temperature and salinity had significant effects on the senses ($P<0.05$). In addition, the p values of A^2 , B^2 , and C^2 were all less than 0.001, indicating that the influence of test factors on the response value was not a simple linear relationship, and the quadratic term also had a significant influence on the response value. According to the multiple regression fitting analysis and processing of three factors, the response surface of the sensory evaluation was analyzed. The results showed that the interaction between heating temperature and salinity was strong. It is worth noting that the cooking temperature of SV technology had a more significant impact on the food than the cooking time. The texture, color, aroma, and flavor of squid significantly lacked after heating treatment at lower temperatures. In contrast, the color, aroma, and flavor evaluation of squid decreased significantly when the heating temperature was too high, in addition to texture. The vacuum packaging form and low-temperature heating could effectively reduce the water loss

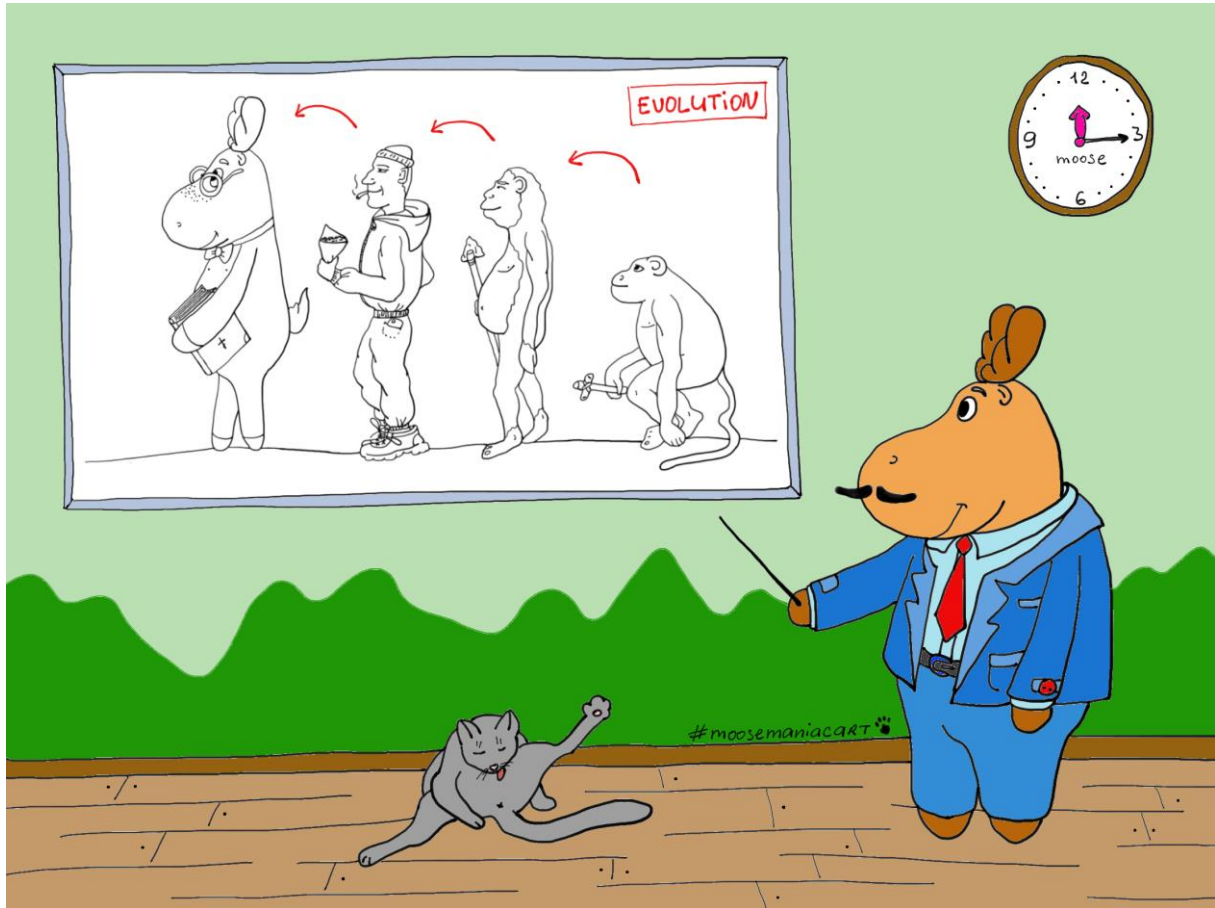
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of squid during the heating process, ensuring a tender and juicy taste. The analysis showed that the best technological test plan for SV squid was cooking temperature 60.7°C, cooking time 30 min, salinity 4.5%, and the predicted sensory score was 43.32; (4) **Conclusions:** Based on the single-factor study, the SV squid process conditions were optimized by response surface methodology as the cooking temperature of 60.7°C, the cooking time of 30 min, and salinity of 4.5%. Therefore, the heat treatment of SV as a method for industrial production of aquatic products is also operable.

Keywords: sous vide; squid, response surface methodology, optimal process; sensory evaluation

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AGROBIOLOGY SECTION



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Conversion of N-acyl Amidines to Amidoximes: A Convenient Synthetic Approach to Molnupiravir (EIDD-2801) from Ribose

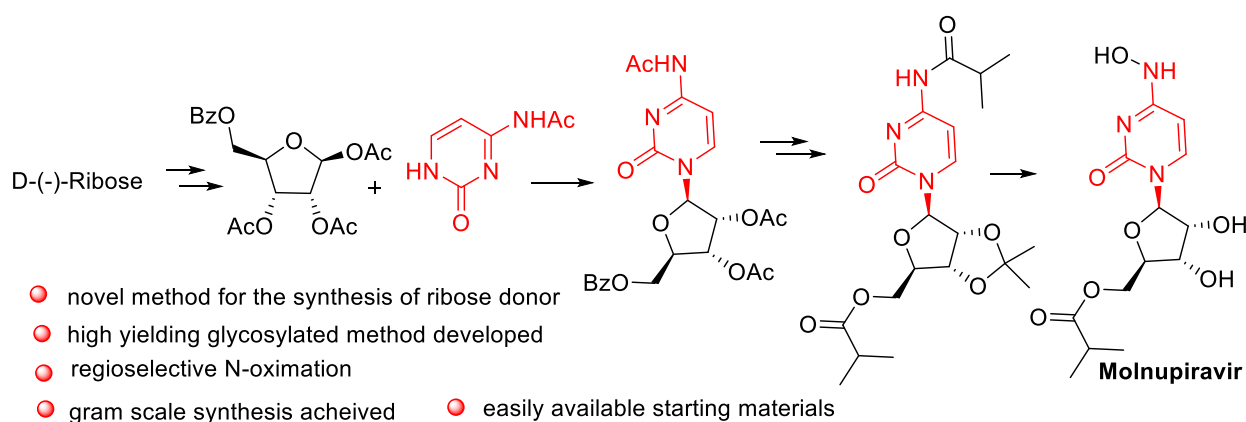
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Abstract: Molnupiravir (EIDD-2801, MK-4482) is an orally active antiviral prodrug candidate that was discovered at Emory University. It has shown broad-spectrum activity against several RNA viruses, including influenza A and B, Ebola, norovirus, RSV, HCV, coronavirus, and Venezuelan equine encephalitis virus (VEEV). With the emergence of SARS CoV-2 in early 2020, the focus rapidly shifted to the evaluation of molnupiravir for the treatment of SARS CoV-2. In October 2021, a preliminary clinical trial reported that treatment with molnupiravir reduced the risk of hospitalization and death from COVID-19 by about 50% for newly diagnosed, high-risk patients. To overcome synthetic challenges here we disclose an efficient method for the preparation of molnupiravir (EIDD-2801) via regioselective conversion of an *N*-acyl-nucleoside intermediate, generated through stereo and regioselective glycosylation of protected ribose and N4-acetyl cytosine, to an amidoxime. This method avoids the use of expensive starting materials, enzymes, complex reagents, and cumbersome purification procedures.



Keywords: Amidoximes; N-acyl-nucleoside; Glycosylation; hydroxylamino derivative

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**Effects of water stress on garlic under *in vitro*
conditions for drought resistance assessment:
Response to osmotics**

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Abstract: Garlic (*Allium sativum* L.) is one of the most popular vegetables in Czech cuisine. One of the main production factors that affect garlic growth and yields is the lack of water combined with the continuous changes in the climate, which causes high temperatures and drought. In recent years the Czech Republic has reported extreme drought. However, the country has the advantage of having one of the significant world collections of garlic species in the Olomouc Genebank. The genetic pool in the collection greatly contributes to safeguarding the large variety of national garlic. This research aims to assess the effects of water stress on selected garlic genotypes under *in vitro* conditions to determine their response to osmotics for drought resistance assessment. The *in vitro* garlic plant has no transpiration (100% humidity) and very low photosynthesis (cultivation below the light compensation point). Osmotic adjustment (OA) is a direct combination of a plant to water shortage with a genetic background. In addition, this method will make it possible to evaluate the stress response of garlic to penetrating and non-penetrating osmotic agents to the cell in an iso-osmotic concentration using sucrose, mannitol, and Polyethylene glycol (PEG). This methodology will allow us to study the pure response of a plant in OA as a main physiological parameter. OA is generally accepted as one of the most common reactions to overcome the adverse effects of water deficit. At the end of the research, the methodology will be simplified to identify a larger number of garlic genotypes resistant to drought stress in these parameters and help increase local producers' garlic production despite the extreme drought.

Keywords: *Allium sativum* L.; osmotic adjustment; drought resistance; *in vitro* drought resistance assessment.

Acknowledgements: This research was funded by the Ministry of Agriculture of the Czech Republic, grant number MZE RO0418.

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Effects of Different Drying Methods on Organoleptic Properties of Traditional Vietnamese Beef and Buffalo Jerky

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Abstract:

Background: Meat is one of the most valuable livestock products. It serves as the primary source of protein for many people, especially in developing countries, where the demand for meat is still rising. Poor equipment and knowledge about meat preservation highlight the importance of feasible alternatives for rural populations. Drying or dehydration is one of the oldest and still most popular methods for meat preservation. Drying the product directly in the sun, which is still used in rural areas of Vietnam, is associated with many difficulties, such as the possibility of contamination by microorganisms, pests, or molds. Moreover, it changes the organoleptic properties of the product. Therefore, this study focuses on the sensory analysis of beef and buffalo jerky dried in different conditions, concretely in the laboratory oven (LD) and active solar dryer (ASD). **Methods:** Beef and buffalo raw meat samples were prepared, and two different types of pre-treatments were applied: marinating the samples in traditional Vietnamese marinade and frying the samples in oil before drying. Prior to drying, the physicochemical characteristics of the raw meat were determined, such as dry matter content (%), Warner-Bratzler shear force (N), and color. The aim was to find a correlation between the dryers and the sensory properties of the meat and the relationship between the different types of pre-treatments applied. The sensory panel also aimed to investigate if different pre-treatments (curing and frying) and different kinds of meat (beef and buffalo) can influence the results of sensory profile analysis. Moreover, these samples were also compared with dried beef meat obtained from the local market. **Results:** Organoleptic properties of five samples were assessed by a trained 13-member degustation panel. The best-scored sample was beef meat from the local market, followed by beef meat dried in ASD and buffalo meat dried in ASD. Frying the samples before drying did not affect final organoleptic properties significantly.

Keywords: Solar drying; meat drying; meat jerky; renewable energy; organoleptic properties; sensory analysis.

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**Cellulose-destroying bacteria's activity of chernozem
soils by different methods of tillage and Leanum
usage**

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Background: Cellulose-destroying bacteria are one of the key microorganisms that exist in the soil. After all, as the name suggests, their main function is cellulose decomposition, which is the basis of all plant cells. Bacteria that can decompose cellulose live in both aerobic and anaerobic conditions. This means that the species composition of organisms that perform the same functions is different. But their main difference, of course, is the products released after "digestion" by cellulose-destroying bacteria of plant residues. Under anaerobic conditions, the decomposition products are carbon dioxide and methane, while under aerobic conditions - water and carbon dioxide (Malinovska & Gavrilov, 2014). Anthropogenic impact on the soil biological activity is significant, especially in the last decades (Tony Yang et al., 2021). Different tillage, norm, dosage, form, and terms of fertilizers, application of soil probiotics influence the soil microbiome (Ágnes Oláh, Zsuposné, 2010; Tsyuk et al., 2018). The aim of our study was to identify the activity of the soil microbiota, namely cellulose-destroying bacteria, in the area of studying the effect of soil pro- prebiotic "LEANUM" and tillage in the field experiment. The research was conducted on corn plots. **Methods:** Cellulose-destroying bacteria activity was analyzed by the method of applying linen cloth by Mishustin and Petrova. For the experiment, the linen textile was cut into pieces of 5*7 cm, after they were numbered, weighed, and covered with a transparent plastic sheeting. The soil was dug up to 35 cm in three times repetition for each variant, one of the walls of which had to be perfectly flat (to ensure the best contact of the cloth with the soil). Linen pieces were located at a depth of 0-10, 10-20, and 20-30 cm, three at each depth. The experiment was started in the phase of 10 leaves and continued until the phase of milk maturity of corn. It should also be noted that tillage options are plowing and flat cultivation to a depth of 25-28 cm, as well as disking to a depth of 15-18 and 6-8 cm. Soil pro-prebiotic "LEANUM" was used during sowing in the form of powder and liquid, and also carried out 2 treatments on the leaf. The application rate corresponds to the manufacturer's recommendations. At the end of the experiment, statistical data processing was performed. **Results:** It was found that the highest percentage of tissue weight loss was at a depth of 10-20 cm and amounted to 10.94%, and the lowest - at a depth of 0-10 cm (8.36%). In general, the option where cellulose-destroying bacteria worked the least was plowing in one treatment per leaf with a rate of 3.46% loss at a depth of 10-20 cm. The highest activity of bacteria has been found in the variant without pre-sowing treatment of seeds, but with two spraying of LEANUM, the percentage of losses on this variant was 31.12%, for tillage - subsurface cultivation to a depth of 25-28 cm. **Conclusions:** The activity of cellulose-destroying bacteria is highest at a depth of 10-20 cm, while at a depth of 20-30 and

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0-10 cm bacteria also work, but with less intensity. Further research is needed to obtain more accurate results.

Keywords: Zea mays, cellulose-destroying bacteria, soil probiotic, soil tillage, leanum

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Traditional llama husbandry in two Andean regions

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Abstract: The traditional husbandry of South American camelids plays an important role in the life of the Andean pastoralists. The products obtained from these animals are often the only source of their economic income. Successful breeding can be challenging under high-altitude conditions. However, there is a lack of information about husbandry practices used in these regions; thus the aim of this study was to analyse the current status of knowledge within breeding systems in South American countries. The data about llama (*Lama glama*) and alpaca (*Vicugna pacos*) husbandry was collected between May and July 2021 in central Ecuador and southern Peru, during the dry season. A total of 40 questionnaires were obtained from the local farmers. The questions were focused on the herd structure and organization, type of pasture, reproductive parameters, and main utilization purposes and products. The mean length of farmer's experience in llama breeding (mean \pm SE) was 8.75 ± 10.1 years. While in Ecuador, 50% of interviewed farmers have not practiced llama breeding for a longer time and have started just before 1 year, the husbandry was found more traditional between the farmers in Peru, up to 47 years of breeding experience respectively. The length of farming depended on the country significantly ($p = 0.0127$). In 70% of interviews, the herds were accompanied by a shepherd, chosen from families of the community. The pasture was shared with cattle, sheep, and horses in 42.5% of husbandries. The mean size and composition of the herds (mean \pm SE) were 51.5 ± 66.5 females, 12.3 ± 15 males and 18.3 ± 21 calves, respectively. Controlled weaning was practiced in 90% of interviewed households, while the remainder of farmers relied on natural weaning. The purpose of breeding in the communities was fiber production (28.2%), as a pasture animal (26.2%), tourism (26.2%), meat (11.7%), skin (5.8%), and as a ceremony animal (1.9%). Traditional selection criteria were pelt color (24.4%), body size (24.4%), growth rate (16.5%), body conformation (15%), pedigree (7.1%), temperament (7.1%), and long distance walking capacity (5.5%). One of the main problems for llama husbandry in these areas is the lack of pasture, especially during the dry season, which increases the mortality rate in the herds. Another factor limiting the production was the presence of parasites, which decreases the fiber quality. Moreover, the covid-19 and lower tourism frequency made the economic situation of the breeders more difficult. This study brings a deeper look into the traditional llama husbandries and presents their main herd production and selection criteria. Further studies should focus on how to improve management and breeding techniques to reduce animal mortality and prevent economic losses of the communities in the Andean region.

Keywords: alpaca; animal products; breeding management; llama; llama husbandry; selection criteria

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**Structural and aggregate composition of soil under
siderates on *Ginkgo biloba* L organic plantation**

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Abstract: Today, one of the global problems for humanity is the depletion of agricultural land. This is primarily due to the significant increase in the population of the Earth, which respectively, increases the need for intensive development of the food industry. Modern manufacturers pay more attention to organic products. In this regard, there is a need to explore effective green manure crops able to replace mineral fertilizers and improve the structural and aggregate condition of the soil. In 2018, the Sumy National Agrarian University created an organic plantation where *G. biloba* is grown. **Materials and methods of research.** The research was conducted in the fields of the educational and scientific production complex of SNAU, Sumy. The sowing rate of plants for green manure: annual ryegrass 18 kg/ha, phacelia 12 kg/ha, white clover 10 kg/ha, red clover 18 kg/ha, white mustard 12 kg/ha, sainfoin 80 kg/ha. The area of each option was 0.025 ha. The control was the area without green manure crops. To determine the structural and aggregate condition of the soil, the samples were taken in late August in layers up to 30 cm with a step of 10 cm. Samples were brought to an air-dry condition and according to the method of dry sieving of I. Savvinov, the diameter of aggregates was determined by sieves of 10 – 0,25 mm (+ pallet, units less than 0.25 mm). For each section and depth, the share of aggregates from the total weight of the soil sample has been calculated. **Conclusions.** Periodic loosening of the soil in the areas without green manure for weed control led to the creation of the best structural and aggregate composition in layers of 0–10 and 20–30 cm, which contributed to obtaining the highest index of the structural coefficient. Among the areas with green manure crops, on average, for two years of research, the highest percentage of the agronomic valuable structure was obtained in a layer of 0–10 cm in areas with white mustard, white clover; in the layer of 10-20 cm - white clover 69.6%, slightly less on mustard 68.3%, sainfoin 68.8%. In the layer of 20–30 cm - the highest percentage of units with a size of 10–0.25 mm appeared in areas with white clover 73.1% and sainfoin 72.9%. Sainfoin and white clover among the green manure crops showed the highest coefficient of structure in the layer of 20–30 cm - 2.7. The coefficient of structure in the layer of 10– 20 cm on the areas with green manure plants was in the range of 1.9–4.3 with a maximum on the area with white clover. The project on the introduction of *Ginkgo biloba* for the conditions of the Forest-Steppe of Ukraine continues. The study of the effectiveness of these green manure plants and their mixtures will be continued, considering the estimation of nutrient and water regimes, as well as the content of organic matter.

Keywords: *Ginkgo biloba*; green manure; organic plantation, aggregate composition of soil

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Effects of low temperature on the weight of guinea pigs

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Background: Today, the popularity of keeping guinea pigs as pets is growing. These cute animals can bring a lot of joy, but only if they are kept under comfortable conditions. The optimum ambient temperature for guinea pigs is 18-25 °C. This temperature is favorable for growth and weight gain. Normally, an animal at the age of 5-12 weeks gains about 30-60 g in 7 days. The purpose of our study was to evaluate the effect of lowering the temperature of keeping on the weight gain of guinea pigs. **Methods:** The subject of the study was guinea pigs weighing 300-350 g, which were kept in the vivarium of the educational laboratory of the Department of Epizootology and Infectious Animal Diseases of the Dnipro State Agrarian and Economic University. The animals were divided into two experimental groups. The first group was kept at a temperature of 2-7 °C without drafts. The second group was kept at a temperature of 15-18 °C. For 10 days, animals from the two experimental groups received the same amount of food (the diet consisted of hay and succulent food). Every two days, the animals under study were weighed and a general clinical examination was performed. Experiments carried out on living vertebrates were consistent with the principles of the European Convention for the Protection of Vertebrate Animals used for Research and Other Scientific Purposes (Strasbourg, 1986). **Results:** The body weight of guinea pigs from the first group, which was kept at a low temperature, increased by 14.67±2.52 grams in 10 days (Fig. 1). At the same time, the animals remained clinically healthy. It should be noted that, in general, weight gain was not observed in the first 6 days of the experiment. During weighing on days 8 and 10 of the study, an increase in body weight was observed. A change in temperature to a critically low leads to inhibition of growth and stress of animals. Together with these, it can be argued that guinea pigs are able to adapt to the action of unfavorable environmental factors due to an increase in body weight on days 6-10 of the study. The body weight of the experimental group by the end of the study did not reach the weight of the second study group. It was revealed that the weight gain of guinea pigs kept at the optimum temperature for this animal species (15-18 °C) increased by 54±4.58 grams in 10 days. Animals kept at low temperatures ate their daily ration faster than the guinea pigs of the second group.

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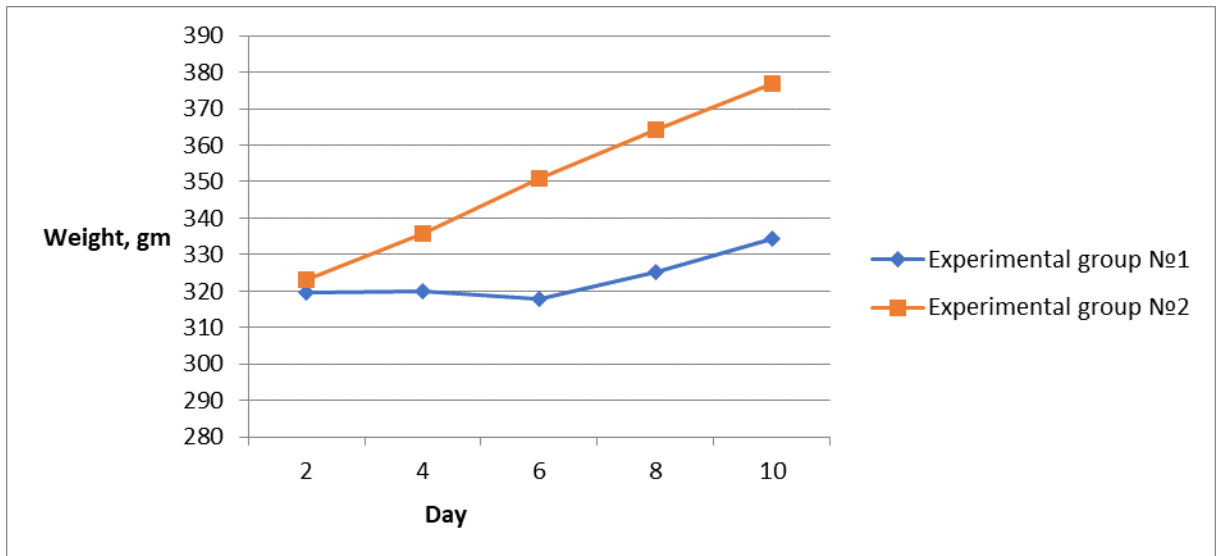


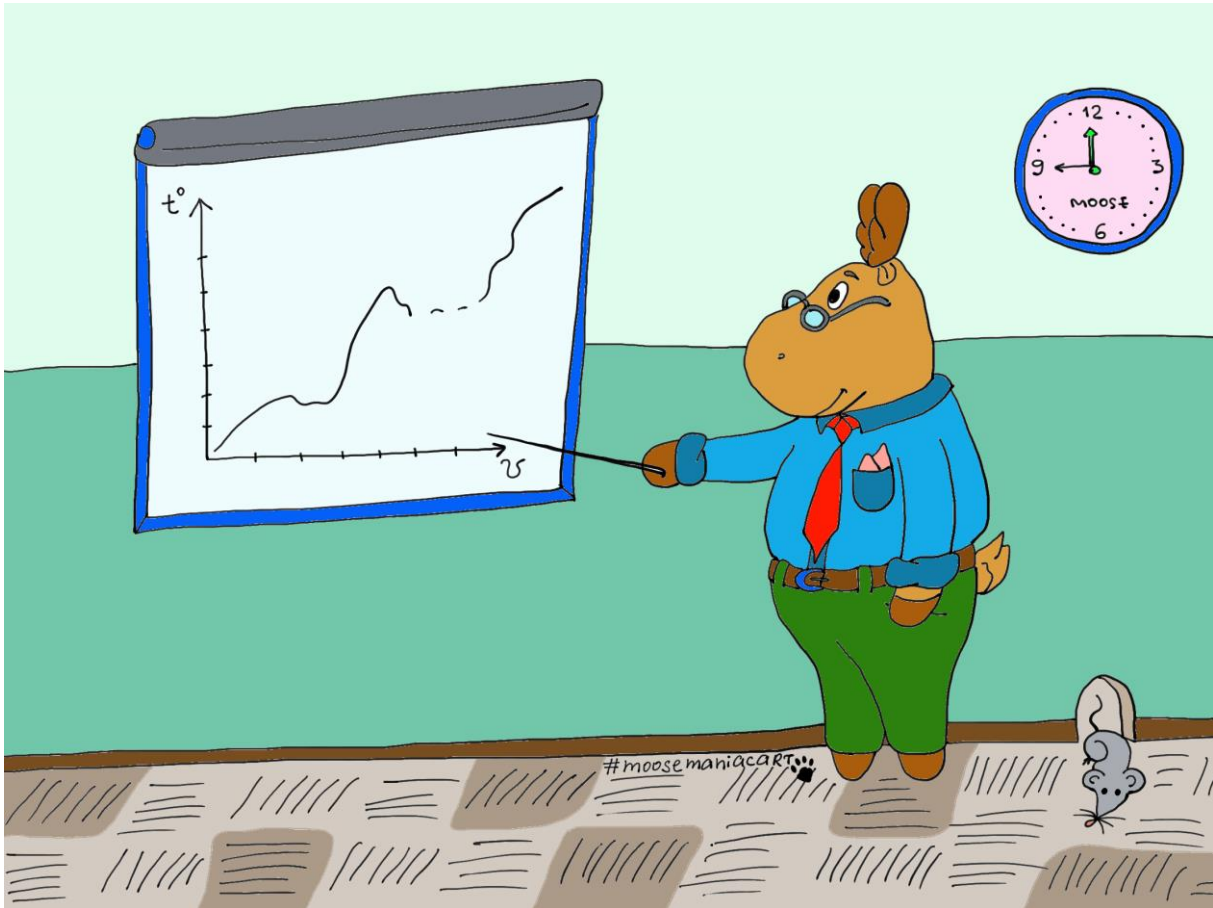
Fig. 1. Dynamics of changes in the average body weight of animals of different study groups

Conclusions: Keeping guinea pigs at low temperatures leads to a decrease in body weight gain while increasing appetite. Low temperatures are not favorable for keeping guinea pigs.

Keywords: guinea pig; ambient temperature; body weight

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Investment gap in SDG 2 and 12: the case of top agro-holdings in Ukraine and the Czech Republic

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Background: The study examines Sustainable Development Goals (SDGs) 2 and 12 in agriculture for the Czech Republic and Ukraine with the aim to find best practices in implementing them within the responsible investment framework and agricultural companies' transparency in Ukraine and the Czech Republic. **Methods:** For these purposes, comparative analysis and the Sustainability Transparency Index (STI) methodology are used based on data for 2017–2020. According to the United Nations, the key problems of humanity are health care, climate changes, poverty and gender inequality. To solve them in 2015 there were introduced 17 SDGs and 169 targets on global and national levels. The UN SDG 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" and 12 "Ensure sustainable consumption and production patterns" contribute to achieving other goals by 2030. **Results:** According to Food and Agriculture Organization (FAO), achieving SDG 2 and its targets is quite a difficult task even by 2050, since almost 800 million people worldwide are chronically hungry, and 2 billion suffer from micronutrient deficiencies. Food production should increase by 60%. The required amount to achieve these goals by 2030 is estimated at 265 billion USD a year by 2030 by International Fund for Agricultural Development (IFAD) and World Food Program (WFP). Agriculture is one of the critical spheres to achieve SDGs because it deals with food security, hunger, waste-free production, and the reduction of environmental pollution. That is why creating investment tools for financing SDGs 2 and 12 in the agricultural sector on a responsible basis becomes particularly relevant. The Czech Republic and Ukraine are countries differing in economic development and the agro-industrial complex. Both countries have recently joined the UN Global SDGs system and are taking the first steps in achieving them. Eliminating a gap in funding SDGs 2 and 12 is relevant for both developed countries (the Czech Republic) and developing countries (Ukraine). A comparative review of global and national targets of SDGs 2 and 12 in Ukraine and the Czech Republic includes these targets at the national and global levels. Some tasks are skipped in both countries with inconsistency between global monitoring data of these goals in Ukraine and the Czech Republic due to the absence of some SDG tracking data, which prevent providing an accurate picture of progress in countries. **Conclusions:** The companies' transparency in sustainable development is an essential element nowadays. The STI methodology is developed to prove this. It is applied to the top 100 Ukrainian agriculture companies. In addition, correlation analysis and Granger test show that the higher the STI score, the better the company's position in the agricultural companies ranking. This is direct evidence that transparency of the company in sustainable development is an important element of its activity nowadays. As a result, appropriate reporting practices are required. The problems of SDGs 2 and 12 implementations need to be solved to level the system of national and global targets of SDG 2 and 12 in Ukraine and the Czech Republic. It helps ensure their full coverage, improve the monitoring targets system, force stakeholders to report the progress in achieving goals, integrate inclusion in national budget cycles, create the most effective RI tools at the state level.

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Keywords: agriculture, global targets, hunger, national targets, responsible investment, SDG, sustainable consumption transparency.

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Statistical analysis of Ukrainian e-commerce development against the background of trends in Central and Eastern Europe

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Abstract: (1) **Background:** Electronic commerce is one of the fastest growing parts of modern economy. Its development is driven by complex of factors with priority of technological progress, as well as impact of the COVID pandemic. Physical inability of offline shopping in the circumstances of pandemic restrictions has prompted consumers to use online opportunities to meet their needs. In this situation, Ukrainian e-commerce showed good results in terms of electronic market growth. The purpose of the study was to investigate the peculiarities of Ukrainian e-commerce in the broader context of e-market trends in Central and Eastern Europe. (2) **Methods:** To achieve this goal, methods of structures comparison and structural shifts were applied, namely differences index, Kasinet's linear coefficient of absolute structural shifts, Kasinet's quadratic coefficient of absolute structural shifts, Gatev's integral coefficient of structural shifts, Salai's integral coefficient of structural differences. Cluster analysis was used to identify similarity in the structures of e-commerce in Ukraine, the Czech Republic, Poland, the Russian Federation, Estonia, Latvia and Hungary. (3) **Results:** The findings indicate that increase of Ukrainian e-commerce in 2020 was the largest among countries under evaluation. The volume of the market raised by 41% compared to 2019 and equaled USD 4 million. E-markets of Poland and the Czech Republic were among TOP-3 countries by growth rates (37% and 29%, respectively). The share of e-commerce in Ukraine's GDP is 2.6%, whereas the highest level of this indicator is observed in the Czech Republic (3.7%) and the lowest in Latvia (1.1%). In spite of the intensity of the electronic commerce development, Ukraine has the lowest level of per capita expenditures (USD 104 annually) on online shopping. At the same time, Czech consumers spend USD 841 a year on the Internet and Poles – USD 541. The main segments of Ukrainian, as well as European e-commerce, are online trade in clothing and electronics. Quantitative measurement of structural differences in e-commerce showed, that the structure of the Ukrainian market is most similar to the Russian and Czech markets. And contrary, the biggest differences are observed with Polish e-commerce. According to the performed cluster analysis, two groups of countries are clearly distinguished. The first cluster includes Ukraine, the Russian Federation, the Czech Republic and Latvia, while the second one includes Poland, Hungary and Estonia. (4) **Conclusions:** Ukrainian e-commerce has a long-term upward trend. Like the worldwide situation, national lockdown had a significant impact on the e-market. But despite the intensity of its development, quantitative characteristics of Ukrainian electronic commerce are at a lower level than in countries of Central and Eastern Europe. From this point of view, an increase in the income of Ukrainian citizens will promote the future development of e-commerce.

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Keywords: e-commerce; Ukraine; Central and Eastern Europe; structural shifts; cluster analysis.

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Global value chain in agribusiness

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Abstract: Background: A characteristic feature of modern business is the high speed of changes in the external environment. At the moment, no industry can expect long-term stability. In order to function effectively under these conditions, companies change the organizational structure in a way that is flexible and formalizes business processes, especially those that are linked to the value chain. To date, global value added chains have become key elements in the global economy, demonstrating the trends of globalization. Given that global chains have a great influence not only on individual companies but also on countries as a whole, it is becoming increasingly important to analyze their impact on the agro industry, as partly present at the global level. **Research methods:** The study was conducted using systematic and dialectical approaches. As part of the systematic approach and logical methods, benchmarking techniques of economic and statistical comparisons across calculations, charting, and analytical tables were used. The dialectical approach allowed the study to consider certain issues in the dynamics, relationships, and interdependence. The study used dialectical, defined historical methods, systems, economic and functional approaches, economic and statistical calculations. **Results:** Agribusiness sectors are increasingly lining up chains led by food companies and retailers. For example, supermarkets, working with both exporters and importers, are trying to control the entire production process (including cultivation and harvesting of agricultural products). They aim to ensure that food products meet quality and safety standards along the entire global value chain, which requires vertical coordination. In virtually all countries, the population has changed its consumption patterns towards improving the quality and safety of food products. At the same time, foreign direct investment and trade liberalization have opened up new opportunities for companies to reorganize their value chains. More and more companies are organizing global food supplies and linking small producers in developed and developing countries with consumers around the world. **Conclusions:** Theoretical and methodological basis of the research study is the works and researches done by the domestic and foreign scientists and practitioners in the field of business competition, revealing the theory of the global economy, international and foreign trade, global value chains. In addition, the study used methodological apparatus of international economic organizations such as the WTO, IMF, UN, UNCTAD, BIS, ECB.

Keywords: Global Value Chains; The World Bank; agro-industrial complex; bilateral trade; correlation and regression analysis.

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Problems of Application of Fair Value Measurement in Agricultural Enterprises of Ukraine

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Background: The growth of the efficiency of Ukraine's economy, strengthening the export potential and providing food security, especially in the context of the global COVID-19 pandemic, are directly related to the economic security of agribusiness entities. Twelve years of practice in implementing International Accounting Standard 41 "Agriculture" and National Regulation (Standard) of Accounting of Ukraine 30 "Biological Assets" in accounting practice indicates that there are significant deficiencies in the measurement of assets at fair value. The purpose of the research was to determine the problematic aspects of the application of fair value measurement in agricultural enterprises of Ukraine and to find possible ways to solve them. **Methods:** To achieve a certain purpose and solve problems abstract-logical method; method of system approach; questionnaire method; method of analysis and synthesis were used. **Results:** The fair value measurement methodology has historically originated and focused on the realities of developed countries in Western Europe and the United States. Nevertheless, according to the questionnaire results and scientific sources, it is established that its implementation in Ukraine faces serious obstacles. The main obstacle is a lack of "open" active markets and reliable sources of information on product prices and product measurement during the initial posting of production. The outlined emphasis puts the accountant of an agricultural enterprise in front of a difficult choice - what information to use, from what sources, whether it is reliable and to what extent it can be applied to a particular enterprise. Therefore, at an extremely responsible stage of fair value measurement, most agricultural enterprises in Ukraine face a number of problems. The most significant among them, in our opinion, are: lack of sectoral regulation of active market pricing processes at the state level; the threat of misrepresentation and reduced economic security due to the significant subjectivity of professional accounting judgments regarding fair valuation; insufficient qualification of accounting staff and limited human resources in agricultural enterprises; the presence of the so-called "information vacuum" on the prices of active markets for certain types of biological assets and agricultural products (especially on biological assets inseparable from land); the presence of "half" decisions due to the subjectivity of accounting estimates etc. **Conclusions:** Thus, the imperfection of the mechanisms for establishing the fair value of biological assets and agricultural products does not allow to objectively apply one of the fundamental elements of the method of accounting - measurement, which affects the further reflection of transactions and their distortion in the financial statements. We see the solution to this problem through government regulation's involvement in determining the prices of active markets in the agricultural sector of the national economy. The proposed approaches to improve the measurement methodology in agricultural enterprises, which are based on identifying its problematic aspects and linking the potential risks of fair value, direct further scientific and practical efforts to build an accounting policy to ensure the economic security of agricultural enterprises.

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Keywords: accounting, measurement, fair value, agricultural enterprises, economic security.

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The strategic development preconditions of dairy cattle breeding in Ukraine

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Background: In the context of increasing crisis factors, in particular the COVID-19 pandemic, there are aggravated issues of ensuring the country's food security, as well as the achievement of growth dynamics in the development of both economic entities and industries and the economy as a whole. The implementation of this task is based on the integrated development of the agricultural sector of the economy as a leading sector, the functioning of which on the principles of sustainable development presupposes the establishment of various relationships with all sectors of the national economy, stabilization of the social component of rural areas and the preservation of the natural environment. The main purpose of the research is to assess the processes of changes in dairy cattle breeding, the vectors of their impact on profitability and economic sustainability, substantiation of the foundations and practical recommendations for the formation of a strategy for the innovative development of commodity producers in the industry. **Methods:** The research methodology is formed on the basis of evaluation of statistical data of the State Statistics Service of Ukraine for the development of the dairy industry of the corporate sector of the agricultural economy. **Results:** The state of the industry led to low livestock productivity and high production costs compared to leading producers of livestock products. A large share of milk production belongs to households, but they remain without the attention of the state. An important prerequisite for the development of the dairy subcomplex is the formation of long-term partnerships between the entities involved in the production of milk, its processing, and sale. Integration processes provide the elimination of the current price disparity and pursue the goal of obtaining equivalent income per unit of capital spent. There is a need for state support for the development of integrated cooperatives with their own dairy plant, which provides significantly lower costs for the production-consumption chain. It is the support of integrated cooperatives that is a priority in developed countries. **Conclusions:** The main direction of the further development of dairy cattle breeding and increasing its economic efficiency is the intensification of production by strengthening the feed base, increasing the level of feeding, the introduction of comprehensive mechanization and automation of production processes, and the transfer of the industry to the latest technologies, the use of highly productive, specialized breeds of livestock, improving the quality of livestock products, improving the organization and wages, etc.

Keywords: agricultural sector, dairy cattle breeding, strategy, development, feed base, management, innovations.

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Impact of the COVID-19 pandemic on wine production and consumption trends

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Background: Wine production and viticulture are important sectors of the national economy of Ukraine. The culture of wine consumption, which is gradually displacing the consumption of strong alcoholic beverages, significantly stimulates the domestic vine market in Ukraine. However, during the COVID-19 pandemic, new barriers and circumstances emerged that affected the industry and wine consumption. The purpose of the research was to analyze the impact of the COVID-19 pandemic on wine production and consumption trends both in Ukraine and globally. **Methods:** The calculation, expert, monographic and comparative methods were used. The information base is the official data of the State Statistics Service of Ukraine and the International Organization of Wine. **Results:** According to experts, as a result of the COVID-19 pandemic, world wine consumption in 2020 has reached a record low since 2002. The reasons for this decline are the cessation of the tourism industry and hotel and restaurant business due to the introduction of lockdowns around the world. These reasons, as well as lower incomes, led to a decrease in wine consumption, which reached its peak in China (-17.4%). At the same time, the wine industry is one of the fastest growing and most profitable in the world's leading countries. According to analysts, in 2025 the revenue from the sale of wine will reach a record high of \$ 529 billion. In addition, Ukraine tends to reduce the amount of production – in 2020, 119 million l of wine were produced, which is less than in 2016. In 2020, Ukraine exported 14.4 million l of wine, twice as much as in 2019, although wine imports to Ukraine in 2020 also increased by 22% compared to 2019. Despite this, the grape and wine industry is developing in Ukraine. As around the world, the COVID-19 pandemic has reduced wine consumption in Ukraine, but starting in 2021, they are projected to grow again. In these conditions, it is necessary to develop and implement steps to support national producers gradually. In the context of globalization and integration of Ukraine into the world trade space, competition in the wine market is intensifying. Due to a number of institutional constraints, Ukraine cannot reach the level of wine production development like in European countries. **Conclusions:** Thus, the global pandemic has affected all aspects of socio-economic development of all countries without exception. Its special impact can be traced to the development of wine production, as wine production with the introduction of lockdowns in 2020 fell to a record low. Despite these trends, in the near future the production of wine and wine materials and the industry's profitability will grow, as evidenced by the forecasts of leading global analysts and experts. Ukraine also has significant potential for the development of the national wine industry. The key to such development, in our opinion, is to increase investment in the industry, improve tax policy, product quality control, and support the national producers.

Keywords: viticulture, wine production, government support, lockdown, consumption.

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Changes and trends in the labor market under the influence of COVID-19 pandemic

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Background: The COVID-19 coronavirus pandemic has exacerbated the labor market. All components of the chain were threatened: the activities of companies - employment - income - the standard of living of employees and their families. The aim of the research was to identify changes and trends in the labor market in a pandemic. **Methods:** In the process of research, the methods of absolute, relative values and time series were used. This allowed us to analyze the levels of unemployment, wages by sector of the economy according to the statistical yearbook "Kharkiv region in 2020" and statistical information of the State Statistics Service of Ukraine. **Results:** The main characteristics of the labor market in the condition of COVID-19 pandemic are the following. *Significant crisis restrictions on employment in some areas of the economy.* The dismissal of employees accompanies all this. In 40% of Ukrainian families, at least one person lost their job. Quarantine added 156,000 unemployed people. This is especially true of the following sectors of the economy: "Activities in the field of administrative and support services"; "Arts, sports, entertainment and recreation"; "Temporary accommodation and catering". The most active employers in the labor market were companies in logistics, retail and wholesale trade. *Wage reduction.* Large-scale transfer of workers to part-time employment, reduction of working hours led to a drop in wages. In March 2020, the average monthly salary of employees in the economy of the Kharkiv region was 9820 UAH which decreased by 10.7% in April-May. It reached the pre-quarantine level in July. *Social insecurity of workers and their families.* It was difficult for the dismissed workers to register with the State Employment Service in order to obtain the unemployed status. The amount of benefits depends on the salary at the previous place of work and the length of insurance. The amount of the minimum benefit (UAH 1,277, approximately USD 47-50) is very meager. *Transition to a remote form of employment on-line.* The pandemic pointed out that there is no difference in productivity depending on whether it is performed by an employee in the office or remotely. Given the experience gained, business leaders can continue to reduce staff and leave to work only employees who can generate profits. *Search for measures to adapt to work in a pandemic.* Coronavirus disease is not the first year and companies have already developed a large number of tools to adapt to pandemic conditions, given the remote work, flexible schedules, hybrid teams. **Conclusions.** The main consequences of the pandemic are constant change in the situation and strategic unpredictability of the labor market; rising unemployment and reducing the number of vacancies; reduction of the level of income of the population and the standard of living; increasing competition in the labor market; maximum cost optimization of companies. In the future, we can predict a further decline in employment, a long-term trend of companies working online and an increase in demand for the creative industry.

Keywords: pandemic, labor market, employment, unemployment, competition, wages, company activities.

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World's trends of the chicken market: possibilities for Ukraine

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Background: World's trends in the chicken products market have a positive trend over the years and are steadily increasing its position by about 25% over the past 20 years. Exporting chicken meat is one of the steps towards Ukraine's integration on the European market of agricultural products, a possibility of increasing sales for Ukrainian chicken producers to increase profit. **Methods:** Data from the official website of the Food and Agriculture Organization of the United Nations (FAO) were used for the analysis. The analysis is based on the use of the following research methods: statistical - to study the dynamics of production and export of chicken meat, graphic - to summarize and clarify the presented research results, generalization - to determine the prospects of positive dynamics in the market of chicken meat for Ukraine. **Results:** The world's volume of chicken meat production has a growth trend of about 2% each year. China, the United States and Brazil remain the world's top three chicken producers between 2010 and 2019. In the global chicken production, the share of the top three in 2019 is 31.48% of the total volume of chickens raised in the world 83125793 thousand heads. Ukraine takes place 23rd to 32nd in the world rankings from 2010 to 2019, and the share of Ukrainian chicken meat in world's production in 2019 is 0.86%. The geography of exports of Ukrainian chicken meat began to expand after 2008, and in 2019, Ukraine exported chicken meat to more than 50 countries (Fig. 1). The top five countries to which chicken meat was exported from Ukraine have been constantly changing from the past decade. Ukraine has been exporting chicken meat to Kazakhstan, Uzbekistan, Vietnam, Georgia, the Republic of Moldova, and the UAE continuously since 2010.

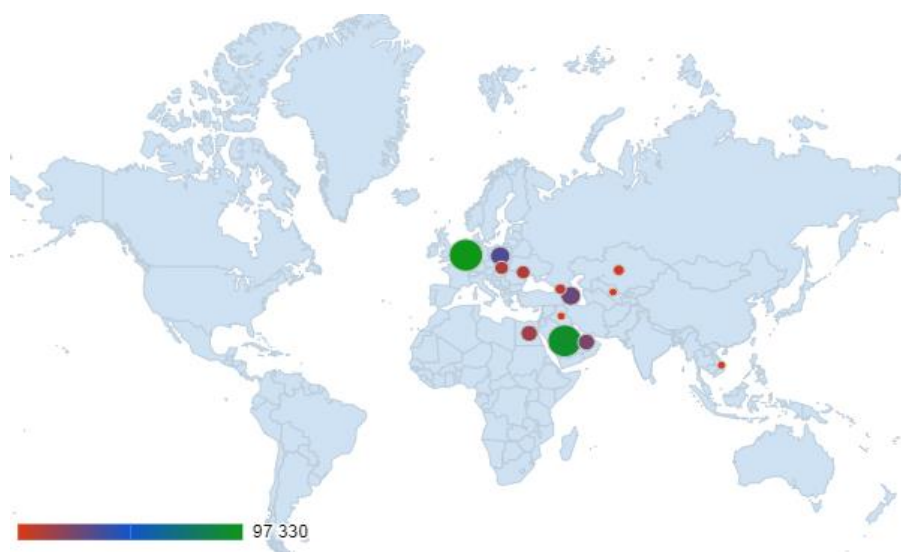


Fig. 1. Geography of exports of chicken meat in Ukraine in 2019, thousand dollars USA

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In 2013-2014, Ukraine started exporting chicken meat to the Netherlands, Saudi Arabia, Poland, Azerbaijan and Egypt. In 2019, most of Ukraine's chicken meat was exported to countries such as the Netherlands, Saudi Arabia, Azerbaijan, Poland, and the United Arab Emirates. A simplification and acceleration of customs clearance of goods exported to the EU and an introduction of the institute of authorized exporter in determining the preferential passage of goods is a positive practice. **Conclusions:** The quarantine restrictions are related to preventing the spread of COVID-19, to spreading the ideology of vegetarianism, to increase in prices for chicken meat and a number of other factors did not affect the situation with a possible decrease in the production and consumption of chicken meat in Ukraine and the world. Thus, entering the European markets is a positive prospect for the Ukrainian chicken market and the world with a possible gradual increase in exports of these products, despite several efforts to carry out export activities for chicken producers.

Keywords: production, world trends, exports, chicken meat

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Ensuring a sufficient level of banking capitalization in the COVID-19 conditions

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Abstract: At the present stage of economic development, one of the banking system's main problems is maintaining its financial stability and reliability. Creating an efficient economy is possible under conditions of functioning equivalent to market relations of the banking sector. Under an insufficient level of capitalization, it is possible to observe the presence of inefficient money circulation, which negatively affects both the domestic financial operations of the state and the world. Thus, the recapitalization of banks stabilizes the economy in a crisis. In a global pandemic, the issue of maintaining a sufficient level of capitalization is fundamental, as the banks of each country must create reliable "airbags" for further operations. In recent years, the level of banking capitalization has been gradually declining, as evidenced by World Bank statistics on the state of the G7 countries. The capitalization rate was not more than 7% during 2004-2020 in developed countries, except the United States, with an optimal value of not less than 10%. According to the NBU, Ukrainian banks will comply with capital ratios, although the indicators are at a minimum level that does not meet the needs of businesses and the requirements of foreign investors. Thus, among the main measures for maintaining a sufficient level of capital in a pandemic are: compliance with H1 and H2 standards, further introduction of stock buffer and countercyclical buffer, monitoring the level of capitalization, taking into account the impact of risks and development of recapitalization plans. This is accompanied by compliance with the standards of the Basel Committee on Banking Supervision. When implementing the requirements of the Basel Accords, the main tasks for the banking system of Ukraine are: increasing the level of financial stability of banks to the impact of aggregate risks by creating appropriate buffers for their absorption; reduction of systemic risk; ensuring an enhanced oversight process for capital planning; increasing the level of information disclosure and compliance with general standards of market discipline. The implementation of Basel III in Ukraine marks a transition to a new supervisory and regulatory policy level. The main postulates of this document are to increase the level of transparency and quality of banks' capital, improve its structure and further implement the practice of capital risk coverage, which are key tasks in COVID-19. Capitalization growth is the main prerequisite for the large-scale participation of banks in the country's socio-economic development. Also among the ways to increase the level of capitalization of the banking system directly in Ukraine in a pandemic are: the reinvestment of net profit of banks; the process of accession, acquisition of institutions; reduction of the state's share in the capital of banks; return of trust and further involvement of the population in the authorized capital of banking institutions, etc.; adaptation of resource policies of banks to modern economic challenges; improving the quality of capital.

Keywords: capitalization, bank, COVID-19.

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Bioenergy processes of organic waste recycling and phosphogypsum utilization

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Abstract: Background. The biotechnology for the processing of complex organic substances has revealed that the decomposition of poultry litter mixed with maize silage in anaerobic conditions leads to the formation of volatile fatty acids and biogas. Thus, the search for alternative support mediums and minimizing expensive chemical inputs is very effective. On the other hand, inventing new ways to recycle and reuse waste is a major task today. Millions of tons of phosphogypsum are stacked worldwide every year and are progressively considered more of an asset than an environmental burden. **Methods.** Research on the elemental composition of phosphogypsum was carried out through microwave-induced combustion of samples with the addition of acids and was followed by inductively coupled plasma mass spectrometry (ICP-MS) measurements. Field studies and point sampling of phosphogypsum from different terraces of the dump and soil samples on the territory of the dump placement were carried out near the village Tokari (Sumy region). Two forms of poultry litter (after thermal and anaerobic treatment) were tested in micro-field experiments with maize on marginal lands in the center and south of the Dnipropetrovs'ka province. **Results.** Tests on inorganic support based on phosphogypsum, microbial transformation of waste and basic biochemical research on substance detoxification are being carried out. The upper site of the phosphogypsum dumps and five terraces were tested for the elemental composition of the substances. Sulfur and calcium were found in large amounts up to 390 mg/g among the samples analyzed, followed by silicium, natrium and phosphorus up to 8 mg/g. The following biochemical properties of phosphogypsum have been revealed: in a microbial living environment phosphogypsum can act as an additional nutrient source and can stimulate metabolic processes of producer cells that belong to different trophic groups.

The thermal treated poultry litter using as soil amendment led to additional yield (21.3%) in the field experiments with maize grown in meadow black soil located in Samara river floodplaine. The application of the solid bio-digestate fraction in the field experiment with maize grown in the phytomeliorated loamy-like loess allowed the obtainment of additional yields of up to 31% correspondingly.

Conclusions. Anaerobic digestion of organic waste with the addition of phosphogypsum with the precipitation of biogenic hydrogen sulfide from heavy metals is a promising way to detoxify wastes and produce a complex organic-mineral fertilizer. Using poultry litter in the poultry life cycle gives the

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possibility of obtaining biogas and electricity directly in the enterprise. Cultivating maize or sweet sorghum for anaerobic process in bioreactors can be cheaper in case of using bio-digestate solid fraction to grow these crops in marginal lands both for anaerobic digestion and pellets.

Keywords: anaerobic digestion; organic waste; phosphogypsum; organic-mineral fertilizer

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Influence of drip irrigation on the chemical parameters of typical chernozem

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Abstract: Background: The aim of our study was to investigate the changes in the chemical parameters (calcium, sodium and potassium content) of Calcic Voronic Chernozem under the influence of drip irrigation by using LAQUAtwin devices. **Methods:** Chemical parameters were studied in Calcic Voronic Chernozem samples, which were taken from the surface layer of the soil (ridge - in the experiment with growing garden strawberries), and then every 10 cm to a depth of 50 cm in these variants of the experiment. **Results:** According to the dynamics of the obtained values during the three years of research on water-soluble sodium and calcium content, we can state that the sodium content gradually increases in all variants of the experiment, and the amount of calcium decreases. As a result, the ratio of Ca:Na decreases. Therefore, the use of irrigation for three years leads to a significant transformation of the content of water-soluble salts in Calcic Voronic Chernozem of all research variants. None of the analyzed variants revealed water-soluble potassium content, except for a single sample. The use of irrigation also affects soil pH. Most of the obtained pH salt values belong to the neutral and close to neutral reaction of the soil solution, slightly less samples show a weak acidic reaction, and a small amount is slightly alkaline. The highest values of water pH were recorded in the lower parts from 30 to 50 cm variants of control and mineral system. The lowest pH was found in the 40-50 cm thickness of the variant of the organic fertilizer system. All other indicators can be attributed to the average values ranging from 7.15 to 7.94. Therefore, irrigation with medium saline water for three years during the cultivation of strawberries does not cause a significant accumulation of salts in the soil. However, it caused an increase in water-soluble sodium, a decrease in calcium and a change in pH. **Conclusions:** Research studies have proven that results obtained with LAQUAtwin pocket meters are strongly correlated with those of traditional laboratory analyses. The LAQUAtwin pocket meters allow direct measurement of micro-volume sample (as low as 0.1 ml) and deliver results in just a few seconds. These advantages enable to make fertilization and irrigation decisions quickly. Regular monitoring of nutrient levels such as sodium (Na⁺), potassium (K⁺) and calcium (Ca²⁺) in plant petioles, soil solution, irrigation water produces not only good yield and fruit quality, but also reduces fertilizer cost and mitigates environmental hazards. The LAQUAtwin pocket meters are the perfect tools for testing. They directly measure samples and provide results in just a few seconds, allowing growers to immediately identify and correct any nutrient deficiency or excess.

Keywords: chernozem, irrigation, chemical parameters.

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Coffee Seed Drying Predictive Finite Element Model

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Abstract

Background: When processing coffee by the wet method, it is required to reduce the grain's moisture content to levels that inhibit the growth of microorganisms, mycotoxins, bacteria, or molds, allowing the production of a high-quality product meeting the proper commercialization and storage standards. Therefore, the drying technologies face a complex task considering that they must ensure an acceptable final seed moisture content. Achieving this is especially difficult for those drying processes that use natural convection or open solar drying as the main source of energy to remove the water within the seed, seeing that these processes depend on climate factors that can change rapidly over time. These methods can be considered as stochastic, meaning that their predictive behaviour is challenging to attain. On the other hand, the machine drying of coffee is a deterministic process that is predictable if the initial conditions are known. However, no record in the literature illustrates the drying phenomenon of a single seed under these two different methods so as to determine the moisture distribution within the grain's inner domain. This research aimed to perform a Finite Element Analysis (FEA) study, simulating the drying process of a single coffee bean. Defined as a transient mass diffusion model under the machine and natural convection conditions, the drying behaviour of both case scenarios can be predicted and controlled depending on the process conditions. **Methods:** A wet grain $\pm 53\%$ (w.b) was 3D scanned and digitized as the FEA simulation geometry. The diffusion of the water between the grain and the atmosphere was further defined by a diffusion coefficient, subject to the temperature and humidity. Three cases were studied: drying of the grain under machine drying at three different temperatures (50, 45 and 40°C) with their corresponding relative humidity and air velocity, natural convection drying at environment conditions (wet and dry season), and natural convection (wet and dry season) including the day and night temperature and relative humidity variation. **Results:** The results agreed with the experimental data found in the literature defining the coffee as a grain bed in both machine and sun drying. However, the graphical distribution of the moisture, predictive drying curves, diffusion coefficients and isotherms were obtained for all phenomena. **Conclusions:** A predictive Finite Element Model (FEM) was designed to obtain relevant data of the drying performance of both machine and natural convection drying under certain conditions.

Keywords: Coffee Drying; Finite Element Model; Seed; Moisture Diffusion.

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Recycling agricultural wastes assessment as fertilizers in the field experiments with vegetable cultivation in the steppe zone of Ukraine

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Abstract: Background. Recently, Ukrainian private farms have used very few fertilizers. Generally speaking, the enterprises have been forced into this situation because they do not have enough money to buy expensive mineral fertilizers. Vast quantities of nutrients exist in agri-wastes that can be utilized as fertilizers or soil amendments to subsidize the tremendous demand for synthetic chemical fertilizers and reduce the economic and environmental costs associated with fertilizer production and waste disposal. Different agricultural wastes generated during the production, industrial manufacturing and consumption of agricultural products can be taken into account as raw materials to use as fertilizers. Several case studies have shown that vermicompost plays an important role in improving vegetable crop germination, growth, and yield. The liquid fraction after liquid/solid separation of biogas digestate has a high potential as a fertilizer due to its high nutrient concentration. In this connection, the use of poultry digestate liquid fraction for irrigation and fertigation appears prospective as well. However, attention must be paid to avoid overapplication of digestate to the soil, due to several negative environmental effects (leaching, phytotoxicity, soil salinity, pathogen exposure, and increased gaseous NH₃ emissions). **Methods.** Peppers, tomatoes, and eggplants were selected as test plants to examine the effectiveness of different forms of fertilizers. Two schemes of field experiments with vegetables included the use of artificial nitrogen fertilizer (50g NH₄NO₃ per 10 liters of water), vermicomposting extract (dilution 1:100), and liquid fraction of poultry litter digestate. A foliar spraying and drip irrigation system were used. The protective mesh was applied as a second trial with the intention of reducing the impact of sunlight exposure on ammonia volatilization with three injections of digestate liquid fraction. All field experiments were managed in the Pokrov experimental station situated in the south of Dnipropetrovsk province. **Results.** The highest level of nitrates was recorded in the trial using drip fertigation with NH₄NO₃. The lowest level of nitrates was determined in the trial with the application of vermicomposting extract. An electrophoresis value of isoelectric points of the peroxidase isoenzymes forms in some seeds and vegetables allowed the different protein spectra to be observed depending on field trials. The highest yield of two pepper hybrids was fixed in the trial equipped with sunlight protective mesh and fertigated with liquid digestate fraction. **Conclusions.** Field experiments with vegetable (tomato, pepper, and eggplants) cultivation were indicative in the case of the application of vermicomposting extract from the productive and quality points of view. The environmental impact connected with the creation of the substitution effect, the reduction of ammonia volatilization, the

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reduction of the threat of environmental pollution, the use of a liquid fraction of poultry litter digestate to produce pepper plantations with high fruit quality was estimated.

Keywords: vermicomposting extract; digestate liquid fraction; fertigation; vegetables; quality.

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Hydroxyapatite-polymer sorption-aspiration drainage system

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Background: Until now, the possibilities of local use of sorbents in the treatment of purulent cavities have not been sufficiently studied, although there are many solid studies on their use in the treatment of suppurations of other localizations. In modern conditions for the treatment of surgical diseases with the presence of purulent cavities, the use of sorbents is relevant and necessary, since these materials reduce the general intoxication of the body, the doses of antibiotics used and, in general, reduce the treatment duration. The aim of this work was to study the possibility of using a sorption composite material based on hydroxyapatite in conditions of peritonitis in white rats; **Methods:** The experimental colloid system was prepared using laboratory-synthesized hydroxyapatite, zinc oxide and sodium alginate. In a unique mold, the above mixture was lyophilized for 8 hours at a temperature of -53 °C. After lyophilization, the resulting samples were cross-linked in a solution of glutaraldehyde and chitosan and saturated with the drug to obtain the composite material in the form of hollow tubes that cover standard plastic drainage tubes as an absorbent layer. Preliminary *in vivo* studies of the newly created drainage were performed on white rats weighing 50-100 g with artificially induced peritonitis by administering a suspension of 0.5 - 1.0 ml of E.coli with a 10¹⁰ CFU/ml concentration. Implantation was performed under anesthesia (ketamine 50 mg/kg). After 1, 2, 3 days, the results were investigated by removing animals from the experiment with an overdose of ketamine (100 mg/kg). The bacterial composition of peritoneal effusion, histological changes in the liver, kidneys, intestine, peritoneum were studied. **Results:** The results of previous *in vivo* studies indicate the drainage system's effectiveness in the drainage of purulent cavities. Within 3 days of the study, the behavior of the experimental animals was adequate. There was a decrease in the inflammatory process in comparison with the experimental group of animals. The therapeutic effect is achieved due to the physicochemical properties of the composite material based on hydroxyapatite. The manifestation of the effect is a decrease in exudation (sorption of peritoneal effusion), a positive change in the microbiological pattern (bacteriostatic and bactericidal action when using hydroxyapatite with ceftriaxone), which effectively reduces general intoxication. **Conclusions:** During the experimental work, the following properties of the synthesized material containing HA were proved: safety, sorption-aspiration properties, absence of any complications, bacteriostatic and detoxification properties. It is assumed that this material can be used in surgery to drain purulent cavities.

Keywords: composite materials; hydroxyapatite; polymer; drainage; *in vivo* study

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Environmental safety of the digestate: Methods of dehydration and treatment

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Abstract: The introduction of modern technological solutions in industry will inevitably positively impact the environment, mainly by reducing the amount of waste. These technologies also include the production of energy through the anaerobic digestion of agricultural substrates. The end products of this process are biogas and digestion substances. However, the mass of the substrate before and after the fermentation process practically does not change and has high hydration (more than 85%). Digestate is one of those materials that must be dehydrated. Due to the content of easily accessible macro- and microelements, digestate is a valuable fertilizer for agricultural crops, suitable for use as livestock suspension. **Background:** The aim of the article was to define an environmentally friendly and economically viable technology for dehydrating digestate in terms of its use as a fertilizer. **Methods:** observation, comparison, measurement. **Results:** Fertilizing fields with digestate has many benefits, such as reducing the demand for plant protection products (killing weed seeds during fermentation), reducing odors or eliminating potential pathogens. Granular digestate fertilizers are environmentally friendly, safe for humans and animals due to the use of additional materials (vegetable silage, natural minerals, limestone, ash, etc.) and liquid digestate fractions. Since the granulate is very hydrophobic, 95% of the granular substance is absorbed by the plants during the growing season and is therefore harmless to the environment. A very serious problem when using digestate as a granular fertilizer is the variability of its chemical composition. During fermentation, easily transformed carbon compounds are converted, nitrogen compounds are converted into ammonia nitrogen, pathogenic bacteria, viruses and parasite eggs are destroyed, amino acids and vitamin B12 increase, macro- and microelements practically do not change and change to C/H. And since the standard requirement of plants in nutrients is at least 50 kg N, 90 kg P and 120 kg K per 1 ton of granular fertilizer, it is necessary to artificially achieve such indicators. This is possible due to the use of solid or dried digestate fraction as an organic component of organo-mineral fertilizers. **Conclusions:** Production of biogas with subsequent use of digestate as biofertilizer is a completely waste-free production. But it is very important to maintain a constant recurring level of nutrients N, P, K, Mg, S. This can be achieved by adding degraded mineral additives to the dry fraction in the required amount during the production of granular fertilizers. Granular fertilizer will have a deoxidizing effect on the soil due to the calcium content in the granulate itself, which will reduce its deficiency in the soil. Processing digestate as a fertilizer is considered the most successful use of digestate, as it is able to benefit society in general and the environment in particular, and will help preserve fossil limited natural resources.

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Keywords: biogas plant, biogas, biogas technologies, fertilizing potential, biofertilizer, digestate, dehydration, renewable energy, technology, fertilizers.

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Reasons behind the low numbers of small-scale biogas plants: the case of Syria and Jordan

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Abstract: The population increase in the Middle East and the instability resulting from the conflicts that the region has suffered have led to an increase in the energy demand. There is no doubt that biogas technology in developing and underdeveloped countries positively impacts the environment, human health, society, and economy. On the one hand, there is a potential for biogas production through the construction of anaerobic digestion plants in rural areas in Syria and Jordan, which has potential to cover a high percentage of the energy demand if it is fully adopted. On the other hand, the application of biogas technology has not been widely deployed. Therefore, this study attempted to center the attention on the reality of the biogas sector in Syria and Jordan and investigate the factors that affect the spread of biogas technology among farmers. The methodology combines primary data collection and the use of secondary sources. The primary data were collected in 2020 through a field questionnaire survey targeting farmers using stratified random sampling and personal interviews (livestock farmers and Crop farmers) in the Syrian coast (N=150) and via semi-structured interviews with farm owners in AlGhoor region, Jordan (N=70). Data has been analyzed through SPSS and Excel software. The findings showed that economic, social, environmental, educational, and other difficulties limit the adoption of small-scale biogas plants within the farmers. Despite the lack of awareness about biogas technology, a large proportion of the survey households are willing to adopt new technology. However, with the condition that it would be cheaper than their current method of discarding their farm waste and if financial and technical support is provided. The presence of suitable quantities of organic waste and the moderate climate in the region are considered motivational factors to the adaption of biogas technology. Government support and increase awareness around farmers about the benefits of biogas technology is highly recommended.

Keywords: Developing Countries; Biogas; waste management techniques; Anaerobic Digestion.

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Small-scale biogas plants in Vietnam: How are affected by policy issues?

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(1) **Background:** Both developed and developing countries are working towards creating an emission free planet. Vietnam, as one of the highest contributors to greenhouse gas emissions, has put in place several policies to curtail this phenomenon. Most of these policies are geared towards the development of renewable energy technologies like biogas. The country's policy on environmental protection, clean energy, climate change and rural development has been centred on small-scale biogas programmes and projects. However, how are these small-scale biogas plants affected by arising policy issues? (2) **Methods:** The mixed-method research design was employed, using both qualitative and quantitative data. An intensive literature review was performed, as well as interviews with biogas experts involved in small-scale biogas developmental projects in Vietnam and Asia. The analytical approach used the policy cycle tool, examining each of the various stages involved in the drafting and implementation of a policy; and assessing how small-scale biogas plants in Vietnam are affected by policy issues. (3) **Results:** The results showed the key role of Vietnam National Biogas Programme and policies focusing on renewable energy promotion and development, environmental protection, and climate change mitigation strategies. These policies contributed to involvement of international environmental and development organizations, bringing projects resulting in biogas construction of biogas plants and job creation. On the other hand, energy policies reducing the price of conventional fuels prevented greater dissemination of biogas. The success of biogas projects was limited by reliance on subsidies. Several policies lacked regulations ensuring compliance with the law. (4) **Conclusions:** Funding remains the largest barrier to biogas policy amendments and implementation; the several biogas programs implemented over the decade could have yielded more positive impact if financial barriers like co-financing by the beneficiaries would be set up more appropriately. Furthermore, policies proposed for the future are in favour of mid to large-scale biogas plants rather than small-scale biogas plants. This policy implication threatens the sustainability of small-scale biogas plants; therefore, policy makers must be adroit in addressing policy issues that affect biogas production in Vietnam.

Keywords: small-scale biogas plants; policy impact; renewable energy; rural development

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**Assessment of the technical condition of water
infrastructure facilities using the example of
regulatory basins**

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Abstract. Background. Yield growth in the Southern Steppe is impossible without irrigation with the introduction of mineral and organic fertilizers, so the repair, restoration, and construction of new irrigation systems are one of the main tasks of regional and district water management. To repair water management networks and regulate basins of irrigation systems, it is necessary to use inexpensive effective methods of establishing their technical condition. Such methods are geophysical, which allow to identify filtration zones in the regulating basins (RB) of irrigation systems (IS). The aim of our research was to localize the areas of filtration water losses for the future concentration of repair and restoration works in the most disturbed areas, which will significantly reduce the cost of time and money and increase the overall efficiency of the structure.

Methods. The following geophysical methods were used: field research to establish filtration zones by the natural pulsed electromagnetic field of the Earth (NPEMFE) and vertical electric sounding (VES). The NPEMFE method, in combination with the VES method, makes it possible to significantly increase the amount of information, increase economic efficiency and reduce labor costs during the localization of areas of latent increased filtration in the body of RB. Processing and interpret the results of measuring the electrical resistivity of rocks by the VES method was performed using the IPI2Win program. To calculate the filtration losses from the RB in a homogeneous soil with pressure less filtration flow, the formula of V.V. Vedernikov was employed.

Results. NPEMFE survey was performed in the profile version with a distance between profiles and points of 2 m. NPEMFE parameters were measured first in water-filled RB. The profiles were arranged in the following sequence: at the foot of the outer dam, in its central part, on both slopes. When the RB is emptied, the NPEMFE survey will be conducted not only at the dams, but also at the bottom of the basins. According to the results of NPEMFE and WPP research, filtration and water loss zones from basins have been identified. VES works were carried out in a point version within the filtration zones through the dams of the basin, selected according to NPEMFE.

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As a result of research filtration zones which are not always visually diagnosed are defined. General characteristics of filtration losses: RB-1 Petrivska IS - length of filtration zones 73 m, filtration costs 4774 m³/month; RB-2 Petrivska IS - 53 m, 3132 m³/month; RB-1 Solonyano-Tomakivska IS - 36 m, 2495 m³/month; RB-2 Solonyano-Tomakivska IS - 131 m and 13413 m³/month; RB-1 Vyshchetarasivska IS - 62 m and 3911 m³/month, respectively. Based on the above results of field and analytical studies performed for all RB revealed their unsatisfactory technical condition. Filtration losses from them cause the rise of groundwater in the areas adjacent to the buildings.

Conclusions. The expediency and proved the possibility of applying a set of geophysical methods NIEMFE and VES to identify the development of hidden areas of water loss for filtration. Calculations have shown that depending on the technical condition of the RB, as well as the chosen calculation method, these losses per month can be from 15 to 30% of the volume of water pumped into the basin.

Keywords: technical condition of hydraulic structures, geophysical methods, filtration losses.

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Waste biomass as a promising source of energy in Vietnam, Southeast Asia

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Abstract: Due to economic growth and population increase, Vietnam faces a tremendous rise in energy consumption. From being an energy exporter during 1990–2010, Vietnam has become dependent on energy imports, although rising energy consumption was anticipated. Primary energy consumption in rural Vietnam relies strongly on biomass, representing the country's largest renewable energy source. However, in total final energy consumption, modern bioenergy represents only about 12.4%. Thus, this study's main objective was to investigate the energy potential and production quantities and fuel properties of the foremost biomass residues in Vietnam, like paddy rice and sugarcane, with an annual production of more than 44 million tons nearly 18 million tons, respectively. The production of these crops has been increasing in recent years, which was indisputably associated with the growing amounts of residues (i.e., rice straw, rice husks, sugarcane bagasse, sugarcane trash) that are unused and contributes adversely to the environment and sustainable farming in general. Residual biomass energy potential was calculated based on the total crop yield, residues ratio and calorific value, and it was found that the total annual energy yield of rice and sugarcane residues is about 443 TWh (416 TWh and 27 TWh accordingly), which is equal to the energy consumption of about 92 million average Vietnamese households. Moreover, a complex laboratory analysis of biomass properties was conducted. The research concluded that rice residues, especially rice straw, offer an alternative material for energy use, which meets the requirements of minimizing CO₂ emissions, i.e., renewable energy source and fulfils the main preconditions, i.e., material in vast concentrations, readily available and on a dry basis. From the point of view of logistics and energy density improvement, the most appropriate option is the production of briquettes or pellets. The energy use of sugarcane residues again meets the requirement of significant amounts in large concentrations in one place. However, drying of sugarcane biomass is necessary to enhance energy potential and more efficient application. The present research revealed the potential and abundance of leftover biomass and detailed the situation throughout the whole country.

Keywords: agricultural residues, waste potential, energy recovery, circular economy, sustainability, fuel-energy properties

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Heuristics and artificial intelligence in the valuation of property in Latvia

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Abstract:

Background: Heuristics are part of our daily lives. Those are essential elements to aid in an effective decision-making process. Moreover, heuristics are linked to the process of learning and acquiring knowledge, called the cognitive process. In this way, Fuzzy considers subjective aspects that are difficult to measure, such as predicting the value of a property. Then this research is the first academic proposal in Latvia to test feasibility in the Fuzzy evaluation of properties. **Methods:** Thus, the objective of this experiment lends itself to a quick appraisal of properties using fuzzy logic, combined with artificial and heuristic intelligence. It to perform real estate appraisals and deal with the uncertainties of the Latvian real estate market, proposing improvements in the engineering assessment with a focus on the property using Artificial Intelligence and Fuzzy Logic. The simulation involves a 50 m² two-bedroom residential apartment located in the central area of Riga. The survey was in October 2018. For that, 37 samples of residential flats have been used, both in Riga, Latvia. **Results:** So, nine are the combinations of input variables used in the survey. The methodology combined the Fuzzy method with the association rule is introduced from the “*apriori*” algorithm by the Weka software. Those were assigned a weight of 1 for each of these variables. It is about establishing the relevant equality for each rule and achieving associations capable of optimizing the chosen parameters. For that, data mining was necessary. In the Weka Software, a minimum level of confidence was applied at 50% by this researcher. The support of 0.15 (15%). These led to the formation of 4,000 associated rules. But only fifty were chosen manually by this expert accordingly to research interest. The results were excellent because they were equivalent to market prices. **Conclusions:** Thus, this research demonstrates that the heuristic knowledge and a civil engineering experiment can translate into a simple system to estimate the price of an apartment in the real estate market with the aid of artificial intelligence tools.

Keywords: appraisal property; artificial intelligence; fuzzy logic; civil engineering; baltic area.

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Development of information technologies in Ukraine under COVID-19

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Abstract:

Information technology is not only the driving force of socio-economic development of the country, but also a powerful driver for economic growth. The study of information technology and the impact of digitalization on the economy of Ukraine, were the works of both foreign and domestic scientists, including: L. Nakonechna, O. Babanin, A. Maslov, J. Sachs, M. Porter, R. Hicks, J. Gates, N. Carr, K. Arrow and others. The article is devoted to the research of the development of information technology in Ukraine. The dynamics of revenues from the export of IT services to the economy of Ukraine, the level of specialists involved during 2010-2020 are considered. The COVID-19 pandemic made significant adjustments to the information technology market. It was this event that accelerated the digitization plan by at least five years. According to Gartner's forecasts, in 2021, global IT costs related to remote work alone amount to \$ 332,9 billion (4,9% more than in 2020). In the entire IT solution, companies invest about 3,9 trillion dollars (6,2% more than in 2020); and investment in the software development segment is 8,8% higher than in 2020. The main normative document in the field of regulating the development of IT is Law «About stimulating the development of the digital economy in Ukraine» №1667-IX, 15.07.21. Ukraine has low positions in international rankings: Networked Readiness Index – 40th place, Global Innovation Index – 40th place, Global Competitiveness Index – 50th place. The reason for such low position is the political and regulatory environment, low efficiency of Ukrainian legislation, the level of the judiciary, problems with the protection of intellectual property. The number of IT professionals in Ukraine is 213,000. Almost 44% of them work as freelancers (the highest figure in Europe). One of the most developed areas of the IT sphere in Ukraine is outsourcing. It is formed by about 1,000 outsourcing companies. Exports of the Ukrainian IT industry tend to grow by an average of 20,7% per year. Accordingly, the importance of IT services in the structure of the country's exports is growing. Thus, the share of exports of ICT services in the structure of exports of Ukraine during 2012-2020 increased rapidly from 6,2% to 16% (in 2020 – second place in the export). The pandemic situation has highlighted the need for digitization and automation, investing more resources in cloud technology, machine learning and data management. Today, the Ukrainian IT industry successfully competes on the world market. In total, in the period 2016-2020, thanks to IT, Ukraine received more than \$ 16 billion in export revenues to the country. The contribution of IT helps the country strengthen its position in the global technology market. The forecast of the growth of exports of IT services in the future may be hindered by the following factors: the human capital, the stay of part of the business in the shadows, inefficient government and fiscal policy, the global economic crisis.

Keywords: information technology, IT industry, IT services, forecast.

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Sustainable Development Trends and Challenges under COVID-19

Experience of UAV usage in the Kharkiv region

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Abstract: Background: Today there are a large amount of publications and active research, given the growing demand for the use of UAVs and the significant relevance of this area of remote sensing of the earth's surface. Most of these materials are based on research by foreign experts, for whom the use of these technologies is not new. The purpose of our research is to develop certain methodological approaches and recommendations for the preparation and implementation of various tasks for obtaining data using UAVs, to assess the capabilities and spatial accuracy of data obtained quadcopters of the middle price segment, using photographic materials of one area, in order to rationally use their technical opportunities. **Methods:** The research was carried out at the research site of KhNAU named after V.V. Dokuchayev. Before the start of the test flights, 14 Ground Control Points (GCP) were assigned to the test site. The area of the experimental polygon is 5.3 hectares. The territory has a pronounced relief. Exceedance between the lowest and highest defined points 23.87 m. 6 drones and 8 cameras were used for testing, for which several routes of shooting a flight were set at altitudes of 25, 50 and 100 m with an overlap of 80% of photographs. During the testing period, 31 flight missions were performed, 4 of which were not included in the processing due to various reasons and failures. **Results:** Based on the results of flight tasks, using special software, the construction of digital terrain models and orthophotos was carried out. The obtained DEMs were divided into 2 groups: 1) models built on the coordinates of the onboard navigation chips of the UAV; 2) models are built with GCP binding. For the second group of models, binding to 6 GCP points was performed. Based on the results of planned and high-altitude RMSE errors, and based on the fact that the accuracy of its scale determines the accuracy of plans, and the accuracy of topographic plans is also determined by the nature of the terrain (angle) and height of the relief section - conditionally groups of scale: planar (X, Y); and altitude, topographic (H). Regarding the results of the group of DEMs built on the onboard coordinates of the UAV, it is interesting to note that the accuracy of high-altitude shooting was higher than planned. The good results of the drones of the line "DJI Phantom" should be noted, which represent the largest budget item among those we used in testing. "DJI Phantom 3 Advanced" proved to be the most stable. Regarding the analysis of the results for the second group of models, we mostly see an increase in the allowable scale, which indicates an increase in the accuracy of the data obtained. Therefore, the use of GCP is a justified measure, but the question of their number, density and location remains open. **Conclusions:** At this stage of our researches, certain methodological approaches and recommendations for the operation of UAVs have been developed. It is established that the use of models of drones of the middle price segment, which were used in the research, is possible to obtain planning and cartographic material of scale 1: 5000 and topoplans of scales 1: 5000 - 1: 1000 with a relief cross section of 1-2 m.

Keywords: UAV, drone, orthophotoplan, digital relief model, accuracy assessment, RMSE.

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**A linguosynergetic view on the framework theory (on
the example of the name of the concept DEATH)**

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Abstract: Different approaches to the definition of "frame" have been systemized since cognitive linguistics appeared. (1) **Background:** However, it should be pointed out that the frame theory in its classic sense does not cover all dimensions of the concept because it is a conceptual model of stereotypical subject situations. In our opinion, this model has nothing to do with conceptual analysis which refers to knowledge about the world in which the concept functions in cognitive and communicative activities of the individual and is realized in a speech act and therefore must be in sight of the latter together with all external connections. (2) **Methods:** The goal was set to build a frame model of the name of the DEATH concept, which would be able to explain the essence of the phenomenon of death in the English-speaking world picture, based on linguistic facts about the studied phenomenon. To achieve the goal, we used the methods of conceptual, functional, semantic, introspective, rational analyses, and conceptual networks construction analysis. (3) **Results:** In the course of the study, we have substantiated the assumption of a fractal recursiveness of frame model of the name of the concept – semantic and schematic self-similarity. It has been proven that the conceptual model of the name of the DEATH concept has such characteristics as complexity, dynamism, recursivity, the presence of feedback and the possibility of entry and exit from any point. It has also been concluded that the conceptual basis of the name of the DEATH concept according to lexicographic sources is generalized information, the source of which is the scope of subject-logical activity of the individual. (4) **Conclusions:** It has been concluded to add to it a specific social individual-emotional component of the emotional sphere of activity of the individual in order to build a modus of the name of the DEATH concept and to get a comprehensive understanding of the concept in the English-language picture of the world.

Key words: frame, base frames, propositional schemes, concept, fractal.

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LAND USE AND FORESTRY SECTION



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**Prospects for creation of sustainable forest plantations
with the use of valuable introduced plants in the
conditions of Sumy region**

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Abstract. More than one hundred plant species introduced from other countries have been tested in Ukraine, and about twenty of those are considered promising. Despite the fact that plant introduction has significantly supplemented the floristic richness of Ukraine, the range of exotic species is not used effectively enough in our country's forestry, in comparison with Europe. This is primarily due to the conservation of native biodiversity. However, given climate change, which also leads to pest outbreaks, the use of introduced species makes it possible to improve and enhance the protective functions of windbreaks. **The aim of the research** is to study the peculiarities of growing and successful introduction of *Larix europaea*, *Pinus banksiana*, *Pinus strobus* and *Pinus nigra* in forest plantations of Sumy region. **Object of the research** are pure and mixed forest plantations with *Larix europaea*, *Pinus banksiana*, *Pinus strobus* and *Pinus nigra* in the studied area. **Methods and conditions of the research.** Prior to the research, we compiled a register of pure and mixed forest plantations with *Larix europaea*, *Pinus banksiana*, *Pinus strobus* and *Pinus nigra* in Sumy region, based on processing information obtained from the database of the Ukrainian State Project Forest Management Production Association VO "Ukrderzhlisproekt" projects archives of forest plantations, forest accounting books and evaluation of forest plantations. Performing surveys directly in forest plantations, we used the generally accepted methods of forestry and forest evaluation provided in works of E.I. Tsurik and M.P. Anuchin. A set of field works regulated by industry standards was carried out at the mock-up plantations. Forest plantations with introduced plants were studied in areas that are part of the Sumy Regional Department of Forestry and Hunting (SRDFH). To analyze the introduction and the degree of acclimatization of trees, the method of M.A. Kohn has been used. **Research results.** In the course of the research, we determined that SRDFH has 816 plots with introduced plants, the total area of which is 98,764 thousand m³. At the same time, 636 plots with *Larix europaea* (80,238 thousand m³), 128 plots - *Pinus banksiana* (10,031 thousand m³), 41 plots - *Pinus strobus* (6,745 thousand m³) and 11 plots - *Pinus nigra* (1,75 thousand m³). **Conclusions.** In general, the range of forest vegetation conditions in which forest plantations consist of introduced plants in Sumy region, allows to identify the most promising of them to develop recommendations for expanding the scale of cultivation of the studied species. It is necessary to create mixed forest plantations with trees of different ages close to natural ones with the addition of valuable introduced plants *Larix europaea*, *Pinus banksiana* and *Pinus strobus*. Forest plantations with recommended introduced plants should be created in fresh and moist sudubravas. In young pine barrens with *Scots pine*, to increase productivity and sustainability, it should be supplemented with the introduced species of *Pinus banksiana*.

Keywords: introduced plants; *Larix europaea*, *Pinus banksiana*, *Pinus strobes*, *Pinus nigra*

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Ecological approach to the normative monetary valuation of settlement land

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Abstract:

Background: Ecological factors affect not only the quality of life and health of settlement residents but also the real property market and land valuation indicators. However, no previous Ukrainian study has considered ecological factors during calculating the normative monetary valuation (NMV) of settlement land. Much uncertainty still exists about the nature of the selection of ecological factors, the list of relevant indexes for valuation, the procedure for calculating and interpreting the results and their application. The aim of this study is to identify the ecological factors and their indexes and to propose a new approach for defining the ecological impact on the NMV of the settlement land and evaluation units. **Methods:** In a retrospective study, infrastructural, environmental and ecological data were collected for the Kharkiv city, covering the years 2014–2019. The empirical methods and GIS tools were used to evaluate and interpret the data. **Results:** A spatial database to evaluate the ecological factor effects at the regional (settlement as a whole), zonal (evaluation districts of the settlement) and local (single land plot) levels was also developed by QGIS tools. The indexes characterising the ecological conditions led to an increase in the minimum index for the normative monetary land value within the evaluation districts from 9.71 USD/m² to 12.00 USD/m² and the maximum value – decreased from 101.60 USD/m² to 86.34 USD/m². The average land value within the evaluation districts of the city did not change and is 45.88 USD/m². **Conclusions:** The new approach for measuring the indexes of the ecological condition of the settlement territory and single evaluation units to determine the normative valuation of land was developed. The proposed approach takes into account the area of environmental factors distribution within the evaluation unit and proves usefulness in understanding the actual ecological impact on the NMV of settlement land. Overall, this study has demonstrated that the size of land valuation is slightly influenced, although not significantly, by ecological factors.

Keywords: ecological factor, land valuation, settlement land, pollution, ecological condition, normative monetary valuation, spatial database.

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Fluorescence of chlorophyll of *Robinia pseudoacacia* 1. in urban forest ecosystems

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Abstract: Background: understanding the response of physiological indicators of photosynthesis, which determines the primary production of autotrophs, to changes in temperature, humidity and lighting is an urgent scientific task. One of the modern and informative methods for determining the influence of environmental factors on the physiological state of forest-forming species is the use of the express method of photoinduction of chlorophyll fluorescence. The goal of the work is to evaluate the influence of climatic factors, namely temperature, humidity of air and lighting on the functional parameters of the photosynthetic apparatus of Black locust (*Robinia pseudoacacia* L.). **Methods:** The study was conducted in the Steppe zone of Ukraine in Black locust urban plantations. The state of the photosynthetic apparatus of plants was studied using the method of induction of chlorophyll fluorescence of the device Floratest. **Results:** Maximum fluorescence reached 1605 units at an air temperature of 16-17 °C, humidity 31-34% and lighting 150-300 lux. **Conclusions:** No relationship was found between temperature, humidity and chlorophyll fluorescence values. Statistically significant dependence showed the indicators of background, stationary and maximum fluorescence of chlorophyll from lighting.

Keywords: climatic ecological factors; photosynthesis; urban plantations.

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Sustainable land use as part of the process of optimizing the use of land resources

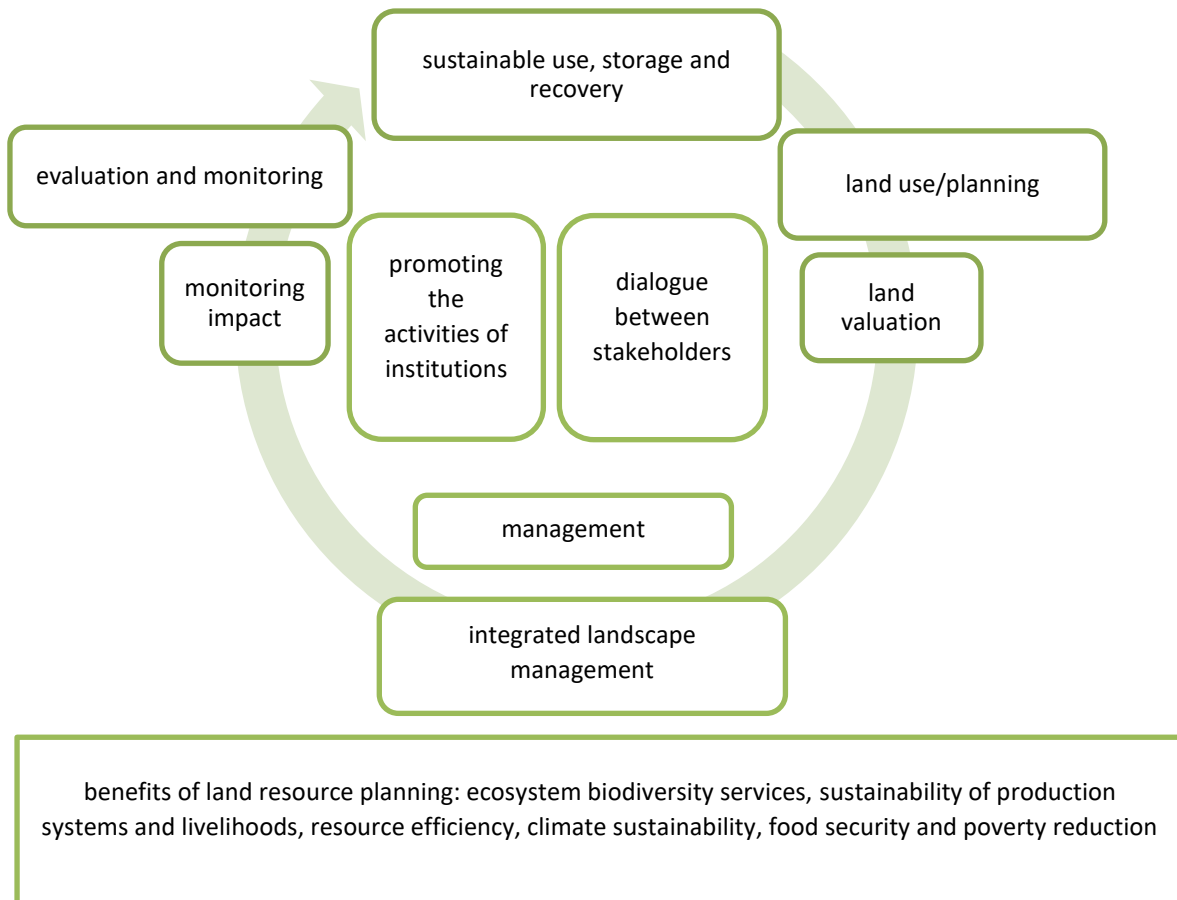
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Abstract: Background: Sustainable land use is an important basis for future sustainable development. Sustainable land use and management is widely seen as a prerequisite for many environmental goals, such as the protection of water, soil, biodiversity and ecosystem services, as well as for social purposes, including food production, livelihoods and access to natural resources. The problem of sustainable use of land resources in Ukraine is quite new for domestic scientists. The Law of Ukraine "On Land Management" defines sustainable land use as long-term use of land without changing the purpose, deterioration of its quality characteristics, which provides optimal parameters of environmental and socio-economic functions of the territories. International scientists give a broader concept. Sustainable land use is a systematic assessment of land potential, land use alternatives, economic and social conditions in order to select and adopt the best land use options. The purpose of the assessment is to select and implement those land uses that best meet people's needs while conserving resources for the future. **Results:** Sustainable land use is a necessary element in ensuring the sustainable development of agriculture, improving environmental, economic and social opportunities for the benefit of present and future generations. Measurements of sustainability are formed from a set of basic sustainability factors that affect the ecological condition of land resources and are characterized by natural and cost indicators. The ecological component of land use can be analyzed using the following indicators: coefficient of ecological stability of territories, coefficient of ecological impact on lands and surrounding lands, indicator of land use level, land use structure, degree of land use intensity, etc. [2]. Indicators of economic efficiency of land use include: land yield, structure of management and ownership, the coefficient of economic stability of land use, as well as agricultural sustainability, which in the absence of accurate measurement tools does not prevent certain conclusions about development trends, growth or decline, etc.. Analysis of the state of land use is carried out using the above indicators according to the methods proposed by international organizations that adapt to the realities of a particular country. National policy is directly or indirectly related to the problems of sustainability of agriculture, which has a significant impact on economic, environmental, social, demographic sustainability at the national and local levels. This makes it possible to assess the sustainability of land use of the territorial community, the region and the country as a whole. Assessment of land suitability is defined as a process of forecasting land efficiency over time according to specific uses (Fig. 1), it is this tool provides information on sustainable land use options, productive potential and socio-economic conditions.

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**Fig.1 Formation of sustainable land use as part of the integrated
the process of optimizing the use of land resources**

These options facilitate the process of making the optimal decision on land use and maintenance. Sustainable land use is an effective tool for land use, promotes land management practices to maintain landscape productivity, ensures ecosystem biodiversity, sustainability of production systems and livelihoods, and efficient use of natural resources. **Conclusions:** The concept of sustainable development has the right to be widely used because it implies, on the one hand, a balance between its socio-economic and natural components, and on the other - the longevity and continuity of society, where the struggle for environmental production should not hinder economic and social development. In the last few decades, a wide range of tools and methods of sustainable use have been developed and applied, which are involved in different contexts and scales of decision-making. Adopting sustainable practices of land use and land management is important to achieve sustainability, which is based on three main elements: balanced economic growth, protection and preservation of the environment, respect and improvement of social mechanisms. Therefore, greening and systematization are the priority areas that should be implemented in the process of sustainable land use in Ukraine.

Keywords: sustainable development, spatial formation of land use, sustainable use, assessment

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District land use and architecture based on biophilic design in Lithuania

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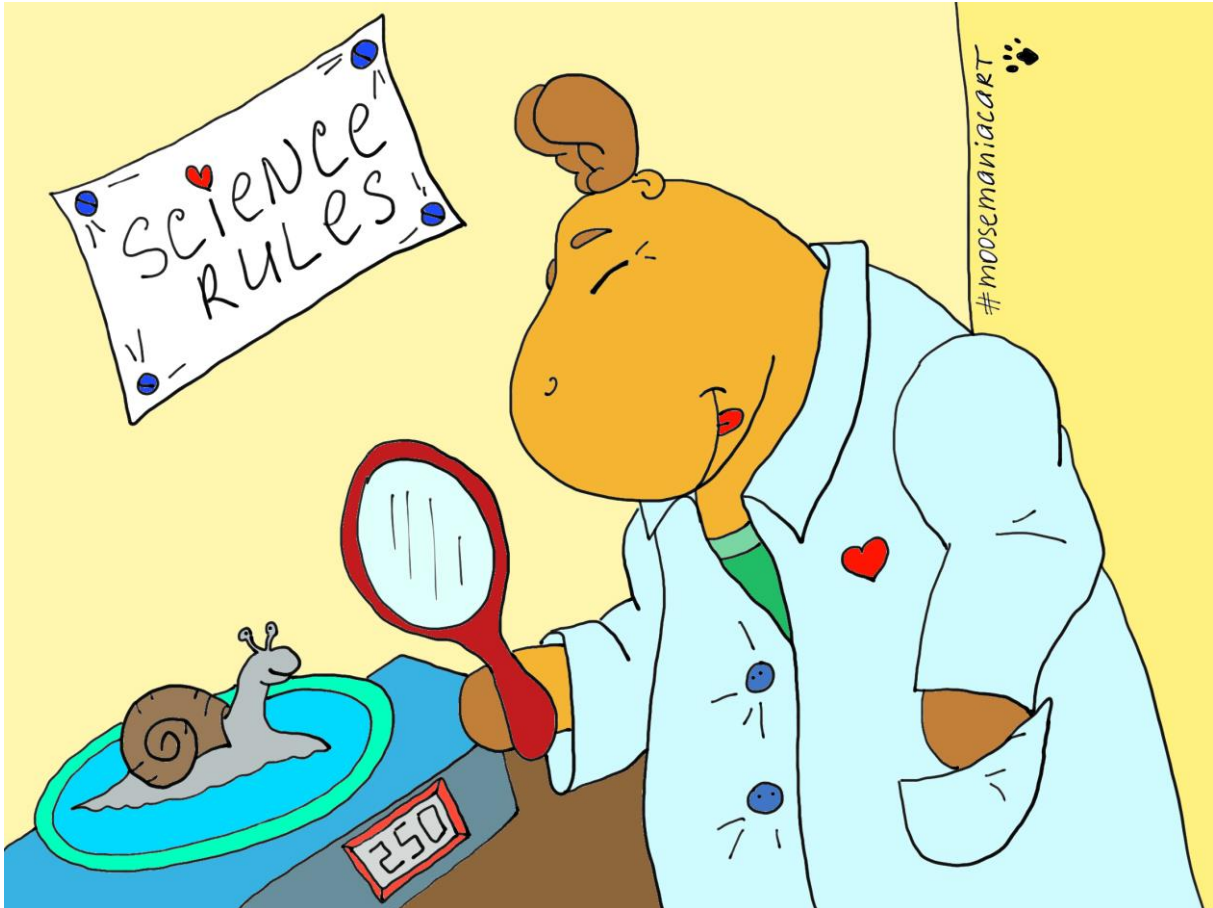
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Abstract: Background. Over the past two decades, a number of studies have been conducted that raise the question of how to restore and strengthen human contact with nature in the current urban environment. This type of research has been conducted in a variety of fields. Scientists have confirmed the positive effects of the natural world on human health and well-being, making biophilic design increasingly relevant. Based on the insights of Kellert (2005) and other researchers, it is recognized today that the man-made urban environment should exist in harmony with the natural environment. When the design of buildings and the use of land are based solely on urban forms, man's natural experience is limited by distancing from natural tendencies. Therefore, the human relationship with nature is the basis of the biophilia hypothesis, and when extended in the context of biophilic design, one should speak of the design and replication of natural structures in urban development. This understanding is needed to properly plan land use for various projects and to encourage the use of biophilic design as an innovative and effective way to improve the interaction of the people with the natural environment. There is currently little research in Lithuania to assess the perspectives of biophilic design, how biophilic design can affect community health, or how to practically reshape architecture from the perspective of biophilic design. Biophilic design is the latest and most widely accepted method of design, therefore the lack of scientific literature in Lithuania on this topic justifies the relevance of the topic. **Purpose.** The aim of this research is to investigate the possibilities of land use in Lithuania based on biophilic design, implementation problems and to provide relevant proposals for its implementation. **Methods.** Mixed methods were used for the research: analysis of scientific literature and documents (legal acts) analysis, qualitative research method and comparative method in summarizing the results of the review of scientific literature and empirical research. This study extends the principles of land use planning by emphasizing the view that anthropogenic elements should reflect natural elements. As a result, the study would be relevant to residential land designers. The study will also fill some existing gaps in biophilic design research, such as the lack of research in this area in Lithuania, and will therefore contribute to the continuation of the discourse in the scientific field. **Results and conclusions.** The study revealed that there is still a lack of agreement at the theoretical level on the definition of some features of biophilic design, which may hamper the implementation of ideas in practice. Meanwhile, Lithuania currently sometimes lacks initiative and funding for larger land use projects of this kind.

Keywords: land use; architecture; Lithuania; biophilic design

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A complementary food supplement from local food ingredients to enhance iron intake among children aged 6-59 months in Benin

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Abstract: Nutritious complementary feeding is often not affordable in Benin and iron deficiency exists. This research aims at formulating an affordable and sensory acceptable complementary food supplement (CFS) using *Moringa oleifera* leaf powder and local foods ingredients to enhance iron intake among children aged 6-59 months in Benin. The local food ingredients were selected based on their availability, nutritional value, and use as food fortificant. The CFS was formulated to ensure that 10 grams would cover 25% of the Estimated Average Requirements (EARs) for iron for children aged 6 to 12 months. The acceptability test of the CFS was performed using fermented maize and sorghum ogi porridges as food matrices with mothers-children couples. *Adansonia digitata* fruit pulp (BFP), *Moringa oleifera* leaf powder (MLP) and *Cochlospermum tinctorium* root powder (CTRP) were the selected food ingredients. BFP mineral contents were 9.9±0.1 mg/100 dw for iron, 0.9±0.1 mg/100 g dw for zinc and 402.2±3.4 mg/100 g dw for calcium. As MLP and CTRP are concerned, their iron, zinc and calcium contents in mg/100 g dw were 34.1±2.2 and 26.8±2.7, 9±0.0 and 0.9±0.0 and 2054.9±11.5 and 1061.3±11.5 respectively. The designed CFS contains 17.4±1.1 mg/100 g dw of iron, 1.2±0.1 mg/100g dw of zinc and 830.0±0.2 mg/100g dw of calcium. The daily consumption of 10 g of CFS (dry basis) would cover respectively 25%, 58% and 42% of iron EARs for children aged 6-12 months old, 12-36 months and 36-59 months. Nevertheless, the zinc content of CFS is low (1.2±0.1 mg/100 g dw). The fermented maize and sorghum ogi porridges enriched with the CFS at substitution rate (in dry weight) of 15 % and 16% respectively were found to be sensory acceptable by children and their mothers. The present study demonstrates the potential of local foods ingredients in the formulation of sensory acceptable and iron rich CFS for children aged 6-59 months in Benin. Next steps would be to develop a multiple micronutrient CFS and assess the bioavailability of the minerals in the CFS.

Keywords: Anemia, food-to-food fortification, food supplementation, minerals.

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Isolation of ecological culture of *Mycobacterium vaccae* strain "K"

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Abstract. Foreign and domestic scientific literature described cultures of *Mycobacterium vaccae* that have immunomodulatory and probiotic properties, isolated from the soil as environmentally friendly and biosafe cultures of prokaryotes, which are able to take root in humans, to associate with the native resident normomicrobiota of mammals and birds, performing immunomodulatory and probiotic functions and improving the general physiological state of the organism. **Materials and methods.** Laboratory studies were performed in the training laboratory of the Department of Epizootology and Infectious Diseases of Animals and in the Laboratory of Biosafety and Environmental Control of Agricultural Products FVM DDAEU. Isolation of atypical mycobacteria was performed by the Gon method and the suspension was sown on Levenstein-Jensen medium, the cultures were cultured at 37-38 °C for 4 weeks. Species identification of field isolates was performed according to the determinant of Bergey's bacteria by the term of growth, colony formation and pigmentation, the ability to cultivate at 25 °C, 37 °C and 45 °C, resistance to sodium chloride and salicylate, hydrolysis of Tween-80, reduction of potassium telluride and potassium activity. Smears from isolate cultures were stained according to Ziel-Nielsen. According to conventional methods, biological research and study of antigenic properties were performed on guinea pigs, rabbits, and chickens. **Research results.** During microbiological examination by conventional methods of manure from healthy broiler chickens for fattening in LLC "Pascal Corporation" Sinelnikovsky district of Dnipropetrovsk region, which was fed as a feed additive 10% humate K from the total sample of manure from the experimental group was isolated and identified biologically. "K" *M. vaccae*, which is suitable for use in the bioindustry of probiotic and immunomodulatory biological products based on live cultures of probiotic prokaryotes. According to the taxonomy Bergey's *Mycobacterium vaccae* belong to the type *Actinobacteria*, class *Actinobacteria*, series *Corynebacteriales*, family *Mycobacteriaceae*, genus *Mycobacterium*, which are members of the association of non-tuberculous mycobacteria (NTM - Nontuberculous mycobacteria) and group IV class IV. Ecological culture of *M. vaccae* strain "K" is characterized by the following basic properties. Morphotinctorial properties. In smears stained by the method of Ziel-Nielsen prokaryotes had the form of straight rods, long and short, bright red, which are located in the field of view singly or in clusters. Along with the sticks, there were also coccidial forms. Cultural properties. Facultative anaerobes and microaerophiles, fast-growing prokaryotes, are adapted to the eductive media on which mycobacteria are cultured. On Levenstein-Jensen egg-dense medium, cultures were grown for 4 - 5 days of cultivation at 25 and 37 °C, with and without 5% NaCl (tolerance up to 5% NaCl), with the formation of yellow pigment in the dark and in the light (scotochromogenicity). The culture did not grow at 45 °C (temperature sensitivity up to 45 °C). Cultures were catalase-active, hydrolyzed tween-80, gave a positive reaction with tellurite K, showed amidase activity, i.e. showed a positive reaction to urea,

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nicotinamide, and pyrocinamide. Ecological soil saprophytes are part of the indigenous microbiota with pronounced immunomodulatory and probiotic potencies, ubiquitous prokaryotes are widespread in nature. Prokaryotes are ecological and indigenous microorganisms, and form part of the normobiota of animals. Parenteral administration causes short-term sensitization to some genital mycobacterial antigens, which is manifested by a reaction to PPD and AAM. The strain causes the synthesis of Ig, which are registered in traditional serological reactions - RA, RIGA. The culture is well adapted to elective nutrient media, shows natural resistance to most antibiotics, phages are not isolated. The strain is free from other microorganisms and fungi. Probiotic properties were studied in an experiment on month-old chickens, which were fed a live culture of *M. vaccae* strain "K" at a dose of 1 mg per head for 4 weeks. Experimental chickens did not get sick, had higher rates of nonspecific resistance and gave a significantly higher increase in live weight. The original culture was re-isolated from all experimental samples. **Conclusions.** *Mycobacterium vaccae* strain "K" is an ecological and biosafe culture of prokaryotes, with pronounced indigenous, probiotic and immunomodulatory properties. Culture is isolated from manure from healthy broiler chickens for fattening using humic preparations, suitable for the manufacture of probiotics and symbiotics with immunomodulatory properties for farm and domestic animals

Keywords: *Mycobacterium vaccae* strain "K", Probiotic, Biological properties.

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Antibiotic Resistance of *Staphylococcus aureus* Isolated in Ukrainian Pediatric Patients

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Background. *Staphylococcus aureus* is a pathogenic microorganism and causative agent of a number of infectious diseases in adults and children. It is still one of the four most common causes of nosocomial infections. Particularly dangerous are methicillin-resistant infections, which bring great losses to the world economy. The issue of monitoring and controlling the spread of antibiotic-resistant strains is especially relevant. An accurate understanding of the MRSA infection status in Ukrainian Pediatric Patients is not available to date. Thus, the current research was performed in a children's hospital.

Methods. Eight hundred and fifty-two clinical samples (swabs from the nasopharynx) collected from 402 patients at Sumy Regional Children's Clinical Hospital between December 2020 and June 2021 were processed in a microbiological laboratory. The antibiotic sensitivity of the isolated bacteria to the 9 most common antibiotics in pediatric practice was established using the disco-diffusion method. The clinical laboratory information monitoring system and the medical record system were used to collect patient information. Microsoft Excel and SPSS 25.0 (Chicago, IL, USA) software were used for the statistical analysis.

Results. Out of 440 culture-positive samples, 89 (20.2%) were *S. aureus* isolates. Among those 89, 65 (73.0%) were found to be methicillin-resistant (MRSA). The infection rate of *S. aureus* was shown to be higher in patients from surgical departments (58.6%) compared with patients from somatic departments (41.4%). The susceptibility MRSA decreased in the following sequence: oxacillin (0%) → benzylpenicillin (1.6%) → ciprofloxacin (44.6%) → vancomycin (57.7%) → clarithromycin (63.8%) → amikacin (77.8%) → gentamicin (80.1%) → azithromycin (95.3%) → linezolid (98.4%).

Conclusions. The dominant agent of the pathogenic microflora is *S. aureus*. The spread of methicillin-resistant strains among children reaches high rates. A significant proportion of MRSA was resistant to a number of other antibiotics: ciprofloxacin (44.6%), vancomycin (57.7%), clarithromycin (63.8%). The degree of contamination of pathogenic microflora and the level of antibiotic sensitivity plays an important role in the further management of the patient.

Keywords: antibiotic resistance; methicillin-resistant *Staphylococcus aureus* (MRSA); pediatric patients.

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Effectiveness of the public health management system in Ukraine

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Abstract

Background. Ukraine is currently undergoing healthcare reform aimed at introducing new approaches to the public administration of the healthcare industry, improving the availability and quality of healthcare services to the population. Therefore, the need to increase the efficiency of functioning, management and financing of the health industry as a holistic framework has become urgent. The study aims to identify the problems of the modern public management system of the healthcare industry in the context of the health care reform and suggest ways to solve them. **Methods.** A logical and analytical method has been used to evaluate public health management components and improve them through reform. **Results:** Over the years, the healthcare industry in Ukraine has experienced many negative trends. Some of the problems of the industry are: financially vulnerable patients; poor quality and efficiency of health care service; inefficient spending of budget funds. The foundations for solving these and other problems were laid in the systemic reform of the healthcare industry. The reform vision for 2016-2020 was formed and approved by the Government in the Concept of Health Care Financing Reform. In addition, the legislative framework for the reform has been provided by the draft laws adopted by the Verkhovna Rada of Ukraine, in particular in the area of financing healthcare services for the population, introducing a state-guaranteed package of healthcare services and medicines, creating the National Health Service as a client of health services, reforming the primary health-care sector and introducing electronic patient records. The procedure and features of the reform of rural medicine are identified in a separate section. **Conclusions:** The healthcare reform will allow increasing the efficiency of the functioning of the public health management system in Ukraine by implementing the following effective measures: 1. Creating a new executive body (National Health Service of Ukraine), independent of the provider of healthcare services and acting as the national insurer, that enters into contracts with health care centres and purchases medical services for the population. 2. Autonomizing healthcare centres - the conversion of healthcare centres into municipal non-profit enterprises that can enter into contracts with the National Health Service of Ukraine and receive direct funding for services provided from the State budget. 3. Implementing a contract system where a patient can choose a primary care doctor (family doctor, general practitioner, pediatrician) and sign the declaration of unlimited duration on healthcare services. 4. Introducing a uniform fee for health care services for all healthcare institutions in Ukraine. 5. Identifying a list of services guaranteed by the State to both Ukrainian citizens and foreigners within the healthcare guarantee program. This list includes emergency, primary, secondary and tertiary health care, as well as health care services for children under 16, maternity care, palliative care and rehabilitation.

Keywords: healthcare, public administration system, healthcare reform.

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The importance of human capital in the formation of capable united territorial communities of Ukraine

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Background: The current state of formation, accumulation and use of human capital in Ukraine is studied. We analyzed the current state of human capital in newly established united territorial communities (UTC) in Ukraine under the power decentralization; distinguishing the tendencies of human capital formation and its role in providing the sustainable development of the communities; studying the human capital impact on united communities capabilities development. **Methods:** Historical and evolutionary methods were applied to analyze the sequence of development of scientific thought on the essence of human capital; analysis and synthesis, induction and deduction methods were applied to clarify the concept of "human capital"; logical generalization and comparison - to analyze approaches to assessing the current state of human capital; expert assessments were applied to assess the degree of impact of human capital development on the development of newly formed communities. **Results:** The research revealed the ambiguity of human capital assessment in Ukraine. On the one hand, there is an improvement in certain qualitative characteristics: the share of the population with higher education is increasing; computer literacy is growing; the ability to work in a market environment has been formed; entrepreneurial activity increases. However, there are processes such as shortage of highly qualified personnel, depreciation of labor, unemployment, low level of innovations implementation, increasing poverty, reducing life expectancy, mortality exceeding births, migration, unequal educational opportunities and medical services, lack of infrastructure and opportunities for cultural development of cinema, theaters, youth recreation areas, etc. that lead to the human capital destruction, especially among the rural population. A survey conducted among rural dwellers revealed that their living standards have changed dramatically after the unification of territorial communities. Only 10% of Kyiv Oblast respondents wanted their children to live in these communities and no one from Cherkasy Oblast expressed such a desire. 53% of respondents in the Cherkasy region found the state of their communities development unsatisfactory, and only 17% considered it good. The survey also revealed a low level of competence of the local government heads and their executive committees, especially in the use of modern mechanisms of public administration. Nevertheless, significant reserves for human capital development in the conditions of decentralization of power and participation of citizens in local self-government have been identified. Investment in people and their professional qualities development can form modern productive abilities and turn them into the main productive force of post-industrial knowledge-based economy. The study substantiates the necessity of cooperation between newly created communities and higher education institutions and the use of their potential in the formation and development of intellectual capital and innovative development. Modern universities' research activity produce new ideas and ways to implement them that can be applied in

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certain areas. The mutually beneficial synergistic effect for their development is substantiated on the example of cooperation of the studied communities with the university. **Conclusions:** It is intellectual property, i.e. human capital with its ability to generate ideas and create opportunities for their implementation, rather than material assets that is a key element in the conditions of decentralization of power, administrative reform and the need for sustainable development of rural areas in the structure of public administration of local self-government. Education and training specialists able to create space for the formation of human capital through its intellectualization is one of the main factors of effective realization of the existing potential of rural areas since it will provide further opportunities and competitive advantages to rural areas in achieving strategic goals of their innovative development. Therefore, regional universities are to become drivers of successful development of united territorial communities and rural areas.

Keywords: human capital, decentralization, local communities, education, sustainable development, resources, rural areas, reforms, local governments.

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Development of museums in Kharkiv region in the conditions of the Covid-19 pandemic

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The epidemic of coronavirus disease and long-term quarantine have become a real challenge for humanity. For the museum business - the pandemic was a big blow, and at the same time, set new challenges for the museums. The main challenge facing museums today and the country is communication with the audience (lectures, tours, online events, social networks, etc.). Therefore, the main task of the museum during the pandemic was to find new ways to organize work. As a result, the struggle of paradigms of thinking began - conservative and liberal values. The first thing that came to the mind of the management of any museum was the creation of "online" lectures, meetings, tours. But the museums of the Kharkiv region and other museums of Ukraine faced technological problems. In addition, there were issues with the multi-layered multimedia and the integrity of the content. It is not easy to show the exhibition to those in front of the screens, to tell the story with the help of materials that can only be given free access to the Internet. But this approach will allow museums to become a new kind of science communicator, using existing open scientific materials. Despite these problems during the quarantine, more museums in Kharkiv region have intensified their digital activities. Although, before the pandemic, when attending cultural events was not banned, most of them did not even have a page on social networks. Digitalization of museums since the beginning of COVID-19, according to the survey, has increased by 15% worldwide and by 40% in Ukraine, along with the rate of presence on social networks. Before building a new communication strategy, most museums experienced a crisis in the spring of 2020, which not everyone was able (and will be able) to overcome. The most popular among museum institutions are those online services that require less additional financial resources or specialized experience and skills. Actions and calls of the audience to participate in challenges also became widespread, e.g., the #GettyMuseum Instagram challenge and the Between Art and Quarantine campaign (and a number of others with a joint call to recreate a work of art at home). A large number of educational games, children's stories, quizzes and even video games (worth only Prisme7 from Center Pompidou), as well as coloring and games with parents and children were created to support parents who want to quarantine their children with something useful and interesting. Paying attention to the segments of the audiences that stood out during the quarantine, it is worth highlighting the local, which has acquired a new significance for museums. Institutions need to reach out to local communities to help local people and survive together in a crisis. A striking example is the most famous art galleries in Italy. Although today the borders between the countries within the EU are open, many Europeans are not ready to go to the country from which the Old World coronavirus began its journey. In such conditions, the Italians got a historic opportunity: to see the native masterpieces, free from the crowds of tourists, and quietly book a ticket in a few days, not weeks or months. Museums often resort to a variety of tricks to encourage new segments in these turbulent times. Main topics: distraction from

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anxiety, enlightenment and humor. This has made museums more accessible and relevant to a wider audience. But will the experience they want to offer be different from the experience of regular visitors? Time will show.

Keywords: museum; audience communication; Art and Quarantine.

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The impact of COVID-19 on state regulation of employment in the agricultural sector of the economy

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Background: The agricultural sector of Ukraine's economy is a powerful and strategically important sector that ensures its food security and independence thanks to its natural resource potential. However, as a result of the negative impact of the COVID-19 pandemic, which caused the global economic downturn, the agricultural sector faced real threats and challenges that could negatively affect the development of the industry, which in turn could negatively affect rural employment. The purpose of our research is to identify areas of public policy in the field of rural employment regulation related to COVID-19 and evaluate their effectiveness.

Methods: The research was based on a systematic approach to the study of the problem and a dialectical method, which allowed a comprehensive approach to establishing the impact of COVID-19 on employment in the agricultural sector.

Results: According to the State Employment Service, in January-September 2020, 2.5 times more workers were laid off in the agricultural sector compared to the same period in 2019. The largest share in the structure of registered vacancies in January-September 2021 for types of economic activity is occupied by agriculture, fisheries and forestry - 18.3%. The dismissal of workers from enterprises, institutions and organizations in the agricultural sector, including through COVID-19 led to a significant increase in unemployment among the rural population in 2020-2021. In particular, the number of unemployed working-age people increased from 580.9 thousand in 2019 to 626.3 thousand in 2021, which is 7.8%.

In general, the employment crisis was observed in all regions of Ukraine. The production of the agricultural sector is closely related to natural and biological processes, but the restrictive measures imposed by the state to overcome the pandemic have negatively affected productive employment, budgeting of rural communities, the social infrastructure of the village and more. The state has developed and implemented a number of measures to alleviate the pressure on business structures and households by providing benefits and tax refunds, which has led to positive results. The state regulation aimed at eliminating possible threats and risks for agricultural producers, including the fact that from March 1 to April 30, 2020 land tax and rent for land plots were not accrued and paid, temporarily exempted from accrual, calculation and payment of a single contribution to the obligatory state social insurance of members of farms.

Conclusions: Thus, in accordance with the purpose of the research, it can be argued that the effectiveness of measures taken by the state to minimize risks and threats under severe quarantine restrictions is low. Further research should be aimed at strengthening the institutional mechanism for regulating rural employment in the face of forced restrictions.

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Keywords: employment, agricultural sector, COVID-19 pandemic, government regulation, agricultural producers

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**Agrarian cooperatives as a form of cooperation to
achieve territorial communities' sustainable
development**

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Introduction: Nowadays, the decentralization reform is implemented in Ukraine, so rural territories receive resources for their development and responsibility. The main task now is to improve the quality and financial capacity of newly created communities and ensure the social cohesion of communities that are just learning to work together.

This research aimed to identify the directions and intensity of the impact of agricultural cooperatives on the indicators of sustainable development of rural territorial communities. We hypothesized that the establishment of agricultural cooperatives in rural communities contributes to economic development and positively affects the growth of social capital in communities.

Methods: To identify the directions and intensity of the impact of agricultural cooperatives on the indicators of sustainable development of rural territorial communities, we compared the dynamics of these indicators in communities where agricultural cooperatives operate with communities where there are no agricultural cooperatives (control communities).

For such an analysis, an econometric model based on the method of differences (difference-in-differences) was built. The essence is to find the difference between socio-economic indicators of sustainable development of the studied communities over time. The period of life of rural communities from the beginning of the decentralization reform in Ukraine (2016) to its completion (2020) - 5 years is considered.

Results: We evaluated the impact of agricultural cooperatives on the change of such socio-economic indicators of community development, as: the number of permanent residents in the village; number of households; bus service (number of buses per day); the number of people who left the village per capita; the number of people employed in all spheres of activity per capita; the number of people employed outside the village per capita; number of deaths per capita; the number of people engaged in entrepreneurial activity per capita; number of places in schools and kindergartens; number of visits to medical institutions; revenues of general and special funds of budgets of territorial communities; income of the general fund per 1 inhabitant; capital expenditures per 1 inhabitant; the level of budget subsidies.

It was found that the presence of agricultural cooperatives in the community has a positive impact on indicators of their socio-economic development: "permanent population"; "number of households," "number of people leaving the community per capita"; "the number of people employed in all spheres of activity per capita"; "budget revenues per capita," "capital expenditures per capita."

Also, there was a significant positive impact of agricultural cooperatives on indicators of agricultural sustainability: "land in crop rotation," "the amount of organic fertilizers," "the amount of crop by-

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products used for fertilizers," and a significant negative impact on the indicator "amount of chemical fertilizers. "

Conclusions: The study demonstrates the effectiveness of agricultural cooperatives in the community for local sustainable development. Due to participation in the establishment and operation of agricultural cooperatives, there are some changes in the thinking and behavior of people that lead to the transition from traditional to modern lifestyle.

Keywords: cooperation; agricultural cooperative; sustainable development; socio-economic development; rural community

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Industrial Mishaps in India: A Challenge to Nation's environment sustainability

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Abstract: Industrial accidents are a silent culprit behind environmental havoc and loss of human lives. It is an accident that unexpectedly happens to a person or group of people in the industry, interrupting the routine progress of the work and resulting in injury or death. It is usually associated with miners, construction, factory, production plants or chemical industry and others. Due to the fast rate of industrialization, population growth, and land restrictions, it was anticipated that accidental risk arising from harmful chemical plants and industries is also increasing. Major accidents involving dangerous chemicals cause a significant threat to human lives, ecosystems, and sustainable growth. Moreover, such accidents cause huge economic losses. The Bhopal gas tragedy was one such example, which was the biggest disaster in the history of mankind. Around 25000 people died and the entire Bhopal city was affected due to it. It is remembered to date as some post-disaster effects are still prevalent in this area. 36 years after the Bhopal Accident in 1984, not much central level monitoring or any accident management system at the national level has been adopted to reduce this kind of catastrophic disaster. Industrial disasters, therefore, impose a unique set of challenges for public health emergencies. Although after the accidents, corrective actions were taken, they were remarkably established. However, there is a massive gap in scientific awareness regarding control of these disasters related to the industrial release of toxic materials, which later challenges the nation's environmental sustainability goal. Hence, it is recommended to establish a central surveillance system that constantly monitors and records necessary information regarding safety data and procedures followed by each chemical industry and other plants. The purpose of this review is to highlight the causalities and environmental harm by industrial accidents and accordingly address them to the concerned authorities to prevent them in the future.

Keywords: Industrial mishaps, Environmental pollution, Death, Disaster, Bhopal gas tragedy

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Factors Influencing Intergenerational Farm Succession – The Case of Syria

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Syria is a country where smallholder farms are prevalent and farm succession is problematic due to massive migration and loss of young men in a war conflict. However, due to small landholdings, large family sizes, and high off-farm wages (reflected in heavy dependence of farmers on off-farm income), many youths and young adults in low and middle-income countries prefer to participate in off-farm work activities.

Moreover, the crisis changed age, gender, and education structures in the population as a result of different factors, including the increased number of male deaths compared to female as well as the impact of displacement, migration, and asylum-seeking

This research aimed to explore factors influencing farm succession processes in Syria and the obstacles encountered during this process to bring more light to the farm succession. Understanding these influences will fill a significant gap in knowledge related to succession in smallholder agriculture and result in the development of targeted policies that will make farm transfer between generations less problematic and more efficient.

We selected the Coastal region of the Mediterranean Sea for our case study. Although the Coastal region is relatively small, it contributes significantly to national agricultural production. Further, this is a relatively safe area where data collection is possible. The target population for this research will comprise of two groups of respondents (Farm head “the decision-maker about farm succession”, Children (Potential farm successors between 18-24 years of age).

A comprehensive mixed methodology including both qualitative methods and quantitative analysis will be used to identify factors that determine the intergenerational succession in family farm businesses by the mean of regression model.

Keywords: Family farming, Generational turnover, Intergenerational transfer Succession

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A Comparative Analysis of Organic and Conventional Agriculture in the Czech Republic and Ukraine

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Abstract: Organic agriculture ensures the implementation of the SDGs, as it creates sustainable food production systems – crop technology, animal husbandry. Abandonment of pesticides and chemicals contributes to the preservation of ecosystems, biodiversity, restores soil quality, and improves the quality of water resources and, consequently, the life of organisms. This study was undertaken to contribute to the understanding the sustainable agriculture in the Czech Republic and Ukraine. Therefore, the objective of this research was to assess and compare organic agriculture in the Czech Republic and Ukraine on the implementation of goals and components of sustainable development. The paper is critically considered the ecological, economic and social practices in both countries and revisited agricultural policies to promote local and regional agricultural markets for last years. Methods of systematic and comparative analysis, interdisciplinary approaches were used to obtain results. Results showed a lower environmental impact of agricultural practices in the organic system, mainly due to the higher efficiency in reducing the impact on fossil fuel depletion. A comparison of data in both countries showed that fertilization is the first priority to optimize the farming, particularly in the organic system, however, manure fertilization results in higher costs for farms engaged only in crop production. Good agricultural practices with electrically-driven irrigation systems, mechanical weeding, and biological pest control can be considered further optimization options to mitigate environmental burdens and reduce costs. Conventional agricultural production methods and the desire to increase profitability under any circumstances have led to deterioration in the environment and food quality. Technologies of natural agricultural production have started to be introduced in Ukraine, but their activity is rather low, complicated by the presence of a significant transition period, during which the profitability of enterprises is significantly reduced. The macroeconomic situation in Ukraine, taking into account the depletion of natural resources, tends to deteriorate. This situation correlates with the situation in countries with below-average incomes and indicates the lack of a clear strategy in the country aimed at achieving sustainable economic growth. In the Czech Republic, the organic system resulted in higher net present value and return of investment that indicate its higher profitability than the conventional system. This, in turn, requires the development of technical, policy, governance and financing frameworks that support agricultural producers and resource managers engaged in a

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dynamic process of innovation. Thus organic agriculture in both countries contributes to environmental preservation but needs significant financial support. In Ukraine, the profitability of organic farms is on the verge and much lower than under conventional farming.

Keywords: organic farming, environment, sustainable development, profitability.

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Characteristics of regional development in a decentralized environment

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Abstract. In the context of globalization, the role of regional development is increasing depending on the available agricultural, social, investment and industrial potential. Stimulating the development of regions in Ukraine is carried out with the help of a number of tools, which during the time of their use demonstrate different degrees and effectiveness. Decentralization reform has great potential to stimulate the development of regions and, consequently, the country as a whole. At the same time, this process has a significant impact on various spheres of socio-political and socio-economic life. Therefore, it is necessary to comprehensively explore and analyse several areas, namely the qualitative change of territorial management, improving the welfare of communities, the impact on reforms in other areas and the development of the country as a whole, Ukraine's recognition in the world and others. **Research methods.** To achieve this goal, the methods of dialectical logic - the unity of historical and logical, analysis and synthesis - were used to justify regional development as one of the tools of public policy. Methods of comparison, analogy, generalization, monographic method, etc. were also used in the work. **Results.** The process of delegating authority to local governments to make decisions in the field of stimulating socio-economic development of the regions reveals the essence of decentralization. The experience of the world's developed countries shows that the stimulation and transfer of a number of powers to local authorities leads to the strengthening of the capacity of territorial communities to solve problems on their own. At the same time, regional and local authorities become critical in the organization and implementation of the state program of regional development. Financial decentralization is defined as an incentive for local authorities to increase revenues within their competence and rational allocation of funds. The lack of real powers of local authorities (provided in accordance with the European principle of subsidiarity) and sufficient resources (financial, material, human) to direct them to address all current issues has led to the transfer of responsibility for community development and regional development to central executive bodies. This practice created risks for the gradual reduction of local initiative, the destruction of incentives for self-development and effective self-management of public affairs of local importance. **Conclusions.** The state policy of regional development should be generated at the state level and supported at the regional level. The balance of relations between the center and the regions should be ensured. During the new stage of decentralization in the country, fruitful work is needed to develop and implement a new effective regional policy. The state strategy of regional development should be based on increasing the competitiveness of the regions and improving the welfare of the population regardless of the territory's place of residence and location, which will ensure the unity of the Ukrainian space.

Keywords: decentralization, regional development, public policy.

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Challenges facing education during COVID-19 pandemic

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Abstract. Background: The WHO declared COVID-19 a pandemic that poses an immediate, global threat for the world. It caused a global shutdown of economic and social activities, including education. Online learning has become the primary educational platform, leading to transformation and crisis in educational institutions. In this regard, this study aims to analyze the main challenges facing inclusive education during the COVID-19 pandemic. **Methods:** The main methods of theoretical research are used: analysis and synthesis, induction and deduction, comparisons and logical conclusions. **Results:** The change to online learning becomes challenging in both a positive and a problematic way, since these processes reflected imprecise planning, design and development of online instruction and program development. Educational sectors swiftly developed online environments where teachers made rapid adjustments for the diverse learning needs of their students. In order to address digital competence as an emergency issue in distance learning, Ala-Mutka et al. (2008) suggested that instead of developing a separate platform for teaching digital skills, schools should integrate them into the teaching and learning of all subjects. Although the change to online teaching was unexpected and rapid, due to a wider transformation of information and communications technology in educational systems, the digitization of schools was highlighted and made prominent only recently. So the digitization must be integrated in the curriculum to a much greater extent, allowing students to use advanced technological tools and digital solutions for creative and innovative problem-solving. Evaluation and supervision are also a challenge (Osterlind, 2002). There is significant literature on classical test theory – grading and analysis – but little on planning, development and writing of test items in online learning. Therefore, the evaluation of tasks given to the learners is limited, in terms of supervision. However, another challenge facing school principals is accessibility to technology. Until recently, computers and the internet were supplied for free by the schools, but their closures led to inequality, due to some of the students coming from a lower socio-economic background. It has become apparent that poverty is directly related to inaccessibility of computers and the internet. As a result, poorer students are unable to join in online learning. Evidently, online educational learning will continue and be more hybrid. Developing a tool for evaluating distance learning allows principals to receive transparent information about online learning methods and the challenges experienced by students and staff. **Conclusions:** The global COVID-19 crisis highlighted the many challenges facing educational institutions. They have to make the necessary decisions in order to inspire certainty, propel educational processes effectively, and ensure open and reliable communication within the education community. Unexpected and enforced change, from face-to-face to distance teaching, can

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be considered as an opportunity to accelerate processes, and is a catalyst for a paradigm change in education. An occasion has arrived for rapid assimilation of technologies, innovative pedagogy and advanced management mechanisms.

Keywords: education, challenges; COVID-19.

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Hybrid threats from the Russian Federation as the trigger for “green” transition of the EU and Ukraine

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Climate change, environmental degradation and decrease in biodiversity are existential threats to Europe and the world^[1] and addressing them creates opportunities to build a new economic model^[2]. The European Green Deal^[3], developed by the European Commission, responds to these challenges. According to 'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality^[4] by 2050, Europe must "become the first climate-neutral continent" which requires the transformation of economy and society on an innovative basis. The EU as the world leader in climate and environmental action, protection of democratic values, coordination of international efforts to reduce global risks and threats, has formed a significant number of legal norms, economic instruments, measures and continues to develop and implement innovations, turning an urgent problem into a unique opportunity. In Ukraine, the course for the European integration of which is defined in the Constitution, the EU experience is implemented, especially in the field of environmental policy, energy, security. In August 2021, the Ministry of Ecology and the Government Office for Coordination of European and Euro-Atlantic Integration began forming a roadmap for key transformations and measures to implement the up-to-date contribution to the Paris Agreement accepted nationally^[5]. By the Concept of "green" energy transition of Ukraine until 2050^[6] the term of achieving the goal of climate neutrality has been set by 2070. By the National Economic Strategy for the period up to 2030^[7], achievement of climate neutrality is expected to be no later than 2060 "through outpacing innovative economic growth taking into account the Sustainable Development Goals"⁷. Otherwise, such a transition can be a huge challenge for Ukraine due to outdated industry technologies, low quality of public administration, etc.^[8]. Simultaneously, the growing hybrid threats from the Russian Federation, nowadays resulting in the energy war and the migration crisis on NATO's eastern border, destabilizing the security situation in some regions and in the world as a whole, are a trigger for the “green” transition process in Ukraine and Europe, given the fact that energy resources are the mechanism of Russia's hybrid war against Ukraine and the EU. Addressing security issues, including achieving energy independence from the Russian Federation and

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the Republic of Belarus (which is de facto a satellite of Russia) in the short, medium and long term, requires the introduction of radical innovations and consolidation of global efforts to rapidly increase the potential for “green” transformation of the European and global energy system, including the transfer of appropriate “green” technologies. The effectiveness and efficiency of mechanisms for scientific and technological collaboration and transformation of society at all levels (individuals, employers, institutions and international partners) to address global challenges and threats was demonstrated during the COVID-19 pandemic spread, which has become the security challenge in a broad sense at the global and national levels and has proved the necessity to ensure the stability of national economies, strengthen strategic foresight and take a set of measures to prevent future crises, resist current challenges, and threats in advance.

Keywords: outpacing innovative development; sustainable development goals; energy security; climate neutrality; energy war; hybrid threats

^[1] World Economic Forum. (2021). The Global Risks Report 2021. URL: <https://www.weforum.org/reports/the-global-risks-report-2021>

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**Cooperation among farmers in pandemic conditions:
Solidarity Economy Aspects (Case of the Czech
Republic and Ukraine)**

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Abstract. A number of scientists [1], [2], [3] consider solidarity economy as a way to overcome crisis phenomena, authors such as [4] and [5] understand by this term all the production, distribution and consumption activities that contribute to the democratization of the economy on the basis of civic obligations, both locally and globally. It is done in different ways, on all continents, it covers various forms of organization used by the population to create their own means of work or access to quality goods and services, in a dynamic of reciprocity and solidarity that connects individual interests with collective interests. In this sense, the solidarity economy is not a sector of the economy but a general approach that involves initiatives in most sectors of the economy. **Case of Czech Republic:** Farms cover 44% of the country area, and the agriculture industry is one of the most important sectors of the Czech economy [7], [8]. However, nowadays, Czech agriculture is based on industrial farms with an average acreage of 800 hectares. Only 7 % of big agricultural enterprises manage 65 % of arable land, most of which they only rent [9]. Cooperation among farmers during the pandemic is seen as a means to sustain agricultural systems amidst the food production, demand and supply crisis created by the current COVID-19 pandemic. Changes in cooperation between farmers during pandemic. Increase in the use of ICT in agriculture for communication during pandemic. The COVID-19 pandemic in the Czech Republic led to increased use of ICTs among farmers. [6] reported that ICTs utilisation in agriculture is a new pathway in agriculture (mostly for communication and marketing). The revolutionary use of doorbells has been instrumental for over-the fence sale of perishable farm products due to the closure of farmers markets. Market research has also been carried out on Facebook and other online platforms. Other online communication tools have been used to organise meetings among farmers to identify their problems and protest against government's restriction measures that are negatively affecting agricultural production. Protests were motivated by the fact that farm markets were closed, whereas supermarkets distributing the food products were considered as essential services (that is, permitted to operate). This disrupted the food production and supply chain, thereby requiring adjustments. However, following the protests, farmers' markets were eventually reopened. **Case of Ukraine:** The problem faced by farmers was the sale of fresh produce. And this is logical because with the closure of catering establishments, the demand for products has decreased. Prior to the pandemic, the farmer sold his own vegetables and fruits in 8 different markets, although he later lost access to all of them. Because of this, with the first outbreak of coronavirus, he began selling products over the phone and online, developing computerized solutions for sales processes of finished products and new models of supply chains for this industry. At the same time, the pandemic has already reduced the demand for food. This has led to lower purchase prices for products for example, for milk - by 0.6%. Lower milk incomes mean lower incomes for farmers. And lower incomes for farmers are fewer opportunities to grow their own

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business and maintain a decent standard of living for their families. This issue is especially relevant during social crises, such as the crown virus pandemic. In this situation, according to many small and medium-sized producers, government subsidies will not save. Additional economic tools can help normalize the business - tax "vacation" or tax deferral. They can help keep small agricultural enterprises afloat, as these organizational units were under the strongest pressure and blow. Such tax holidays must last during the lock-down period, or during a certain period, i.e., be temporary. This means that the smallest entrepreneurs would avoid paying UAH 1,100 in SSC and UAH 210.2 in the single tax for December 2020, and in 2021 they will save UAH 6,600 in the payment of SSC and UAH 1,094.5 in the payment of the single tax. Instead, the tax authorities are threatening the courts with those farmers who are not ready to pay taxes in a crisis. **Conclusions:** Due to quarantine restrictions, Ukrainian farmers have lost access to markets. According to experts, there are tons of food thrown at random during the pandemic, which farmers simply could not sell. After all, the markets, restaurants and cafes with which they cooperated were closed. In our opinion, all food could be bought only in supermarkets, where sanitary conditions are observed. However, not every small farmer can meet the requirements for standards of packaging, safety, volume and quality of products, as in supermarkets. After all, it is difficult to find farm products in our large retail chains. The explanation of the above is justified by the fact that farmers are "inconvenient" suppliers for supermarkets. There are many of them, and it is easier for chain stores to have one large supplier.

Key words: solidarity economy; farmers cooperation; rural areas; pandemic; social economic and environmental effects.

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Development of youth activism as a fundamental factor in the functioning of a powerful civil society

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Abstract: (1) **Background:** The COVID-19 pandemic has significantly changed the rules of the game in the political, economic and social spheres of Ukrainian society. At present, all tasks and challenges related to the stabilization of the socio-economic situation in Ukraine (and even more so - ensuring sustainable and secure development) are solved in conditions of deficit, in fact, all kinds of resources and radical constraints. The crisis of Covid-19, which caused structural changes in the life of society, had a huge impact on the formation of activity and involvement of young people in active life and the formation of a sustainable civil society. Experience shows that in times of crisis, the decisive role in overcoming their destructive experiences was given to public activity and self-organization, ie youth. Active and charged people and individuals changed the world. Due to the challenge of the pandemic, the crisis and the urgent need to respond to them, there have been, though not numerous, positive changes at the level of public consciousness. "Social capital" has grown in society - the demand for human connections, contacts, solidarity, mutual trust in the conditions of quarantine restrictions has grown. This has led to the search for new opportunities for young people in terms of social interaction, so the process of finding resources to apply new technologies of self-organization, social communication and the development of new skills has intensified. Also, this situation for active and progressive representatives of civil society has become a new opportunity for the development of public activities in establishing cooperation using the latest technologies and remote formats. 70% of experts say that the partnership, the interaction of young people with many institutions in joint activities should be the basis of relations between civil society and the state during the corona crisis. However, there are numerous problems, the solutions of which are still at the stage of formation and implementation. **The main questions** of a wide range of research, which we sought to understand during the study, which was conducted on the basis of a survey of youth representatives on the level of youth policy of the city and the general level of civil society to determine the current situation on this issue were: What is the level of youth involvement in the city? In which projects do young people participate / aspire to participate? Do young people in the city consider themselves "the engine of structural change" in the development of civil society in the city? **The purpose of the study** was to study the current state of development of youth policy in the city and analyze the situation regarding youth activity and the formation of a number of tasks and relevant practical measures to increase their involvement and activism. **Our goal was** to increase the level of involvement of the youth of Bila Tserkva in active public life, to involve them in decision-making processes and influence on the overall development of the community. (2) **Methods:** The main and most important method of the research was a survey developed in the context of creating an online portal for young people to create their own NGO and get involved in the active youth life of their own city or community. Respondents aged 17 to 25 took part in the survey.

The platform we created looks like this:



All data of respondents remain confidential (*a link to a questionnaire that we created as a basis for the study*)

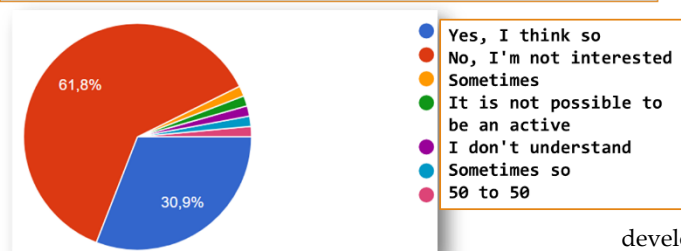
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https://docs.google.com/forms/d/1mwhTF380kw3kc_GtDuFwQ1xhPY2_DVA1ucb4We5r1kI/edit). Also, another method of project implementation was online - presentation of the project to the general public at the meeting of the scientific circle of the Department of Public Administration, its discussion and some changes to improve the process of determining the results of the survey. Another research step for us this year was the creation of a project of a portal for young people called "Youth. Activism. Changes ", which contained topical tips on creating your own youth NGO and practical cases and opportunities for young people (announcements of various events, development programs, conferences, etc.), to increase their activity and involvement.

(3) **Results:** First of all, we received the results of a survey on youth policy in Bila Tserkva and formulated the following conclusions: 1. At the time of this survey, young people chose education, self-education as their main priorities in their lives. Career and professional training, as well as health. This testifies to the readiness of young people to change, self-improvement and move in the direction of structural changes in civil society. 2. Many young people do not understand the concept of "youth policy", so it is necessary to improve educational work and promote this area through various events, trainings and more. 3. Unfortunately, only a third of respondents do not consider themselves socially active, who are directly / indirectly involved in changing the city for the better. 4. However, about 53% of them, according to the survey, have ever participated in the activities of NGOs (public organizations), community initiatives or local youth projects / events in your city. 5. Also, about 63% of respondents answered that they would like to create their own public organization in the city of Bila Tserkva. This shows that young people, although not sufficiently aware and experienced, still want to move forward and

Do you consider yourself a person who is socially active and directly / indirectly involved in changes for the better?



implement change today! 6. When asked about the main priorities of the youth policy of Bila Tserkva by the city authorities, young people mainly chose to promote employment and self-employment of young people, housing, creation of a number of youth associations, locations for active youth, support for talented youth, dissemination among young people in a healthy and safe lifestyle, etc. That is, young people are interested in their own

development, but emphasize the need to intensify power in this direction and the initiative of the citizens themselves.

7. Other observations found in the results of the study

([https://docs.google.com/spreadsheets/d/1T46YkfRlr-](https://docs.google.com/spreadsheets/d/1T46YkfRlr-NHiT1ooFUMKnozYgP8CYiCiGjYGIWdmZk/edit?usp=sharing)

[NHiT1ooFUMKnozYgP8CYiCiGjYGIWdmZk/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1T46YkfRlr-NHiT1ooFUMKnozYgP8CYiCiGjYGIWdmZk/edit?usp=sharing)).

(4) **Conclusions:** Speaking about the conclusions of this study and the conducted experience and relevant analysis, it should be noted that young people, as never before, do not need to be involved in the development of civil society. Therefore, these young people lack an understanding of the very interpretations of the concept of "activity, youth policy, etc." and their practical implementation. There is interest and initiative, but an implementation mechanism needs to be established. Therefore, the activities are to intensify the educational and information campaign - measures of numbers, involvement in government and one page, attracting young people to become more proactive, aware of their rights and opportunities, and most importantly - to implement them and change lives for the country!

Keywords: civil society; youth policy; activism; change; research of youth activity.

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This series of artistic drawing was prepared by Assoc. Prof. Oksana Zamora PhD from Sumy State University.

We hope, that you will enjoy them as much as we do!



ART AND SCIENCE

Traditionally, art and science have been treated as two separate disciplines, but when they are studied together it's clear to see the impact one has on the other.

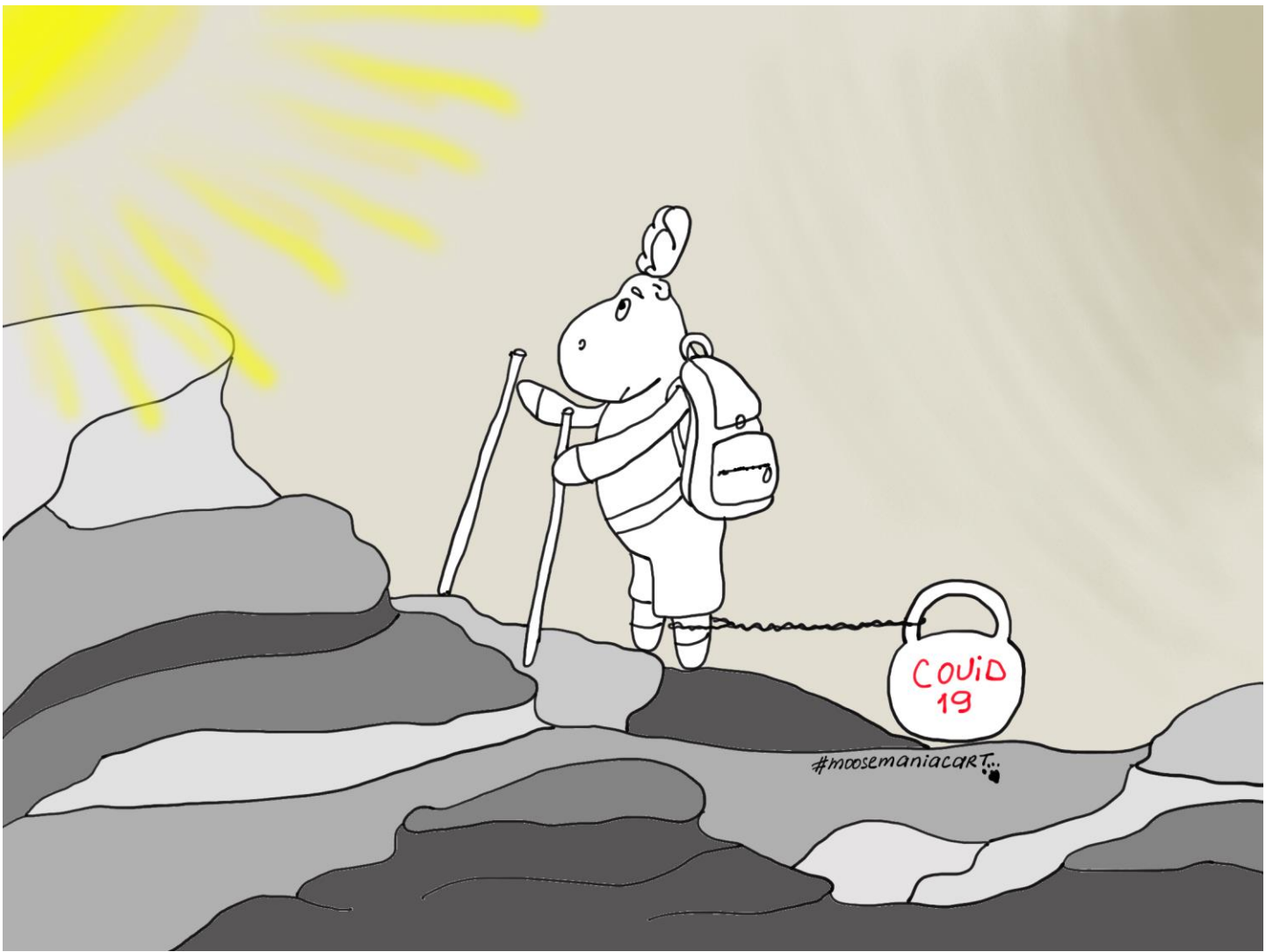
A great deal of creativity is required to make scientific breakthroughs, and art is just as often an expression of (or a product of) scientific knowledge

„ART IS AN
IRREPLACEABLE
WAY OF
UNDERSTANDING
AND EXPRESSING
THE WORLD“

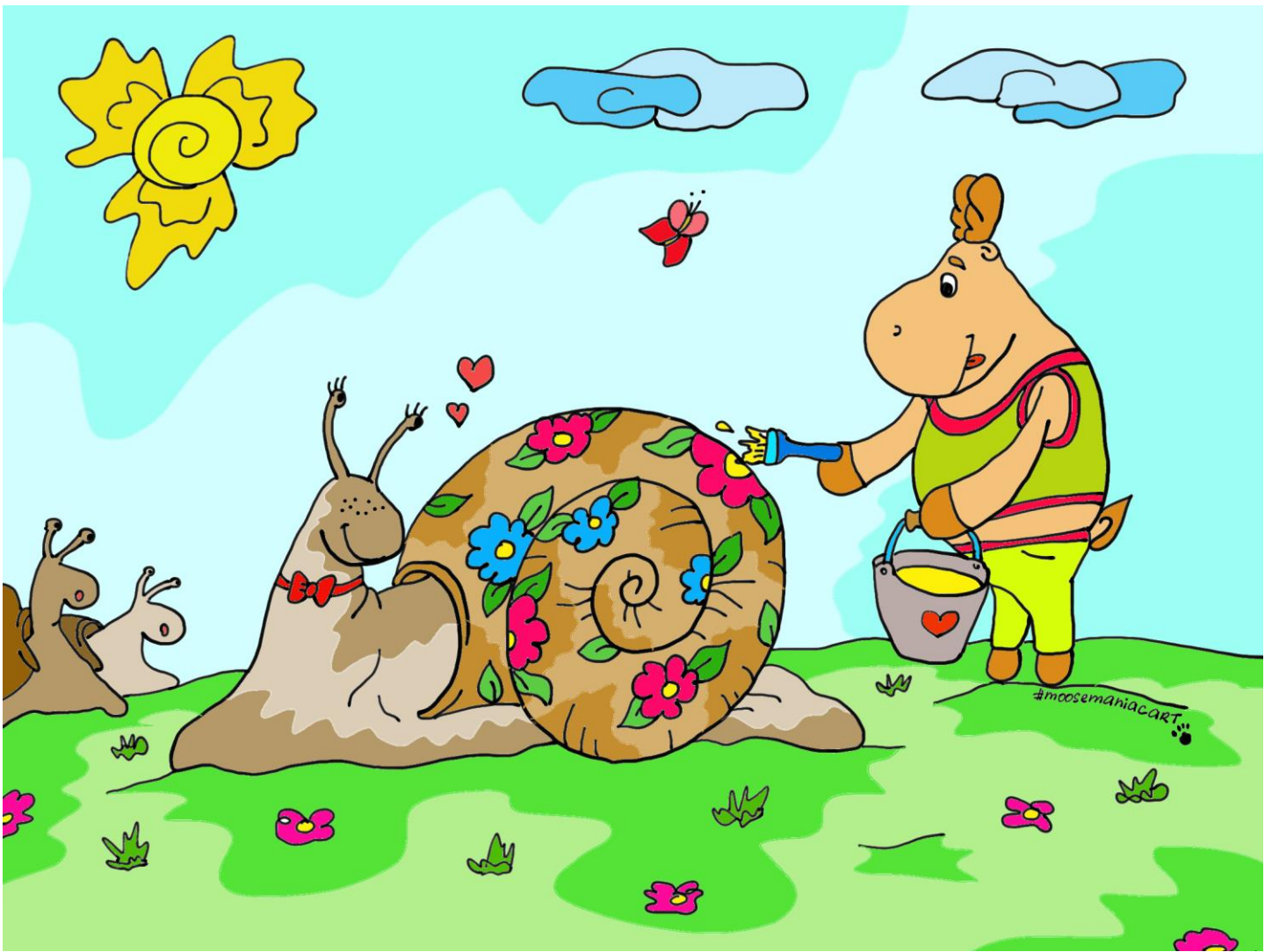




**LET'S GO
TOGETHER WITH
OUR SCIENTIFIC
MOOSE'S...**



**EVEN THE
SCIENTIFIC
MOOSE IS
TROUBLED BY
COVID-19...**



**BUT, ALWAYS
LOOK ON THE
BRIGHT SIDE...**



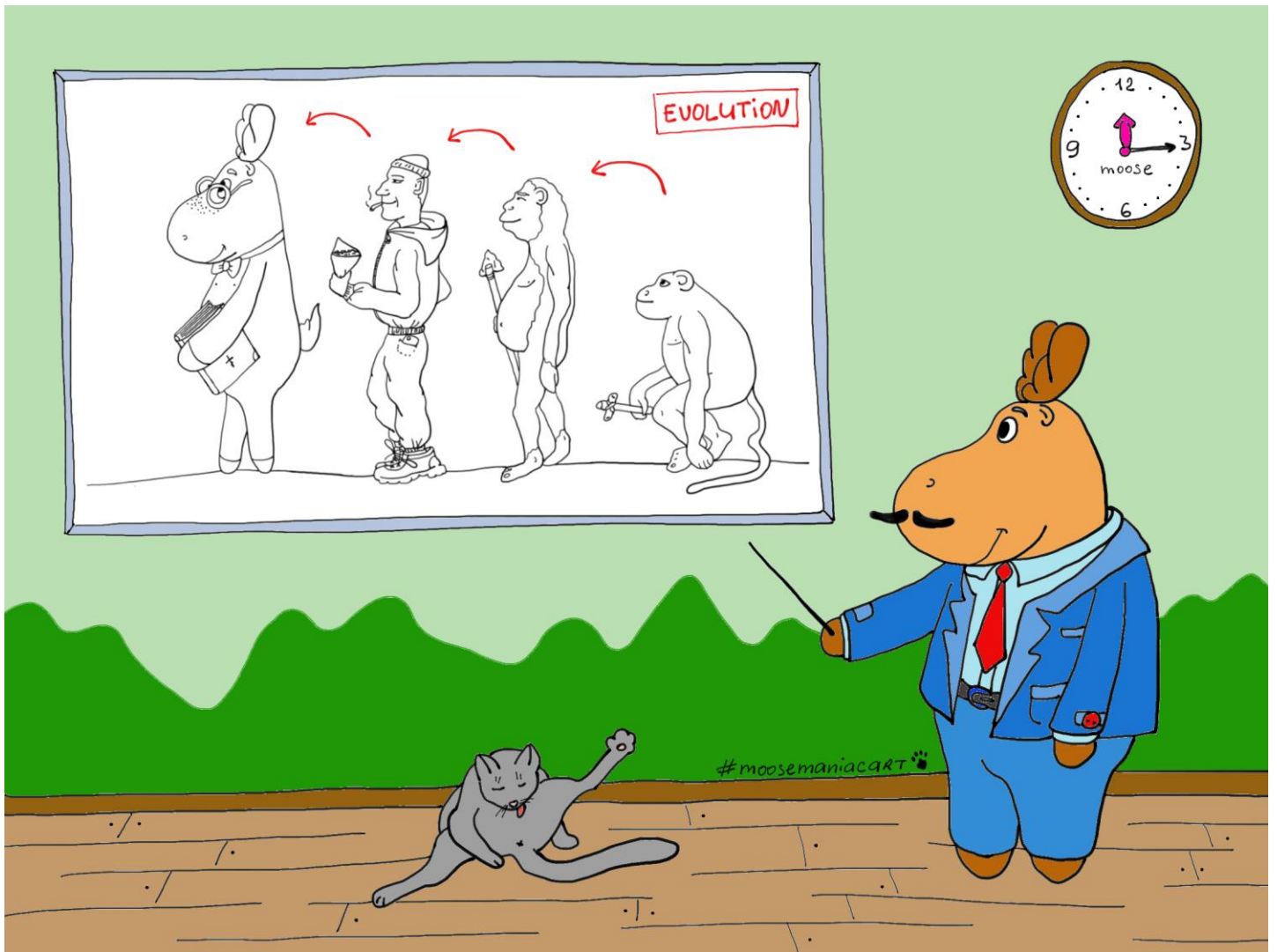
**AND KEEP IN
MIND, THAT
SUSTAINABLE
DEVELOPMENT
MIGHT BE THE WAY**



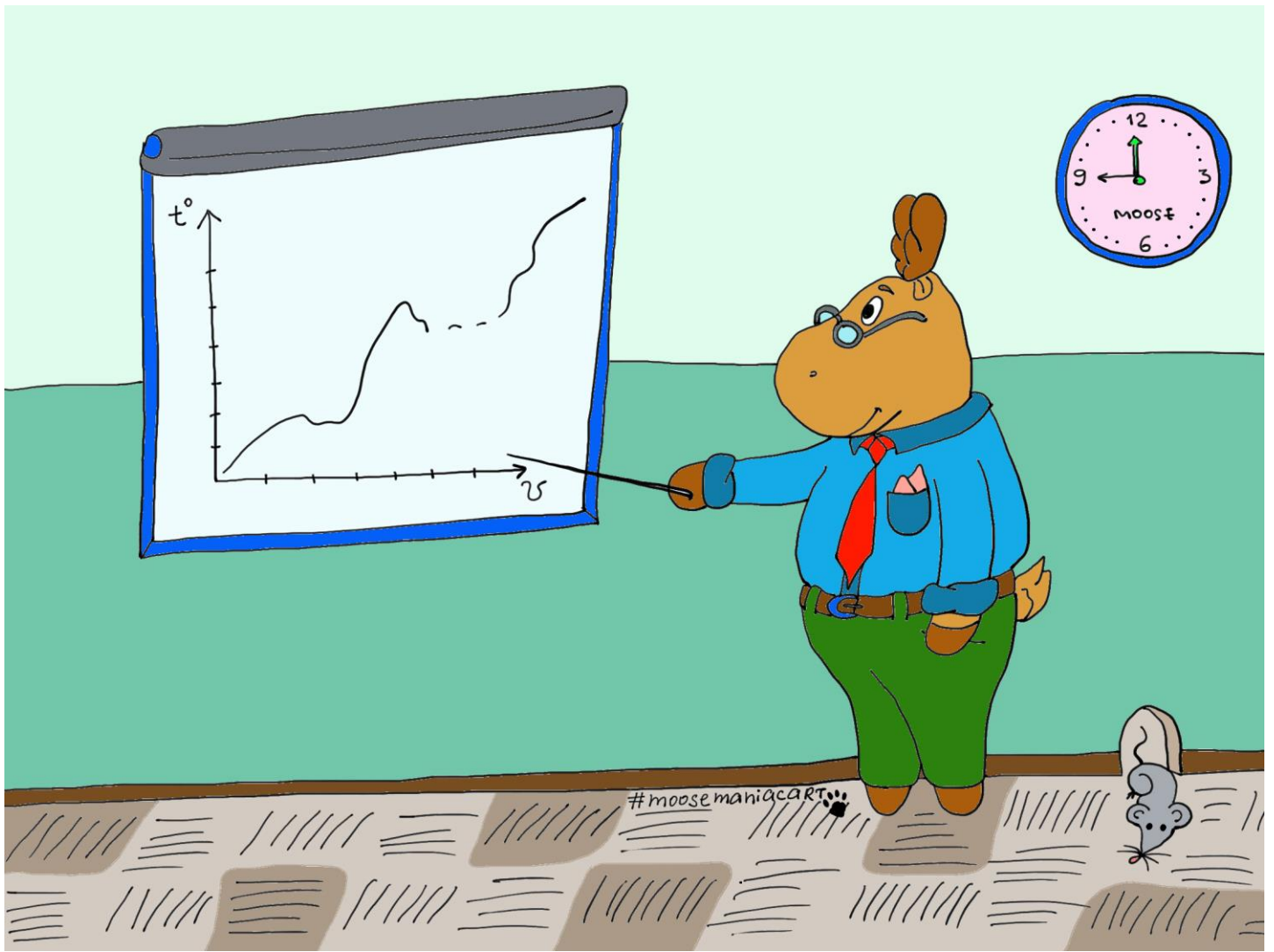
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AND A LITTLE LOOK TO PRAGUE – CHARLES BRIDGE



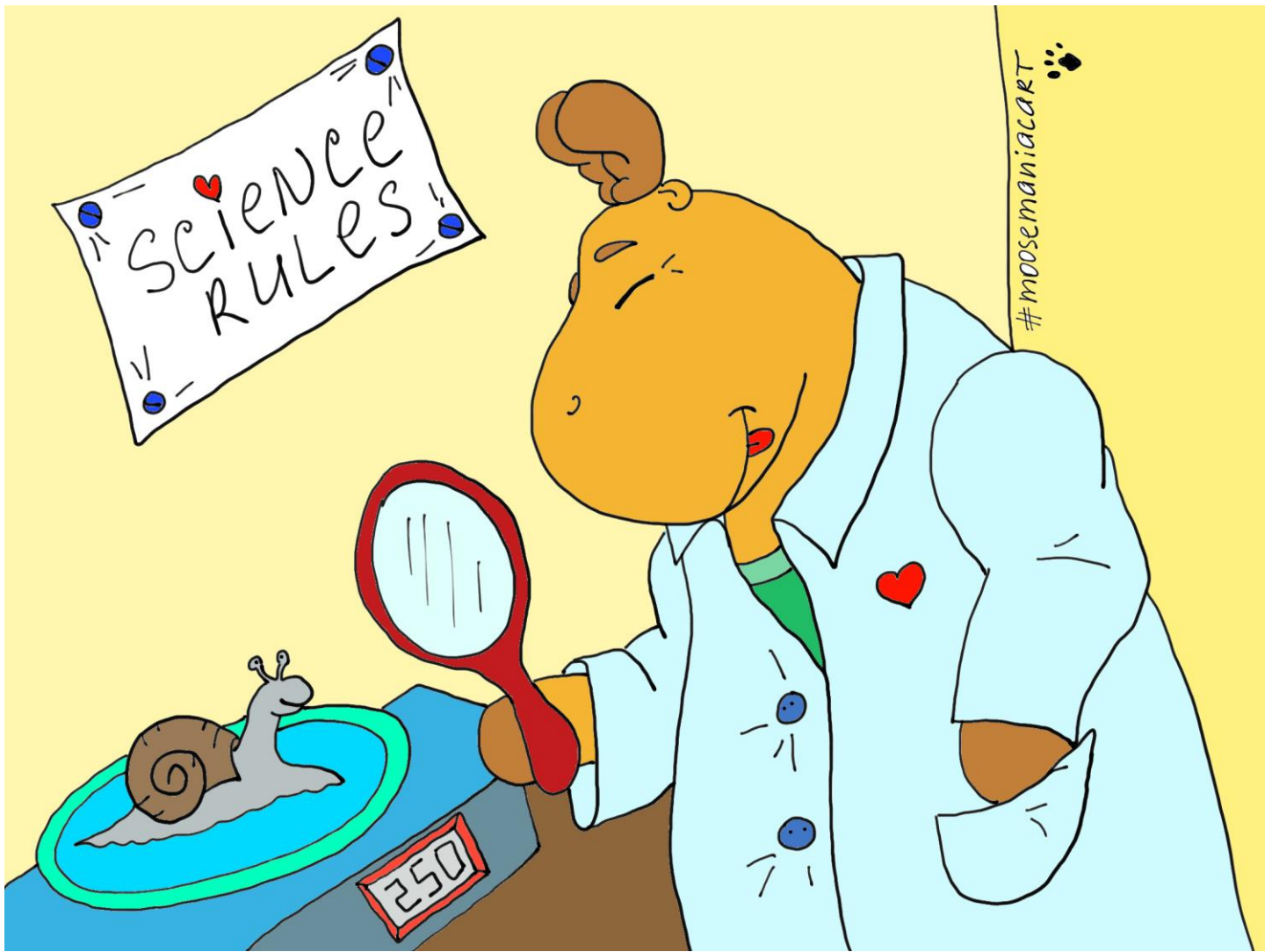
MOOSE'S EVOLUTION?



**IT IS TIME FOR
SOME LECTURES...**



**FINALLY TIME FOR
SOME
EXPERIMENTS...**



VETERINARY MEDICINE?



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LOOK INTO THE
FUTURE...**



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