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and



Association
«Higher Educational Institutions and
Enterprises of Food Industry
UkrUFoST»

In cooperation with:





Dear delegates, guests, ladies and gentlemen,

On behalf of the UkrUFoST and National University of Food Technologies, on behalf of the whole community of Ukrainian food scientists and technologists I am pleased to welcome our colleagues from abroad on the hospitable Ukrainian soil and our Ukrainian colleagues in our University.

The International Scientific Committee, Technical, Staff Committees did their best to organize this Congress to facilitate bridging between the scientific schools, to provide an ample opportunity for every participant to share his or her achievements, to learn what his or her colleagues are active at.

The focus of the Congress will be put on the modern problems and challenges which we all are facing. We, as food scientists, are deeply concerned first and above all with the people's well-being and health, we keep ourselves responsible for food safety, food security and sustainability. Since we, as educators, teach our students at every field adjacent to the food production, we understand more than anybody the problems of integral approach in food production and especially when developing new products. We also put a special emphasis on the problems of energy and resources saving, environmental protection related to the food manufacturing, every aspect of food chain operation including food refrigeration and storage.

Food product expertise lately became a focal point of our research. Last year we started training specialists in the Food Expertise and Standardization. Surely, all our efforts, as a Ukrainian community of food specialists, are aimed at the social well-being and safety. We also have an idea to share our achievements in the field of generic foods, national brands, preventive and special foods.

It is necessary to specifically point out that nowadays in a modern society all problems and challenges we face must be dealt with in an integrated manner; insofar we cannot solve one problem at an expense of another. I mean that an increase in productivity and implementation of new technological processes must not only satisfy the requirements of safety, security, highest hygienic requirements, but they must be energy efficient and environmentally friendly.

Thus, here at the Congress we have to proceed with the promotion of multidisciplinary integrated research approaches.

Formulating the schedule of our Congress we tried to allocate enough time for the sessions with oral presentations as well as to facilitate eye-to-eye contact between colleagues during the poster presentations. We also had a strong urge to show to the utmost the hospitality of our nation. Therefore, you will be given a good chance to participate in the cultural event.

The International Scientific Committee was delighted to receive

Dear colleagues,

You were given the Programmes of our Congress, in which you can find all information concerning plenary presentations, session orally presentations as well as the schedule of poster sessions.

Poster presentations have been organized in two sessions, the details of which you can find in your programmes. Each session will exhibit nearly 150 posters presentations. The delegates are invited to visit posters sessions and have eye-to-eye contact with the authors during coffee-breaks and special poster sessions. The members of the Organizing and International Scientific Committees did their best to develop an extended cultural programme, which will include "The Europe Day" Celebration; also you will be given a chance to participate in the boat trip on the Dnieper River.

Dear friends,

Let me greet you one more time, wish you every success, express my sincere hope that this Congress will turn out a proper place for establishing new contacts, mutually fruitful exchange of ideas.

I would like to express my deep appreciation to the members of the International Scientific Committee, Technical Secretariat for their hard work and relentless efforts invested into the organization of this Congress.

Kind regards,

Sergii Ivanov

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Oral Presentations

Oral Presentations

PLENNARY SESSION

UKRAINIAN FOOD SCIENCE IN GLOBAL CHALLENGES CONTEXT

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Years ago Ukraine was proud to be called “European breadbasket”. It is well known that our country possesses one of the most valuable nature’s gifts – vast areas of extremely fertile lands. We have mountains, we have steppes, we have abundant water resources coupled with the excellent climate. All these factors are the supportive ones to transfer Ukraine into the most powerful supplier of the highest quality food products.

We, Ukrainian food scientists and educators, are capable of discerning the challenges that Ukraine faces now in achieving the above mentioned objective. These challenges are extremely acute acquired in any branch of Food Industry, in training of food specialists, as well as in any adjacent field, including banking, processing, infrastructure, legal issues, taxation etc.

Ukrainian government has determined that one of the most promising directions of the country’s further development would be organic foods production and export. Not going into the technicalities, I would like to mention that in order to lay the fundamentals of country’s export infrastructure we have organized training specialists within a new specialty namely Quality, Standardization and Certification.

Another side of this problem would be training of specialists with the highest level of expertise in food safety, particularly, in the issues of hygienic food production and designing food machinery and processing in a close compliance with the EHEDG regulations and guidelines. We have introduced the EHEDG training course for MSc mechanical students which had been developed with the close cooperation with EHEDG.

In the nearest future, we expect to obtain a new generation of food specialists trained in the newest modern measuring techniques, procedures of food-testing, legal issues. We expect that our graduates will pioneer in organizing powerful flows of organic products to be exported from Ukraine.

The next direction we pay a great attention to is Ecology. It is well known that a majority of food enterprises might be source of big amount of wastes which either discharged into water or being dumped into the landfills, which is strictly prohibited in Europe. Therefore the departments of Ecological Monitoring and Audit and Ecology and Environmental Protection were organized at our University.

One more direction that we deal with at the University and within UkrUFoST is ethanol and bio fuels.

We used to have nearly 200 sugar mills and a number of ethanol factories which could be modernized and reoriented to produce bioethanol and motorfuels. A special department has been organized at the University to address thus problem.

We have also a lot of far reaching plans on hand, such as organization of wine gastronomy tourism. Our achievements in this direction will be presented to you within the framework of this Congress.

KEY WORDS: food science, food products, food safety, expertise, ecology

PEOPLE, PLANET, PROSPERITY, THE FOOD CHAIN AND DECENT REGULATIONS

Huub Lelieveld

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The world has over 7 billion people and they all want to be happy, having enough to eat, have families and prosper. For numerous reasons, when the numbers were much lower and this would have been possible, it did not happen. There has always been a big gap between the fortunate (relatively) few and those living in poverty. Now that it might become possible, it looks very much like the planet cannot sustain these numbers. The gap is still there, possibly even increasing and hunger is rising, not diminishing. To attend to the wealthy part of the world, the food chain has become absurd, often involving the transport of raw materials from the most distant places to processing plants and then pack the product to be transported back to the most distant places again. Food safety regulations among countries differ to the extent that healthy food is legally destroyed, depriving desperate populations their basic needs. Such regulations are not based on sound science but on media hypes or lobbying by powerful stakeholders. Members of the scientific community, including technologists, engineers and nutritionists, in cooperation with regulatory specialists are working together to remove the regulatory hurdles to food security.

KEY WORDS: food safety, food security, planet, prosperity, poverty, food chain, food safety regulations

EHEDG SCOPE OF WORK, GOALS, CERTIFICATION, MEMBERSHIP

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Until not so long ago, food safety was based mainly on drying, fermentation, heat treatments or addition of chemical preservatives. Food processing and packaging equipment was designed for a function, like mixing or pumping, not to avoid microbial growth or contamination with microbes, chemicals or foreign bodies. In the 1970's food companies started to object to the costs of the use of non-hygienic equipment, consumers objected to the use of chemicals and started to dislike overheated products and regulators started to pay attention to this. The result was that in the next decades the European Commission produced directives and the industry founded the European Hygienic Engineering and Design Group (EHEDG). While the EC publishes the requirements of hygiene for handling food, the EHEDG produces guideline on how to meet these requirements. To facilitate the choice of equipment that meets the requirements, EHEDG provides test facilities and certifies equipment to meet stringent hygienic requirements. EHEDG is a non-profit organisation that is supported by the food industry and their suppliers, manufacturers of equipment for food processing. Apart from guidelines, EHEDG also publishes Yearbooks and contributes to several books on hygiene in food manufacture.

KEY WORDS: food safety, food security, equipment, contamination, requirements of hygiene

NANOTECHNOLOGY FOR ENCAPSULATION AND RELEASE OF NATURAL BIOACTIVE COMPOUNDS

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Promotion of health and prevention of disease through improved nutrition demands the development of food-grade delivery systems, including active packaging and edible structures, to encapsulate, protect and deliver bioactive components. In particular, volatile substances with bioactive features are of great interest and their efficient encapsulation and controlled release represent a major challenge, considering their high fugacity and liability towards environmental factors. Conventionally, studies involve the dispersion of the active agent in carriers with limited surface areas (e.g. polymer films and layers), with considerable losses during production and storage. Furthermore, the release of active substances from these structures is mainly based on concentration-dependent passive diffusion.

Nanotechnology offers a wide range of innovative approaches in order to troubleshoot the drawbacks associated to encapsulation and controlled release of bioactive compounds. Because of their submicron-scale and the consequent large surface-to-mass ratios, nano-structured materials offer a number of additional advantages, such as being more responsive to changes in the surrounding atmosphere, which allows for a more specific triggered release, yet protecting the active molecules from environmental factors.

In this report, special attention will be addressed to recent developments on nanofibrous membranes, fabricated by means of electrospinning technique, as encapsulation and controlled release systems of volatile bioactive compounds. The production of these nano-structured materials is very simple, cheap and recently it has been demonstrated that they can overcome several of the problems related to volatiles encapsulation, therefore representing an interesting solution for example to the food-packaging industry.

KEY WORDS: nanotechnology, volatile bioactive compounds, controlled release

PHYSICAL PROPERTIES OF COFFEE BASED POWDERS DURING STORAGE

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Coffee based beverages are one of the most widely used food preparations nowadays. Instant cappuccino powder is commonly used in households all over the world because of its easy and quick preparation which is especially important in today's fast way of life. As for its composition, cappuccino powder is made from varying percentages of instant coffee, sugar, milk powder and different emulsifiers and anti-caking agents and represents a complex mixture of different food powders with different physical and chemical properties. For example, sugars are known for its dependence on storage temperature and humidity and milk powders for their dependence on surface fat composition. During the mixing process it is very important to choose powders with similar granulation so segregation does not occur during storage. During storage, quality of the powder mixture decreases with increasing levels of moisture or increasing storage temperatures, together with possible segregation of the particles. The objective of this work was to investigate the change in physical properties of cappuccino powder during 4 months of storage. Cappuccino powder was stored at ambient temperature of 20 °C and a relative humidity of 50 – 55%. During 4 months of storage changes in particle size, color, moisture, bulk density, cohesion and caking properties were monitored. Particle size was determined by laser diffraction method and a significant correlation was found between all parameters of particle size distribution. Color changes based on CIELab L, a, b scale were slight, but statistical analysis showed no significance of these changes. Bulk density increased with each month of storage, with a significant influence of moisture content on bulk density values. Cohesion properties did not show a significant change during 4 months of storage. However, a significant dependence was found between cake strength and cohesion index determined by TA.HD.Plus Powder Flow Analyser coupled with TA.HD.Plus Texture Analyser – an increase in cohesion index was followed by an increase in cake strength. Results obtained from this study show changes which occur during storage of cappuccino powder which influence the quality of the powder mixture and to which cappuccino manufacturers should pay close attention to, in order to retain the quality of their products at the highest possible level.

KEY WORDS: Coffee, particle size, particle flow

CHALLENGES IN HYGIENIC DESIGN ON DRY MATERIALS HANDLING (POWDERS)

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The EHEDG produced a number of documents with hygienic engineering guidelines. The first documents focused on the liquid processing area. However, in the food industry also large amounts of powders are being produced and handled. It became clear that besides the several published EHEDG design criteria, which were more and more commonly recognised and applied, additional guidelines were required on specific types of machinery that are used for dry products. These are e.g. dryers, pneumatic transport systems, powder discharge systems, rotary valves, silos, etc.

Therefore the EHEDG subgroup Dry Materials Handling produced several documents describing the general hygienic design criteria for the safe processing of dry particulate materials.

Points of concerns are e.g. seals, flexible connections, powder discharge valves, dust formation etc.

Also the specific characteristics of dry materials (e.g. particle size, flowability, hygroscopicity, moisture content, etc.) have consequences for the proposed design criteria. On the one hand dry materials have a higher potential of products build-up in pipe-lines and dead areas and therefore more strict criteria and procedures are required. On the other hand, if only dry procedures are applied (also dry cleaning!), 'less hygienic' design criteria might be applied as e.g. metal to metal contacts.

During this presentation some design criteria with regard to dry products will be discussed.

KEY WORDS: Dry Material Handling, specific characteristics of dry materials

DRY OR WET CLEANING - A FUNDAMENTAL CHOICE IN HYGIENIC ENGINEERING

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During this presentation some design criteria in the liquid area as well as details of design criteria with regard to dry products will be highlighted. In the dry materials handling area the type of cleaning procedure (wet or dry) is crucial for these final design criteria.

In order to establish the correct design and engineering conditions we should consider the typical hazards in all types of processes. The best tool for this is a dedicated HACCP study (Hazard analyses of Critical Control Points).

KEY WORDS: Dry Material Handling, Cleaning, HACCP

**BRIDGING EDUCATION, TRAINING AND RESEARCH FOR INDUSTRY AND THE WIDER
COMMUNITY: THE ISEKI_FOOD NETWORK APPROACH**

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ISEKI-Food was designed as a network of University and Research Institutions, Professional and Students Associations, and Industrial partners to foster collaboration. Several European and global academic networks projects received funding between 1998 and 2011 from the European Commission and currently the ISEKI_Food 4 (2011-2014, www.iseki-food4.eu) and Track_Fast (2009-2013, www.track-fast.eu) projects are ongoing. The main objectives of the network are to contribute to the Higher Education Area by internationalization, enhancement of food studies quality and fostering of innovative developments of the entire food sector by bridging education, research and industry. Important outcomes of this network (www.iseki-food.eu) are e.g. the EQAS_Food award for accredited Food Study Programmes; innovative teaching materials and methods including the ISEKI-Food book series published by Springer; a training platform including tailor made e-learning courses, web seminars and workshops facilitating Lifelong Learning; a platform to support international cooperation and mobility (PICAM_Food); several web databases collecting curricula, teaching materials and stakeholders aimed to maintain a worldwide network in the food supply chain and to promote synergies between research, education/teaching and industry. The International Journal of Food Studies (<http://www.iseki-food-ejournal.com>) is an international peer-reviewed open-access journal featuring scientific articles for education, research and industry. The ongoing ISEKI_Food 4 project will contribute to the modernization of the food studies by tools to promote the development of the personal skills in the future generation of food technologists, to implement the educational abilities of the university teaching staff and to implement the entrepreneurship and professional qualification of doctoral students in a lifelong learning perspective. A virtual tool for Continual Professional development (www.foodcareers.eu) of food professionals and a website (www.foodgalaxy.org) to attract talented students to undertake a career in the food sector have been developed within the Track_Fast project and the former will be maintained by the ISEKI Food Association. To ensure the sustainability of the network activities the ISEKI-Food Association (www.iseki-food.net) was founded in 2005 counting over 250 individual members as well as 200 individual members as well as 27 companies and institutions from all over the world. Today the ISEKI-Food Network is a successful Network that is managing to achieve a great impact through its internationalization and communication to a large audience of stakeholders of the food sector.

KEY WORDS: Higher Education, ISEKI-Food 4, ISEKI_Food network, Track_Fast project, ISEKI_Food Association

THE COMMON AGRICULTURAL POLICY TOWARDS GLOBAL CHALLENGES

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Globalization opens up new opportunities for international economic cooperation. Increases access to new markets, distribution network, capital and information technology. At the same time global competition forces companies to adapt to the new conditions, change the behavior and interactions of businesses, employees, and consumers. Triggers entrepreneurship, but also increases the risk. For many social and political groups, countries or entire regions of global competition is both a challenge and threat. Societies highlights the limits of policy choices determine the socio-economic objective laws of development, rather than political choice. The global market is not only becoming more and more fierce competition for getting the lowest cost, but also competition for creating the most attractive conditions for investors. Competition for quality location for capital values cause has many consequences. The simplest tool is to reduce taxes and giving businesses tax breaks and capitals. This in turn may limit the possibility of state funding important social tasks.

One of the major problems of the modern world economy development is the incorporation of agriculture into the market regulations and determine the shape of agricultural policy in terms of national and transnational levels. Extending the impact of WTO accelerates changes in the mechanisms and policy for agricultural commodity producers. The operation of international trade liberalization through the elimination or reduction of tariff and non-tariff barriers. On the other hand, highly developed countries compensate farmers for their "losses" incurred as a result of liberalization, using the instruments of support and protection on the market. In OECD countries, the total value of agricultural subsidies approaching \$ 250 billion a year.

Increasing international competition forces European agriculture to compete principally on the quality, or the dissemination of techniques for controlling the food production process in accordance with established quality standards. This requires a comprehensive reorganization of the agricultural sector.

KEY WORDS: Higher Education, ISEKI-Food 4, ISEKI_Food network, Track_Fast project, ISEKI_Food Association

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| Oral Presentations |
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| Section FOOD EXPERTISE AND SAFETY |
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| LEVELS OF CHLORINATED PARAFFINS IN HUMAN MILK FROM BAVARIA, GERMANY. |
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| <u>Mehmet Coelhan</u> ¹ , Bettina Hilger ² , Hermann Fromme ² , Wolfgang Völkel ² |
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Chlorinated paraffins (CPs), also known as polychlorinated n-alkanes (PCA), are complex mixtures consisting of thousands of isomers which are also not possible to be completely separated by HR-GC. Over 200 commercial products with different compositions are available. For these reasons, the analysis of CPs is difficult and only limited information on CPs in environmental samples are available.

With reference to their chain lengths, CPs are classified as short (C10-C13), middle (C14-C17) and long (C18-C30) chain chlorinated paraffins (SCCPs/MCCPs/LCCPs). Corresponding to their intended use, the chlorine content varies between 30% and 70%. The application range of CPs is wide: e.g. as fire retardants, plasticizers or additives in paints, sealants or rubber and in a number of other industrial applications. Annual global production of CPs is assumingly more than 600 kilo tonnes, with a majority having MCCPs. Since 2004, SCCPs may not be used (in concentrations higher than >1 %) in metal-working and for liquoring of leather in the European Union.

The acute toxicity of CPs is low, but based on their physicochemical properties CPs exhibit, dependent on chain length and chlorine contents, a more or less great bioaccumulation potential. Currently it is reviewed if SCCPs are persistent organic pollutants according to the Stockholm convention.

Middle chain chlorinated paraffins were present in 58% of examined samples while SCCPs were detected in 43% of samples. Highest concentrations were 903 ng/g_lipid and 60 ng/g_lipid for MCCPs and SCCPs, respectively.

KEY WORDS: Chlorinated paraffins, human milk

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| A IRMS/SIRA STABLE ISOTOPE TECHNIQUE FOR IDENTIFICATION AND QUALITY CONTROL OF FOODSTUFFS IN PRACTICAL CASE STUDIES |
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| <u>Alexander Kolesnov</u> , Irina Filatova, Dina Zadorozhnyaya, Olga Maloshitskaya, Alexandra Kolesnova |
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| <i>Moscow National University of Food Production (MGUPP.), Research Laboratory of Food Quality & Technology (PNIL), Volocolamskoe sh. 11, 125080 Moscow, Russian Federation http://www.mgupp.ru, http://www.biolab.ru, irms@biolab.ru, zakon@biolab.ru, kt4@mail.ru</i> |
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Nowadays the modern state of international and national food economies is characterized by different trends. Positive trends include expansion of markets, trade and assortments; reduction of administrative barriers etc. Negative trends are unfair competition; backlog of legislative support from the current level of anthropogenic risks; lack of development of independent monitoring etc. A consequence of the negative trends in the field of quality is the presence of adulterations on international and national markets. This can be illustrated with hot topics publications in world and national press of 2012-2013 (eg, in the UK, Germany, France, USA and other countries). The cases with adulterated foodstuffs and/or misleading labeling are undermining the public confidence, fair competition and, consequently, the quality of foodstuffs. To minimize the adverse effects of mentioned negative trends the practical measures are required. These measures involve the regulatory and supervisory control, the use of food science advances, including modern research methodologies of quality of foodstuffs.

The methodology of stable isotopes of light elements is one of the fundamental research techniques for study of plant and animal products. The first in Russia unique research complex for fundamental and applied studies of stable isotopes in foods is set up in the Research Laboratory of Food Quality & Technology (PNIL) of the Moscow State University of Food Production (MGUPP). Features and capabilities of this complex comply with all the requirements and challenges faced by the food science in the XXI century, and are fully consistent with needs and risks of modern food markets. The poster report shows the possibilities and limits of the stable isotope methodology in foodstuffs studies (eg, sugar, sparkling and natural wines, milk, juices, mineral water, coffee). The results of research enable the development of standardized methods for the identification and evaluation of products quality on international and national levels.

KEY WORDS: stable isotopes, carbon ¹³C/¹²C, oxygen ¹⁸O/¹⁶O, hydrogen D/H

EXPRESS METHOD OF FOOD PRODUCTS ANALYSIS USING ELECTRONIC NOSE

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Due to the distribution of low quality products, adulteration, counterfeit on the Ukrainian market, the widening of export-import supplies, it is too important to develop criteria and methods for the identification domestic and exported food products, detection of adulteration, techniques and methods assessing quality and early spoilage screening of food products using modern express methods of analysis.

Such method is an electronic nose system based on chemical sensors, for example, piezoelectric quartz microweighing, combined with complex computer algorithms registration, processing and decision making («artificial intelligence »).

Odor is one of the most significant parameters among the sensory properties of foods. The representative flavor of volatile compounds, so-called fingerprint, may provide knowledge about safety and particular characteristic of food, acting sometimes as an indicator of process mistake as well. Off-flavors may include substances originating from the metabolism of spoilage microorganisms, bacteria and fungi; which may naturally or accidentally contaminate the products during their production.

Electronic noses (EN) are instruments based on an array of semi low selective sensors that are selected on the chemical affinity to individual components of the analyzed gas mix and vapors and pattern recognition methods. ENs have been applied in various food contexts such as process monitoring, freshness evaluation, shelf-life investigation, authenticity determination, and product traceability.

The object of our research is express methods development of identification, estimation of quality and early spoilage screening of dairy and meat products using multisensory electronic nose system based on piezosensors.

The absolute advantages of electronic sensory analyzers are their versatility, portability, ability to automate measurements and interpretation of signals, reproducibility of results.

KEY WORDS: analysis, electronic nose, quality, safety, identification.

APPLICATION OF GAMMA AND ELECTRON BEAM IRRADIATION FOR CHESTNUTS CONSERVATION

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The Trás-os-Montes region of Portugal is responsible for 85% of the nation's chestnut production, representing an income of more than 20 M€. Since the EU legislation banned methyl bromide from being used as a fumigant, from March 2010, that alternative treatments have been pursued to overcome the limitations of conventional ones. Gamma and electron beam irradiation have been used as conservation alternatives in various food stuffs including chestnuts, with satisfactory results. Our research group has successfully tested gamma and electron beam irradiations (doses of 0; 0,5; 1; 3; and 6 kGy) and different storage times (0, 30 and 60 days) on chestnuts in the past 2 years. We have assessed the effects on antioxidant and nutritional parameters as well as on organic acids and triacylglycerol profiles. Regarding the nutritional impact of both irradiations we concluded that storage time plays a more significant role on nutritional degradation when compared to the irradiation treatment. Total phenolics were preserved in irradiated samples especially for 1 and 3 kGy doses. The effect of electron beam radiation on organic acids was very slight and, once again, storage time had higher influence on the amounts of specific compounds. Nevertheless, the highest doses of electron beam radiation caused significant differences on triacylglycerol profile when compared with lower doses and non-irradiated samples. Overall, irradiation might be a suitable technique for post-harvest chestnuts preservation.

Acknowledgements

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KEY WORDS: chestnuts, conservation, food irradiation, gamma, electron beam

APPLICATION OF THE ELECTROMAGNETIC ION-OZONE NANOTECHNOLOGY IN THE PRODUCTION OF CEREALS

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Today more and more attention is given to the production of an organic food, and the use of the electro nanotechnology in the production of cereals is an irreversible process. Electromagnetic ion-ozone ultrasonic nanotechnology processing of grain products occur continuously, usually intense, with high speed, which lend them to the highest fine control and automation. The direct and without intermediate conversions impact of electromagnetic ion-ozone mixture with the application of ultrasonic waves on materials or processes of biological objects make in one or little stages, as well as let them to avoid the use of a bulky equipment and, therefore, does not require large capital investments for their development and is time efficient.

As a result of the electromagnetic flux and ultrasonic vibrations at ion-ozone grain processing an electromagnetic field of cavitations is created, which acting on the wheat, and promotes an effective restoration of the original structure and the quality of the grain.

KEY WORDS: Electro nanotechnology, electromagnetic field, ion-ozone mixture, ultrasonic waves.

UTILIZATION OF FOOD INDUSTRY WASTES WITH PRODUCTION OF PRACTICAL VALUABLE MICROBIAL PRODUCTS

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Searching for the ways to process waste has become very topical today. Biotechnology is one of the most environmentally attractive methods, which has the ability to solve the problem of waste utilization and to produce the valuable microbial products, for example biosurfactants and exopolysaccharides.

We concluded that fried sunflower oil and oil-containing wastes (soapstock) can be used for biosurfactant production by *Rhodococcus erythropolis* IMV Ac-5017, *Acinetobacter calcoaceticus* IMV B-7241, *Nocardia vaccinii* IMV B-7405 and exopolysaccharide ethapolan synthesis by *Acinetobacter* sp. IMV B-7005.

The conditional concentration of surfactants on oil containing substrates exceeded those on n-hexadecane and ethanol by 2–3 folds. The highest rates of surfactants synthesis were observed on fried sunflower oil with using inoculum grown on carbohydrate substrates (glucose, molasses).

The possibility of intensification by 2–4 folds of surfactants synthesis by *R. erythropolis* IMV Ac-5017 and *N. vaccinii* IMV B-7405 on fried sunflower oil (2 %) with addition of glucose (0.1 %) was shown. The simultaneous addition of fumarate and glucose (0.05 %) into the *Acinetobacter* sp. IMV B-7005 cultivating medium was accompanied by an increase of exopolysaccharide quantity by 2–2.5 fold compared to the cultivation without precursors.

The ability of surfactants preparations to reduced (by 15–65 %) adhesion of *E. coli* IEM-1, *B. subtilis* B-2 and *Candida albicans* D-6 on different materials was shown. Biosurfactant preparations of IMV B-7241 and IMV Ac-5017 strains were effective against *Escherichia coli* IEM-1 and vegetative and spore cells of *Bacillus subtilis* B-2. We have shown that cell survival of pathogenic bacteria of genera *Pseudomonas* and *Xanthomonas* was 0–70 % after the treatment with surfactants preparations for 2 h. These results suggest a promising use of microbial surfactants for the development of environmentally friendly products to control the number of pathogenic bacteria.

KEY WORDS: biosurfactants, microbial exopolysaccharides, food industry wastes, fried oil, biosynthesis

FOOD MARKET: MARKING, IDENTIFICATION, RISKS OF CONSUMPTION

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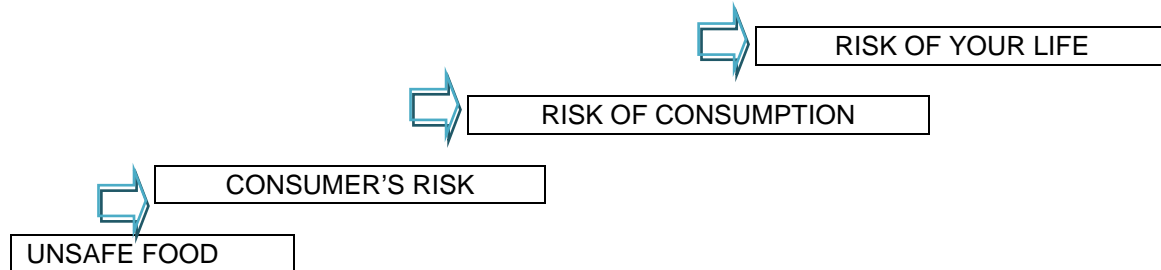
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According to the Law of Ukraine all the expired foodstuff must be utilized. But who controls it? The considerable part of expired products is being sold or recycled.

Unfortunately, there is an expired food product market these days in Ukraine.

The lack of appropriate identification and presence of incorrect marking lead to the risk of unsafe product consumption that can be termed as consumer's risk. Consumer's risk develops into a more serious problem – risk of consumption, after that into "obtaining" of health disorder and then into "risk of your life". Consequences of unsafe food can be expressed in a scheme:



Picture. Risk factors caused by the lack of appropriate identification or presence of incorrect marking

A person in the range of health (health – food – disease) is the object of applied efforts of the whole range of sciences – from ecology and commodity research to medicine and teleology. Consumer's awareness, self-control and control of competent authorities as to food consumption of high quality and safety are the bedrock of the human life cycle. Marking is one of the most important sources of information about product market for a consumer. Before choosing a good, consumer studies the label thoroughly and by identifying the marking on labels and packing one can find out information about the product itself. The consumer's right as to information about production is appointed at the legislative level and, certainly, infracting of legislation about information provides responsibility, although the harm to person's health in case of incorrect marking can't be compensated by any punishment of the guilty ones. Food products marking in Ukraine is carried out according to the requirement of the Law of Ukraine "On the protection of consumers' rights" and the Law of Ukraine "On quality and safety of food products" and other normative documents. Although, modern economic ties require harmonization of the national normative base as to products marking with the national standards, regulations and rules in order to except ambiguity in terminology in this sphere and interpretation of some food products identification positions, in particular, informative identification.

On the ground of the mentioned above, the problem of food products marking, their identification is the priority of the state, and control observing the rules of information about food products achieves international significance as well as it becomes a part of foreign economic relations of the country.

KEY WORDS: marking, identification, risks of consumption

THE BENZ[A]PYRENE MONITORING IN SUNFLOWER SEEDS AS THE WAY TO CANCEROGENIC SAFETY OF FOOD OILS AND OIL AND FAT CONTAINING PRODUCTS

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It is given a lot of attention in EU countries to oil and fat containing products safety control including benz[a]pyrene in vegetable oils. The EU Commission instruction 208/2005/EU strictly regulates the content of PAHs in foods. In particular, the content of benz[a]pyrene in fat must not exceed 0,002 mg/kg. To solve the problem of cancerogenic safety it is essential to provide the control the amount of PAHs in this group of foods, because the compounds mentioned have the cancerogenic effect.

The aim of our investigation is to use modern analytical methods in polycyclic aromatic hydrocarbons (PAHs), especially benz[a]pyrene in sunflower seeds in 2011-2012 marketing year. During 2011-2012 marketing year more than 1000 samples of sunflower seeds were investigated. As a result of investigation, it was discovered that the content of benz[a]pyrene in sunflower seeds was from 0,9 to 15,0 mg/kg, and in some cases it was up to 100 mg/kg.

The obtained statistic data for sunflower seeds correlate to the results of unrefined oils investigations where the part of samples containing benz[a]pyrene exceeding the accepted level has been 51%. The sunflower seeds monitoring analysis for 2011-2012 marketing year monthly from September to April indicates that the technological process – drying and predrying has made a weighty contribution to benz[a]pyrene content increase. It is technologically possible to dry seeds at enterprises under different temperatures to reduce humidity in sunflower seeds. Depending on humidity in sunflower seeds their drying conditions and process duration are changed and this impacts the polycyclic aromatic hydrocarbons adsorption. Using active aeration in the process of sunflower seeds drying reduces the benz[a]pyrene level by 29%.

To prove the mentioned data we have researched the weedage seeds, petrol, flooring and furr. The results prove that cancerogenic PAHs get into sunflower seeds, vegetable oil and foods through asphalt flooring, using low quality petrol and growing sunflower along the roads.

The prospects of further investigations are following: benz[a]pyrene monitoring in oilseeds, vegetable oils, oil and fat containing products and foods safety control.

KEY WORDS: sunflower seeds, oil, benz(a)pyrene, monitoring

LEGISLATION ON FOOD ADDITIVES IN THE EU AND UKRAINE

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Food additives are used in the food industry to improve the technological properties of food products. In the EU the Joint FAO/WHO Expert Committee on Food Additives (JECFA) evaluates the safety of food additives. In Ukraine such function belongs to Department of Sanitary Inspection of the Ministry of Health of Ukraine.

The "Codex General Standard for Food Additives" (GSFA, Codex STAN 192-1995) sets forth the conditions under which permitted food additives may be used in all foods.

In the EU food additives should be approved and used only if they fulfill the criteria of the EU. Food additives must be safe when used, there must be a technological need for their use, and their use must not mislead the consumer and must be of benefit to the consumer. The European Parliament has the right to forbid the additive that is used if there are the results of its harmfulness.

Regulatory framework on food additives in Ukraine is presented by Resolution of the Cabinet of Ministers of Ukraine № 12 "On approval of the list of food additives authorized for use in food" from 4 January, 1999 and Order of the Ministry of Health of Ukraine № 222 from 23 July, 1996 "On approval of sanitary regulations on food additives" that are general rules, but they do not specify each particular additive.

In 2007 National Codex Alimentarius Commission of Ukraine has considered the project "Sanitary norms and regulations on food additives, enzymes, supplementary materials for processing and some flavourings", but it was not registered in the Ministry of Justice of Ukraine. The fate of the document is unknown.

KEY WORDS: Food additives, legislation on food additives, food safety

THE USE OF INTERFACE SPECTROPHOTOMETRIC IN QUALITY CONTROL AND EXAMINATION OF FOODSTUFFS AND RAW MATERIALS

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It is known that the quality control and environmental safety of food products involves, among other factors, determination of the content of the following metal ions: Cu (II), Zn (II), Pb (II), Cd (II), Hg (II), Fe (III) and others.

In Ukraine, the content of these metals is determined using standard methods of photometric, polarographic and atomic absorption analysis. The main disadvantages of these methods are complicated sample preparation and the necessity of expensive equipment, which requires maintenance in permanent laboratories and by highly qualified personnel.

We used the method of solid-phase spectrophotometry, which allows combining sorption concentration and subsequent photometric determination in the solid phase, for the determination of microelement composition of different foodstuffs.

Copper (II) was determined as a complex compound with a reagent SPADNS (2-(4-sulphofenilazo)-1,8-dioxynaftalin-3,6-disulphoacid) which was immobilized on anion exchanger AB-17□8. Zn (II) is low-toxic. However control of Zn (II) is conditioned by its high biological value. In this study, Zn (II) was separated from the Cu (II), Pb (II), Hg (II) and Fe (III) using xylenol orange, immobilized on AB-17□8, then Zn (II) was separated from the Cd (II) by acid chromdarkblue, immobilized on anion exchanger AB-17□8. Zn (II) was determined in the liquid phase in the form of photometric complex compound with xylenol orange. The high toxicity of the ions Cd (II) and its compounds, necessitates the development of highly sensitive, selective and fast methods of their determination. Cd (II) was determined by eriochromblack T, immobilized on anion exchanger. Pb (II) is one of the most toxic metals. Determination was performed using pyrikatechin violet reagent, immobilized on anion exchanger AB-17□8. Hg (II) is also one of the most toxic metals. Mercury (II) was determined by chromazurol S, immobilized on anion exchanger AB-17□8. The content of Fe (III) was determined using arsenazo III, immobilized on anion exchanger. All definitions were carried out after ultrasonic sample preparation. Graphical version of the addition method was used for the determination of metal ions content. Validity check of the data was performed by the "made-found". The convergence of the results obtained by the new methods of interface spectrophotometric - definition and standard methods of polarographic and atomic-absorption determination confirm their accuracy.

KEY WORDS: immobilized dyes, ionites, hybrid spectrophotometric methods of analysis

USING OF ACTIVATED LIQUIDS FOR EMULSIFIED MEAT FOODSTUFFS PRODUCTION

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In the meat industry water-in-oil emulsion is widely used in the technology of emulsified meat products. Using of protein-lipid emulsions in the technology of emulsified meat products can be used in sausage production of beef fat, collagen, pork skin. Furthermore, the use of such emulsions can add the animals' fat in a well digestible form. In addition, the issue of the sausages produced with such type of emulsion can be increased by 4-7%. As a rule, the quality of the emulsified foodstuffs and other consumer properties of them are connected with the quality of emulsions and their stability.

During researches the influence of different methods of water activation on the main functional and technological properties of emulsified meat products are studied. For stabilization of the emulsion the collagen protein "Kat-Gel 95" was used. For emulsion production were used the different types of water: drinking water (DW); catholyte ECA-water with pH=11(CW); cavitation-disintegrated water (CDW); and the water that has passed activation by electrochemical and cavitation treatment (CW+CD). In addition, it was assessed the different ways of emulsion production: the traditional way - on homogeniser (cutter) and cavitation treatment in a disintegrator «Hielscher» (CD-processing).

The results of comparative analysis of the traditional and CD-processing methods of emulsion production allow us to recommend the use of cavitation disintegration for preparing water-lipid emulsions in the technology of emulsified meat products. The best results for the preparation of high-quality emulsions obtained for CW+CD water and the production of the emulsion by cavitation disintegration.

Using of activated liquids instead of water in emulsified meat products production allows excluding the water-holding chemical additives (for example, phosphate), improving the technological characteristics (issue, taste and aroma characteristics, etc.) and producing the healthy meat products with high consumer properties.

KEY WORDS: food emulsion, activated liquids, cavitaional disintegration, safe methods of treatment

PROSPECTS FOR INCREASING OF FOOD AND BIOLOGICAL VALUE OF FOOD PRODUCTS WITH CHICKPEA

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The protein products production is one of the most stable developing sector of the food industry in the world. Animal protein deficit result in using other sources, including vegetable protein for satisfaction of population needs.

The perspective safe non-genetic-modified high-protein bean culture is Chickpea for Saratov region. Chickpea is an undemanding plant which can be easily cultivated and its cost is cheaper than that of soy. Table shows the chemical composition of chickpea grades "Krasnokutskiy 28" and "Priva -1", which are used in the research.

Table

Physicochemical properties of chickpea

| Index name, unit. | Grade «Krasnokutsky 28» | «Grade Priva-1» |
|---|-------------------------|-----------------|
| Mass fraction of moisture, % | 9,0 | 8,5 |
| Mass fraction of protein, %, in terms of dry matter | 24,0 | 20,7 |
| Mass fraction of fat, % | 3, | 4,3 |
| Mass fraction of ashes, % | 3,3 | 3,2 |
| Mass fraction of starch, %, in terms of dry matter | 46,0 | 41,8 |

The chickpea application allows to increase of final products value thanks to essential amino-acids, vitamins, minerals, dietary fiber, which chickpea is containing. The chickpea flour applications in mealy and sugar confectionery (cookies lingering, crackers, carrot cream, soft oriental sweets such as candies, fondant candy) has been studied for increasing of food and biological value of the final products, to reduce main raw materials expenditures, to extend food assortment. At the same time the high moisture-retaining properties of chickpea promote to increase the shelf life of finished products.

The results of chickpea protein factional confirmed that the by-products of chickpea can be used in technology of low-gluten food products. The recipes of gluten-free sauces based on tomato paste and chickpeas flour have been developed.

As part of the study of deep processing of chickpea beans chickpea protein isolate has been picked out. The prospect of a by-product production (the starch) have been shown.

The physico-chemical and functional and technological properties of the protein isolates chickpeas have been investigated. The properties testified the promise of chickpeas protein isolate using as an emulsifier, water- and fat- retaining additions. The problems of boiled sausages, mayonnaise and mayonnaise sauce, meat-vegetable canned food producing of enriched with chickpeas protein isolate has been investigated. Technical documentation for a number of derived foods has been developed and approved.

KEY WORDS: chickpea, functional food products.

ORGANIC PRODUCTS CERTIFICATION IN UKRAINE

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Organic may be called the products which have passed the certification procedure in the prescribed manner, and these products meet approved standards and are properly marked. The label of an organic product should have the logo and information about the organisation, which provides certification. Companies may mark their products as organic only if they have been certified by all stages of production: from water, air and earth and to finished products. Assessment is made according to national and international standards that take into account not only compliance with the standard of the product by itself, but also all stages of its production, in terms of impact on the environment.

Today certification of organic production in Ukraine is conducted by 12 European certification organizations. Certification is performed according to the standards of the EU companies, the USA and others. Such companies as from Netherlands, Switzerland, Italy, Germany, Hungary, Poland and others have been working with Ukrainian products for a long time. Companies have an opportunity to choose the certifying institution.

Today in Ukraine there are no proper developed national standards because organic products are certified according to international standards such as:

- IFOAM;
- Council Regulation EC 834/2007 and Council Regulation 2092/91 on organic production and labeling of appropriate agricultural and food products;
- "BIOLan";
- National Organic Program;
- Japanese Agricultural Standards;
- Private Swiss Standards Association "Bio Svis";
- Demeter - standards of biodynamic agriculture;
- Domestic standards, regulations, programs and policies.

There is only one Ukrainian campaign "Organic Standard," that provides similar services and has international accreditation. It is accredited according to standards of ISO / IEC GUIDE 65:1996 and certifies depending on market orientation (Ukrainian, international, market of the USA, Switzerland and Japan) according standards of Biolan, Council Regulation (EC) 834/2007, 889/2008 and NOP, JAS, Bio Suisse.

KEY WORDS: organic products, certification, standards.

ESSENTIAL CONTENT OF FOOD SAFETY

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For a long period of time Ukraine has been regenerating its economic system, and thereby efficiency of its economic potential is reduced.

The problem of food safety in Ukraine is a sphere of social life that has not lost its actuality for many years and at any stage of its development. The most important international document on food safety is the Universal Declaration on the Eradication of Hunger and Malnutrition that was adopted by the UN General Assembly in December 17, 1974. It, says: "Every man, woman and child has the inalienable right to be free from hunger and malnutrition to full development and to save their physical and mental abilities ...".

In modern economic literature, there is no single approach to the definition of food safety. It subjected to complexity and multi aspect nature of this concept. In Ukraine, the definition of food security is in such documents as the Law of Ukraine "On State Support of Agriculture of Ukraine", "State Program for Rural Development until 2015", "The concept of economic security of Ukraine." The most complete definition is in the Law of Ukraine "On food safety." According to it, food safety is a social, economic and environmental situation in which all social and demographic groups are stably provided with safe and qualitative food, in the necessary quantity and assortment, which is sufficient for physical and social development of the individual, ensuring health of Ukrainian population.

Not only food safety, but also national safety in general depend from a reliable food supply of the country. In the production and consumption of food stuffs Ukraine has as positive as negative phenomena, which effect directly food safety. Such different trends directly affect welfare and living standards of the population of the country.

KEY WORDS: safety, food, food safety.

AUTOMATIC COLOUR CONTROL OF WHITE SUGAR AND SPECIAL TYPES OF CRYSTAL SUGAR

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The article deals with the advantages of using the automatic colour control of crystal sugar compared with the standard method. Standard method in accordance with State Standard includes preparation of solution, heating, filtration, determining dry matters concentration using the special level of pH water etc. All this needs much time and is labor-consuming process.

So the most preferable method of crystal sugar colour control is automatic method.

The only limitation on using imported automatic analyzers is their high price for sugar-performing enterprises in Ukraine, Russia etc.

So the express analyzer of special type (CU TEP-S) was designed and performed in Joint Stock Company «DKTB TEP» jointly with Technology of Sugar and Water Preparation Chair of National University of Food Technologies (NUFT) and Ukrainian Scientific Institute of Sugar Industry in Kiev.

Automatic analyzer CU TEP-S has following technical characteristics:

| | |
|---------------|------------------------|
| Basic scale | 0-250 ICUMSA un. |
| | 0-1.92 Stammer st. un. |
| Special scale | 200-4000 ICUMSA un. |

Repeatability,% ≤ 10 , $p = 0.95$

Analyzer CU TEP-S is performed with the up-to-date electronic components and includes the emitters of special wavelength ($\lambda_1 \dots \lambda_n$), condensing optical system, the cell for the sample of sugar, focusing optics, photodetector, data handling unit and display.

The automatic analyzer CU TEP-S has software support.

To less inaccuracy of measuring sugar colour on automatic analyzer for light and dark sugar was the second scale performed in the analyzer CU TEP-SM especially for dark sugar with colour meaning more than 104 ICUMSA un.(0.8 Stammer st.un.)

The new modification of automatic analyzer for controlling special types of sugars – yellow and brown sugars with colour meanings more than 250 ICUMSA un.(1.92 Stammer st.un.) was also performed as a result of joint work of Stock Company «DKTB TEP» and NUFT in Kiev, Ukraine.

KEY WORDS: Colour, analyzer, emission, photodetector, reflected

DISSEMINATION OF SCIENCE-BASED INFORMATION AND KNOWLEDGE OF FOOD SAFETY VIA A MODERN INFORMATION TECHNOLOGIES CONSISTENT WITH EXISTING RESOURCES AND NEEDS

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Trade globalization, liberalization of markets, modern food technologies, food safety requirements, economic development, changing social demands drive a continuous evolution of food systems around the globe. Dissemination of information and knowledge is the core responsibility of any organization tasked with generating and sharing knowledge products, especially of new kinds of unique (and valuable) content that are as usable and accessible as possible. In this context, the food safety knowledge and information dissemination stands in the direction of a better quality of life for everyone, at present and for generations to come, in terms of economic, environmental and social issues. The basis for this is the modern information and communication technologies used to implement effective access to knowledge and information. The purpose of given food safety information support system is to devise an outreach mechanism for the end-user through the establishment of an electronic data system, including its structure of information and knowledge, access and delivery methods, for food safety related issues of interest of all referenced actors. The developed information system is a multi-user, interactive, user-friendly Web-based information system. The information include various aspects such as a) knowledge and information on the production and processing industry; and b) the food safety aspects including standards, laws, hazards, course materials available, etc. The main actors in the food safety system were identified as: food producers and processors, consumers, regulatory bodies, and educational organizations. The information needs of these actors categorized as: commercial, educational, technical and general. Developed system give possibility manage such information objects: news, market, companies, regulatory bodies, educational opportunities, grants, standards, laws, alerts, tips, hazards, FAQs etc. In this connection, information system support: cognitive knowledge (I 'know that'), applied trade (I 'know how'), system understanding (I 'know why'), the personal motivation to work (I 'want to know why').

KEY WORDS: Knowledge dissemination, food safety, information system

REGULARY FREMAWORK ON FLAVOURINGS IN UKRAINE: CURRENT STATE AND PERSPECTIVES

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Analysis of Ukraine's legislation in the sphere of production, storage, transportation, sale and utilization of flavourings revealed the following shortcomings:

- registration all flavourings without exceptions;
- necessity of flavouring inclusion level establishment to foodstuff;
- lack of an approved flavouring registration procedure.

Project of "Sanitary rules and regulations on the use of flavourings" was developed in order to harmonize the legislation of Ukraine with WTO demands and EU legislation. EU Regulation 1334/2008 on flavourings and certain food ingredients with flavouring properties and the international standard of Codex Alimentarius Commission "Guidelines on the use of flavorings », CAC / GL 66-2008 were taken as a basis. The project was considered and approved by the National Codex Alimentarius Commission of Ukraine, but the Ministry of Justice of Ukraine didn't register it and the fate of the document is unknown.

In our opinion, the primary step which Ukraine should make in the sphere of flavouring regulation is to register the Project of "Sanitary rules and regulations on the use of flavourings" and approve the roster of flavourings safe to use. The experience of the EU members, the USA and Russian Federation in the field of flavouring safety regulation shows that approval of complete list of flavourings that are not subject to state registration, based on the existing EU Register of flavourings and evaluation results of flavouring safety in the food for the consumer health, made by Joint FAO / WHO Expert Committee on Food Additives (JECFA), is appropriate and strategically advantageous step for Ukraine as an economic and social points of view.

The following information should be included to such register of flavourings:

- the serial number and date of flavouring registration;
- trade name in Ukrainian;
- in the presence: index CAS, FEMA GRAS, chemical name in Ukrainian;
- type according to the classification defined by law.

Flavouring register should be promulgated.

Implementation of the mentioned above conditions will create favorable circumstances for the production and sale of flavourings, provide consumers with qualitative and safe flavored products and prevent misunderstandings that may arise with the interpretation of the information specified in the labeling

KEY WORDS: Flavourings, legislation on flavourings, flavouring register, flavouring safety.

METHODS OF DETECTION OF OLIVE OIL ADULTERATION

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The special value of olive oil is that it contains 80% monounsaturated fatty acids, and also other biologically active substances: polyunsaturated fatty acids, vitamin E, carotenoids, sterols. Olive oil - a valuable food product and is therefore subject to tampering. The most common types of olive oil adulteration is to replace the high-quality oil low-quality oil and a full or partial replacement with cheaper oils.

The problem of detecting falsification olive oil settled large number of modern methods. Olive oil can be identified by the following physical parameters: density, refractive index, viscosity, iodine number. There is a method for determining the presence of olive-pomace oil in virgin olive oil. The method is based on the color reaction of olive-pomace oil with concentrated mineral acids. The method CE-tandem mass spectrometry was applied for the determination of the selected betaines in seed oils and extra virgin olive oil. In extra virgin olive oil, carnitines were not detected, making it possible to propose them as a feasible novel marker for the detection of adulterations of olive oils. There is a method of detection of olive oil adulteration with some plant oils by GLC analysis of sterols using polar column. An olive oil authenticity factor based on the summation of campesterol and stigmaterol percentages was established as an indicator of olive oil adulteration with vegetable oils. Falsification of olive oil can be determined by TLC. The chromatographic profile of vegetable oils can be used for identification of oils by the number of areas with specific values of relative mobility components.

To detect adulteration of olive oil can be used different methods. Considered methods are based on the determination of some specific components of olive oil, the physical parameters, the chromatographic profile of oil.

KEY WORDS: olive oil, adulteration, method of detection, authenticity factor

IMPROVING FOOD SAFETY IN UKRAINE

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Everyone, including governments, food industry, and consumers has an abiding interest in saving food. Fortunately, Ukrainian food safety system generally does good job of protecting consumers from food safety hazards. Although there are many cases of food-borne illness annually in Ukraine, the overwhelming majority are mild and involve only minor discomfort and inconvenience. Despite increasing public anxiety about food safety, it is exceptionally rare for debilitating illness or death to result from the consumption of unsafe food in Ukraine.

Yet there is no reason to be complacent. There is possibility of improving Ukrainian food safety performance. Although the precise figure is impossible to calculate due to current data limitations, the health care costs and the lost of productivity attributable to food-borne illness are surprisingly high. When high-profile outbreaks- or even increased fears of outbreaks - occur, businesses can experience significantly reduced sales, high recall costs, and lower consumer confidence. All of these not only threaten Ukrainians' health, but can negatively affect the economic competitiveness and viability of the food industry on which we rely on to meet our nutritional and dietary needs.

In the light of our analysis, which estimat

es of the sources of food safety risk and effectiveness of the government risk management activities, industry, and consumers, we offer the following potential government, industry, and consumer actions that may help to improve food safety outcomes in Ukraine:

- provide SME restaurants and food service operators with management advice;
- encourage better behaviour among consumers;
- harmonize private standards to protect the public interest;
- make greater use of technology to improve visibility and traceability;
- add resources to address food safety risks due to globalization.

KEY WORDS: food safety, health, food industry.

TECHNOLOGICAL OPTIMIZATION OF PROGRESSIVE COUNTER-FLOW PRELIMING OF DIFFUSION JUICE

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Preliming of diffusion juice aims for ultimate disposal of soluble nonsugars forming sediments resistant to high alkalinity and basic liming temperatures having normal sedimentation-filtering properties. When diffusion juice is being prelimed, the hydrodynamic structure of flows in the process vessel stands as one of the major indicators significantly affecting the technological aspects of the process. On the basis of a physical model of progressive vertical counter-flow predefecator there was indagated the role of the main and recirculating flows particles retention time in the process vessel. According to the calculated statistical characteristics intensification of the counter-flow in the vertical progressive counter-flow predefecator to more than 300% shall not sustain rational increment curve of pH and juice alkalinity in predefecator sections and shall not provide for efficient preliming process.

Although the fundamental question remains outstanding: how does the variance in juice alkalinity in the process vessel sections with performance of the applicable internal recycling influences qualitative indicator of purified juice and final technological characteristics of prelimed juice, which, unfortunately, was not found in the works of Brigel-Mueller, Navo and other researchers. There was performed the study of technological optimization of preliming on a physical model of progressive vertical counter-flow predefecator defining effective final pH and and prelimed juice alkalinity values as well as rational curve of alkalinity and pH juice increase according to the sections with the corresponding value of alkaline juice recycling in predefecation process vessel. Technological studies of the effect of value variance of internal alkaline juice recycle in the process vessel on the juice quality indicators showed that the optimal value of the counter-flow is 200%.

For the purpose of determination of the degree of proteins coagulation in vertical counter flowing preliming unit macrokinetics model was being developed

KEY WORDS: hydrodynamic structure, progressive counter-flow preliming, recycling value, coagulation, sedimentation

INVESTIGATION OF LACTOSE HYDROLYSIS METHODS LACTOSE-FREE PRODUCTS MANUFACTURING

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Today some population categories cannot consume milk and its processing products that are essential part of the diet of healthy person due to lactose intolerance.

Until recently mostly infants or old people had lactose intolerance that is why the assortment of low-lactose products was introduced by low-lactose milk for old people and low-lacto for baby food. In the last years all over the world the measures has been taken to create and implement the dairy products for patients of all ages with food allergies and digestive abnormalities, that accompanied by intolerance to some food components, including lactose.

Among well-known methods of removing lactose from milk and dairy products the most common is hydrolysis. Hydrolysis of lactose can be made by acid and enzymatic methods.

The ion-exchange resin, that covered by the dark colour sediment is formed in the process of heterogeneous acid hydrolysis. The dark colour sediment is a mixture of caramelized lactose and melanoidins that requires the periodic regeneration of resin. It complicates the process and requires neutralizing and wastewater treatment that are expensive. It results in cost supplement of hydrolysis process.

The mineral acids, primarily hydrochloric acid are used in the process of homogeneous acid hydrolysis. The disadvantage of this method is the formation of Maillard reaction products at temperatures above 130 ° C, that affects the process.

Enzymatic hydrolysis with using soluble β -galactosidases is easy to apply to the process of manufacturing and does not requires no additional equipment has the soft conditions of the reaction (30 ... 60 ° C) that exclude the possibility of formation of unwanted hydrolysis products (melanoidins). In addition, it provides a high degree of lactose hydrolysis (to 94%) depending on the temperature and process time of hydrolysis.

Thus, enzymatic hydrolysis method has such advantages as easy-to-use, allows to pick up the enzyme for any foods system, lack of necessity of additional technical equipment, low-cost in technology implementation.

KEY WORDS: Lactose, lactose intolerance, lactose-free products, milk

RESEARCH OF TOTAL ANTIOXIDANT ACTIVITY OF VEGETABLE OILS

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Antioxidant activity is one of the basic criteria of vegetable oil biological value. There are many methods for antioxidant activity (AOA) assessment, based on model process including two stages: certain quantity free radicals generation and injection of scavengers or substances that affect free radicals concentration or state in the model system, that is reflected in detection system parameters. According to the basic principle analytical AOA assessment methods have been divided into three categories: spectrometry, electrochemical techniques and chromatography. Electrochemical techniques and chromatographic methods application require expensive equipment to be available, therefore spectrometry method is dominant in the most cases. FRAP (Ferric Reducing / Antioxidant Power) is the one of the most popular spectrometry methods, based on Fe^{3+} ions and photometric reagent interaction, followed by intensively coloured ferrum (II) complex formation. AOA is determined by calibration curve and the result is expressed as recalculation on reference substance. Long time of analysis and high requirements to the purity of chemicals used as references are disadvantages of this method. For improvement of the method we suggested to use fat-soluble vitamin E as a reference, because it has high antioxidant activity and low cost. We have reduced the consumption of reagents and the assay time. Application of nonpolar solvent for sample preparation improves antioxidant components extraction. Consequently, the developed method is not expensive, allows to reduce costs for analysis as well as charges of reagents and obtaining results as recalculation on vitamin E antioxidant activity.

KEY WORDS: antioxidant activity, vegetable oil.

QUALITY MANAGEMENT OF CROP PRODUCTION

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Under current conditions of environmental degradation and global pollution of the biosphere, the problem of quality of agricultural production goes to a leading place as it determines the quality of life. We know that today the quality of agricultural products produced in Ukraine, not always complies with the Ukrainian and even more so the international requirements.

In developed countries the methodology for quality and safety agricultural products based on the principle of control from the final product to predicting the possible negative impact and avoiding of them at the production stage, is actively considered. In Ukraine the methodology should be based on the principles of HACCP (Hazard Analysis and Critical Control Points), Council Directive EEC "On the hygiene of food" and other international regulations and should include particularly the following:

- analysis of hazards related to crop production and the development of measures required to hazards control;
- identification of critical stages and operations of technological process which must be controlled to eliminate hazards or minimize the possibility of their occurrence;
- development of monitoring system that will ensure control of critical operations of the technological process;
- development of methods for obtaining high quality products in various environmental growing conditions;
- development of procedures for determining the agricultural land suitability for obtaining high-quality and safe agricultural products.

Therefore the question on the development of methods for obtaining high-quality and safe plant products, that will meet international requirements and standards and will be competitive on the international market remains highly important as well as creating of quality map-schemes by soil and climatic zones based on which it will be possible to make recommendations for growing certain crops in specific regions that will provide the fullest use of agrobiopotential and a high-quality crop and high yield. It will help to reduce the number of illnesses caused by the consumption of spoiled food and reducing the volume of pesticides that adversely affect the environment and human health.

KEY WORDS: HACCP, crop production, environmental factors, monitoring process.

Oral Presentations

Section **NOVEL SYSTEMS FOR FOOD CHAIN**

EUROPEAN CONSUMERS AND NUTRITIONAL LABELING

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Health professionals agree that the relationship between diet and health is important. Our eating habits can help or hurt our overall health and well-being.

Consumers are often confused by nutritional and health claims on food labels. The food label was designed to help people choose food for a healthful diet. By using the food label, we can compare the nutrient content of similar food, see how food fits into our overall diet, and understand the relationship between certain nutrients and diseases. Nutrition labels can help us choose between products, and keep a check on the amount of food high in fat, salt and added sugars that we're eating. Nutrition labels can also provide information on how a particular food or drink product fits into our daily diet.

The EU funded project NUTRILAB - NUTritional LABELing Study in Black Sea Region Countries which started in January 2013, examine how nutritional labeling in European countries and out of Europe can influence on health and welfare of population. The study was carried out in five countries (Republic of Moldova, Ukraine, Russia, Bulgaria and Romania). The overall aims of NUTRILAB are: bring together, review and analyze current research on consumer understanding of claims, and also labeling where this would inform our knowledge of consumer understanding of claims and gather information on how consumer understand of claims varies across different population groups.

To take account of as much relevant information as possible, research will conduct into consumer understanding of food labeling in general, where this could be used to draw conclusions about consumer understanding of nutritional and health claims.

Acknowledgement

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KEY WORDS: Nutritional labeling, Health, Black Sea Region

MUSTARD OIL – A POTENTIAL FOOD PRESERVATIVE

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Mustard cultivation technology is relatively simple and the pedoclimatic conditions for obtaining a high productivity are met by Romania. Main Uses of mustard seeds in Romania is as raw material for obtaining mustard paste.

Three different types of oil are made from mustard seed and may be referred to as "mustard oil": (1) is a fatty vegetable oil that comes from pressing the seeds, (2) is called essential oil and is made by grinding the seeds, mixing them with water and extracting the oil through distillation and (3) involves infusing mustard seed extract with other vegetable oils.

Mustard oil has a pungent taste and is mostly used for cooking in India. Compared to other cooking oils, mustard oil is considered to be an oil that has low saturated fat. It basically consists of fatty acid, oleic acid, erucic acid and linoleic acid. Antimicrobial properties of mustard oil studied and proven by numerous scientific researches, effects of artificial additives introduced role in food preservation, especially promising results of a recent study based on extraction of essential white mustard oil, should encourage production of mustard seeds and especially their processing purposes other than those above specified.

Foods that would lend itself best to use mustard oil as a preservative are especially meat and meat products, because meat is favorable environment for the development of many pathogens. As a preservative, essential mustard oil can be used in fish, milk, dairy products, vegetables and fruits. Main factors that influence antimicrobial behavior of this oil in food could be: pH, temperature and oxygen levels.

In this food, may occurred undesirable organoleptic effects that can be limited by careful selection of amount of essential oil according to the type of food.

KEY WORDS: mustard seeds, mustard oil, preservative

LABELLING OF FOODSTUFFS IN UKRAINE

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Summary information on the label of food products that are realized in Ukraine is regulated mainly by the Law of Ukraine "On Protection of Consumer Rights", part 15 "The right of consumers to information about products». Part 1 states that "Label - any sign, containing pictures or inscriptions, written, printed, printed by stencil, embossed or depressed and are attached to the unit package (container) with food" The same article defines the characteristics of the food that is not properly marked. For example, the product sold under the name of another product, the information submitted is not the national language, marked mislead an user, the text is hard to read the label.

Information on the label must include [http://www.consumerinfo.org.ua/must_know/legislation/1046/4980]: product name, the name (number) of the normative document regulating the production, data on the composition of production (raw materials and dietary supplements), product number (or mass, volume) food and energy value, if consumption precautions for use, information on harmful substances, the presence of GMOs, storage, manufacturing date, expiry date, warranty of the manufacturer, producer data (name, address legal and producing). A product that is subject to certification must have information about certification. Labels must comply with the law on the state language. Exported foods that are packed in Ukraine should have information about the origin. The peculiarity of the new laws that govern the content of the label is strict regulation of the product name. These laws made it impossible to mislead the consumer, when the name of the product did not meet its contents. For example, until recently, the label blends of vegetable fats indicated that this dairy butter, fruit drink was marked as a juice, a mixture of vegetable fats - like concentrated milk.

Further development of the labeling of food products in Ukraine is focused on understanding consumer information on the label. Assumed to represent the content of the product in simple terms, compared "many small-medium" or specify a percentage of the daily requirement of each component of the product and so on.

KEY WORDS: labelling, food, law

COMPARATIVE STUDY OF ANTIFUNGAL ACTIVITIES OF BASIL AND THYME EXTRACTS

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Basil (*Ocimum basilicum* L.) and thyme (*Thymus vulgaris* L.) are aromatic herbs that are used extensively to add a distinctive aroma and flavour to food. The leaves can be used fresh or dried as spices.

Essential oils extracted from fresh leaves and flowers can be used as aroma additives in food, pharmaceuticals, and cosmetics (Simon, Morales, Phippen, Vieira, & Hao, 1999; Javanmardi, Khalighi, Kashi, Bais, & Vivanco, 2002; Senatore, 1996).

The objective of this study was to evaluate and compare the antifungal potential of basil (*Ocimum basilicum* L.) and thyme (*Thymus vulgaris* L.) extracts, intended for uses in food, against *Fusarium* spp.

The extraction procedures investigated and compared in this study included the method of single step extraction (maceration), Soxhlet extraction and ultra sound assisted extraction. Also the extractions were realized using pure ethanol and mixtures of 70:30 ethanol:water respectively 50:50 ethanol: water.

Fusarium species are frequent contaminants of cereals (corn, barley, wheat, oats, rye, rice, etc.), cereal products (flour, bread, cakes, etc.), fruits and vegetables (Pitt and Hocking, 1997; Lević et al., 2004).

Antimicrobial activities of these extracts were examined by disc diffusion method and mean of diameters of inhibition zone for different dilutions of the extracts.

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KEY WORDS: Basil, thyme, antifungal activity, ethanol extracts, hydro-alcoholic extracts, disc diffusion method

ESTIMATION OF COMPETITION AND PROCESS EQUIPMENT TECHNOLOGICAL LEVEL

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The process equipment should meet the requirements of the consumer on the technical and economic performances. The equipment technological level is defined by relative performance of its quality which is grounded on comparison of indexes of technical perfection by corresponding indexes of analogues.

At equipment maintenance profitability and safety indexes are important. Economic indexes - the equipment price, level of expenditures for maintenance service and repair. Safety indexes - level of a possible traumatism at service, presence of harmful factors: vibration, noise, high or low temperature and another which influence health of the worker.

The complex index of technological level Q of the equipment is calculated behind the formula:

$$Q = k_1\varphi_1 + k_2\varphi_2 + \dots + k_i\varphi_i,$$

Where φ_i - an index i -properties of the equipment according to functionality, operation ability, universality, safety of maintenance, etc; k_i - the weighing factor.

Weighing factors of indexes answer conditions:

$$k_1+k_2+\dots+k_3=1$$

As a matter of convenience the analysis of complex indexes of a technological level of the process equipment spend its rationing under condition of $0 < Q \leq 1$.

The new method of an estimation of competition and equipment technological level is offered. The profile analysis is put in the fundamentals. At first the area of a profile (polygon) of the is conditional-ideal equipment on indexes is defined: functional exactitude P_1 , profitability in maintenance P_2 , an index of level of safety P_3 , automation P_4 , patent-legal protection P_5 , an index of expenditures on maintenance P_6 .

For the conditional-ideal equipment each of indexes of separate function P_i is taken as a unit. For analogue they will be less units, and the polygon area will be smaller.

Comparing the areas of profiles (polygons) which it is accepted for a complex index of technological level Q of the equipment, we evaluate level of competition and an equipment technological level.

The offered method allows to select the most qualitative equipment, to evaluate change of its quality during maintenance, to consider a deterioration and to establish duration of maintenance between flowing and capital repairs.

KEY WORDS: process equipment, quality, technological level

THE NONTHERMAL METHOD OF LIVER PATÉ PRODUCTION USING HIGH PRESSURE

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The inactivation of enzymes has notable influence on the life of microbiological structures. It is shown in change of speed of the vital reactions.

Apparently, high pressure (HP) has different influence on different enzyme catalyzed reactions. Influence of HP on enzymatic activity can actually be used to control certain enzymatic reactions.

It is necessary to achieve paté microbiological safety and inactivation of the acid phosphatase to ensure its culinary doneness. We conducted an experiment on processing of raw paté ground meat with HP in order to achieve its culinary doneness.

The test samples of ground meat were produced in industrial environment of a plant in compliance with all technical and technological conditions. The control samples of ground meat were packed into a polyvinylidenechloride wrapping film. After formation of capsules with raw paté their processing in the HP volume was made. The samples having temperature of 5°C were processed by pressure from 100 to 700 MPa by varying the time limit from 10 to 20 minutes. After HP processing the determination of acid phosphatase residual activity (the method is based on photometric determination of intensity of the developing coloring in a product, depending on the residual activity of acid phosphatase, expressed by the mass fraction of phenol) and microbiological researches was made.

After analyzing the obtained data of the residual activity of acid phosphatase, we have found that after liver paté HP processing, the samples processed by pressure of 100-400 MPa was outside the norm (the maximum value of the mass fraction of phenol 0.006%). The samples processed by pressure from 500 MPa and more conform to standards of a ready-made product.

Given the fact that the acid phosphatase is inactivated with pressures over than 500 MPa, the samples processed by pressure of 500, 600 and 700 MPa were subjected to the microbiological analysis.

The obtained data prove that all the samples for microbiological indicators are normal, that it is possible to speak about their culinary doneness. Also, we found that the processing time of paste should be from 15 to 20 minutes.

As a result of the performed researches we have determined the possibility of HP applying to the paté production by the nonthermal method. The patent of Ukraine for the affective model "The nonthermal method of liver paté production using HP" was obtained.

KEY WORDS: high pressure, nonthermal, liver paté

HIGH PRESSURE APPLYING TO THE PRODUCTION OF RESTRUCTURIZED POULTRY GOODS

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Commercially available ham products are important protein food. Our preliminary analysis of domestic and foreign scientific and technical literature showed that technology of restructured ham products based on meat primary materials is promising.

Application of restructuring allows to regulate organoleptic and structural-mechanical properties of the products, to involve primary materials, partially used in traditional technologies of natural meat products, modify functional and technological properties of primary materials, to vary chemical composition of the finished products, to expand the assortment, to increase the yield of the finished products, and production profitability.

In this regard, to increase the depth of raw meat processing and diversification of meat product it is necessary to pay attention to the chicken meat use. Restructured products are much lower in their self cost than natural ones.

Thanks to the media, modern consumers have also elaborated persistent distrust to any additives and prefer to buy and eat food with minimal content of additives, and it is the best option to do without them.

In our opinion it is possible to find the way how to replace the potentially harmful chemical ingredients in sausage products by safer methods for physical procession of food primary materials. The concept and technologies developed as a part of it, are based on the fact that high pressure can not only disinfect food products but also give them new properties that are more attractive to consumers. High pressure is also capable to bring the processed foods into the state of culinary doneness without thermal treatment.

The aim of this work is to develop technologies of restructured meat products from chicken meat with application of high-pressure that is capable to recreate a structure of unminced primary materials, which properties are similar to the structure of the whole-muscle large pieces meat without application of chemical stabilizers and thickeners. In accordance with the aim the following tasks were resolved in the work:

- Investigate microbiological indexes of ham;
- Determine a degree of culinary doneness by experimental approach;
- Give an experimental estimate of tensile strength of the obtained ham samples.

Analyzing the obtained results it is possible to draw preliminary conclusions that with the help of high pressure treatment it is possible to recreate a structure that will be similar to the structure of whole-muscle large pieces meat without the use of chemical stabilizers and thickeners. At the same time it is possible to achieve culinary doneness without use of traditional types of thermal treatment.

KEY WORDS: high pressure, restructured meat products, microbiological parameters, culinary doneness, tensile strength

SUNFLOWER SEED DRYING IN A VIBRO-FLUIDIZED BED UNDER INFRARED HEATING

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Traditionally, in the Ukraine and Russia drying sunflower seeds carried by the convective process in drum, tunnel, shaft and recirculation dryers, the main advantage of which is higher productivity. However, the dryers are quite energy intensive, overall and provide uneven heating of seeds, because they do not take into account the specificity of sunflower seeds as an object of drying. Different chemical composition of the seeds shell (husk) and the core causes varying degrees of moisture due to be removed during drying. Keep in mind also that the seed husks of confectionery sunflower varieties are not tight to the core, that is, between the husk and the kernel has an air cavity. Thus, the seed is made up of components that differ sharply on the thermodynamic properties.

More promising for drying sunflower seeds look volumetric method of the heat, of which, in recent years the most widely used infrared and microwave. They can provide a uniform heating of the entire seed or more intense heating of the core. In addition, there is no need to use air as a heat agent, which reduces the energy consumption for the drying process. Promising in this respect is the combination of infrared or microwave heating and active contact seeds with poorly heated or not heated air, which provides, for example, fluidized bed, vibro-fluidized bed or centrifugal fluidized bed. In addition, for certain values of the operating parameters should be to create conditions of the drying process, which will support a temperature gradient from the center of the core to the husk. This, as a result, will provide the same direction, concentration and temperature diffusion of moisture.

We carried out a series of experiments in drying sunflower varieties of "Titanic" in the vibro-fluidized bed with infrared heating. We investigated the change of the average moisture content and temperature of product bed during drying, depending on the heat flux. For the test of the product pre-defined physical and mechanical properties. Using the experimental data of the curves as drying, drying speed and temperature at different points in the product. The curves drying rate approximated by the least squares method in the computer application.

For a preliminary assessment on the effect of processing on the quality of the dried seeds used average integral temperature of the product during drying.

These results will form the basis for the development of industrial apparatus for sunflower seeds drying.

KEY WORDS: drying, sunflower seeds, radiating heating

INTENSIFICATION OF THE PROCESS OF OBTAINING OF APPLE PECTIN, WITH THE HIGH-PRESSURE TREATMENT OF RAW-STUFF

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The article solved the urgent problem of intensification of the process of obtaining pectin from recycled plant material (pomace) by its high pressure working. A method of pectin producing from fresh and dried pomace was worked out, which has stages: washing raw with water pH of 2.5 – 3.0 at 50 °C for 2 × 15 min; hydrolysis-extraction at pH 1.8 in the presence of phosphoric acid at 70 °C for 120 min; alkali neutralization, centrifugation sediment for 3 - 5 min at G = 625 – 700 g; concentration of the solution 70 °C / 0.1 atm; deposition of pectin alcohol, filtering, drying and grinding. Yield of pectin from fresh pomace apples "Antonovka usual" – 5.08 %, sort mixture – 3.79 % (yield anhydrous pectin by weight of moist pomace).

The influence of processing of moist pomace by high pressure (0 - 600 MPa, 5 - 30 min) on the yield and quality parameters of pectin, that is withdrawn, is researched. The rational parameters of processing are determined - 400 MPa / 15 min, in which the output of pectin pomace apples "Antonovka usual" is 6.68 % and pomace of sort mixture – 4.31 %.

Processing pressure allows to save a high quality of indicators of pectin: the degree of etherification of 67 %, gelatinous capacity 207 – 212 °TB, molecular weight 28 – 31 kDa, moisture 9.3 %. It was established the conservation microstructure of pectin and the characteristics of its IR spectra after processing of high pressure.

The effect of high pressure on the compression characteristics (density, relative volume, bulk modulus of elasticity, coefficient of compressibility), disperse composition and form-factors (area, diameter, perimeter, compactness, length, roundness) of particles of moist pomace were researched; approximation functions were obtained.

With increasing pressure from 0 to 600 MPa, the volume fraction of apple pomace decreases from 1 to 0.757, the density increases from 1050 to 1390 kg/m³, the compression modulus is reduced by 1.33 times, and the compressibility factor is increased by 22%, and the values of form-factors changed to 1.0 – 1.5%.

The cost-effectiveness of implementing the results was determined.

KEY WORDS: high pressure, pectin, apples pomace

EFFECT OF PRE-HEATING OF THE MATERIAL ON THE EFFICIENCY OF THE DRYING PROCESS

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The known method of increasing the drying process intensity is a pre-heating of the material. The effectiveness of this technology is based on the acceptance that the increase in the average material temperature before drying increases the coefficient of internal moisture diffusion, which determines the overall process duration.

However, in practice, there are no recommendations on the selection of the modes for preheating of the drying material which analyze energy consumption. Obviously, the preliminary increase in temperature of the material, on one hand, reduces the duration of the subsequent drying process, but on the other hand, requires a lot of the overall energy cost to the whole process.

This paper presents the theoretical and experimental studies to determine the rational modes for pre-heating edible raw materials in order to reduce overall energy costs for the drying process.

To estimate the energy efficiency new index is proposed: the ratio of dryer performance by moisture evaporation to drying process energy costs ratio.

It is shown that there exists an optimal duration of the preliminary material pre-heating process at which the total energy consumption for the drying process with pre-heating is minimal.

Based on the example of grape pomace drying in heat Mass Transfer module with conductive heat supply it is shown that dryer energy efficiency increases 25 ... 45% when pre-heating duration is optimal.

KEY WORDS: drying, energy efficiency, pre-heating

DEVELOPMENT OF 3-D MODEL OF NATURAL GAS COMBUSTION IN VERTICAL PILOT REACTOR

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Modern software of 3 – D modeling of thermal and hydrodynamic processes becomes the most powerful and sophisticated instrument which enables a profound research into the local characteristics. These methods are extremely valuable when studying such complex processes as combustion; insofar a set of governing equations has to include the hydrodynamic conservation equations of momentum, mass of components diffusion, chemical reactions, convective and radioactive heat transfer.

It should be mentioned that direct experimentation into the combustion process appears to be cost prohibited, since only heating of reactors needs a significant amount of organic fuel to be burnt.

Therefore, a commercial software ANSYS (Fluent, CFX) has been utilized for 3 – D modeling and validation of models.

A set of geometric objects of the VGP – 100 B (a pilot experimental combustion stand of the Coal Energy Technology Institute of the National Academy of Sciences of Ukraine) were developed and mached.

The process of natural gas combustion has been modeled including the processes of flue – gases turbulent flow, component reactions of combustion, heat transfer including radiation in the semitransparent irradiating combustion products.

The validation has been carried out by comparison the data calculated within the developed model to those measured in the direct experiments. A close correspondence of data thus obtained proves the accuracy and validity of the model.

KEY WORDS: 3 – D modeling, combustion, diffusion, software, flue – gases turbulent flow

A STUDY OF THERMAL DECOMPOSITION OF BEET SUGAR PULP (TG ANALYSES OF DEMOISTURIZATION)

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During sugar production campaign a huge amount of beet sugar pulp can not be utilized directly and being dumped in landfills on the open ground. Being exposed to the ambient conditions sour pulp starts to degrade and emits methane which has a GW potential of 21. Therefore a proper and quick utilization of unwanted beet sugar pulp becomes a critical problem. There is a number of promising technologies of biomass effective utilization. Co-firing of biomass with coal in the furnaces of utility of power boilers is one of the most attractive options, since the capital investments into the boiler's modernization are minimal. Similarly, biomass pyrolysis with syngas production is also a promising technological option. In both cases, determination of the kinetic constants of the thermal decomposition of biomass becomes crucial in the following designing and calculations of burners or pyrolyzers. The results of TG studies of beet sugar pulp drying and devolatilization with the initial moisture content as high as 70% is presented.

It is worth noticing that despite a significant difference in the initial moisture content (10%...70%) the temperature ranges characteristic for moisture release for the three cases are approximately equal and lies within 60...160 C. At the same time the value of mass derivative varies significantly.

The major objective of the present work is to determine the kinetic constants for the initial stages of thermal decomposition of biomass (moisture release), and the following stage – release of volatiles has been achieved by introduction of integral method of data processing. A set of kinetic constants for the Arrhenius Equation of the 1-st reaction order were derived. The data can be used for modeling demoisturization and devolatilization stages as constituent parts of combustion process.

KEY WORDS: demoisturization, devolatilization, pyrolysis, beet sugar pulp, co-firing of biomass

A STUDY INTO THE KINETICS OF SOME TYPES OF BIOMASS DEVOLATILAZATION

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Biomass introduction as a prospective fuel resource, which happened during last decades, has proven a promising source of renewable energy.

Since Ukraine experiences an acute deficiency in fossil fuels, biomass may become an abundant and clean source of energy. When comparing biomass and coal, one should keep in mind that volatiles content in biomass reaches 70-90%, whereas that in coal nearly amounts to 5-20%, as for domestic anthracite - its volatiles amount only to 4-6%. Co-combustion of such different types of fuel positions significant technological problems. First, the size of co-particles after grinding maybe estimated as $R_z=50$ mcm, at the same time extremely low ground ability of biomass determines its lowest attainable size at 5-10mm. The particles of so sensitive size will have much greater heating time and, respectively, much longer time of devolatilization than that of coal particles. The stated above determines importance of research into the devolatilization process of some type of biomass. The following set of biomass has been studied in the present research:

a)beet sugar pulp b)pine tree woody chips c)wheat straw d)sunflower husk

The process of devolatilization has been modeled with the use of TG techniques (thermogravimetry). The process of devolatilization has been described by the first order differential equation.

The experimental data obtained from the thermogravigrams were processed according to the Coats-Redfern integral methods and a set of kinetic constants has been obtained.

KEY WORDS: devolatilization, kinetics, anthracite, groundability, co-combustion

INTELLIGENT SYSTEM TECHNOLOGICAL FOR MONITORING OF FOOD PROCESSING INDUSTRIES

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In terms of control problems food production are related to complicated organizational and technical systems. One of the characteristics of such objects control is considerable uncertainty in the evaluation technological parameters such as quality indicators of raw materials, semi-finished and finished products. Detection of situational behavior of technological processes through significant signal interference and noise of random nature is also an important problem. The presence of complex nonlinear dynamic interconnections in objects of food industry generates phenomena of intermittency as alternating chaotic (turbulent) regimes with regular (laminar) with the formation of dissipative spatial and temporal structures. An important factor is the analysis of critical and resources conflicts, detection of reasons of their origin and solutions. These factors complicate the problem of technological forecasting, analysis of work situations, resource allocation in the production of foodstuffs, making operational economical solutions for control stimulating non-coercive nature.

Solution of these problems is provided by comprehensive observation of the control object, analysis of technology information, forecasting the development of technological processes of different depth, including trends and forecasting of system modifications due to intellectual information-measuring systems of technological monitoring. System of technological monitoring was developed for food enterprises based on modern information technologies. The main applied functions of this system are: the analysis of input technological information, which includes problem of rejection abnormal results of measurements of different nature using neural networks; filtration of the measured data using wavelet transformation; recovery gaps in the data based on precedent and fractal analysis; classification of technological regimes and production situations by methods of pattern analysis and Kohonen's maps; technological forecasting powered by DATA MINING and flicker-noise spectroscopy; constructing mathematical models of optimal control of technological processes due to original methods of structural and parametric identification and fuzzy approximation, conflicts analysis and technological nature of recommendations on their solution.

The system is integrated into automated systems of technological processes due to information and computer networks. As the production tests show, the developed technological monitoring system provides improvement of product quality, increases productivity manufacturing equipment and contributes to resource conservation.

KEY WORDS: automatization, food production, intellectual system, technological monitoring

ANALYTICAL - INFORMATION MANAGEMENT OF COMPLEX TECHNOLOGICAL SYSTEMS

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One of determining directions of management of complex technological systems is to use the methods of modern control theory based on intelligent information processing technologies. A new type of automatic control of technological systems - analytical - uses a combination of operational management solutions, which are formed by officials on the basis of monitoring the current production situation, the results of the qualitative and quantitative analysis of retrospective data (work experience), implemented by means of data mining (Data Mining).

In recent years microprocessor automation systems, which include various technical tools combined within the networks of different levels and purposes have become a commonplace in the technological complex of food industry. There are also examples of usage the production management systems MES standard (Manufacturing Execution Systems). The problem, however, is the creation of the necessary information, software and algorithm software.

The basis of the analytical, so-called advanced management, are new approaches and methods such as the use of predictive models (MPC, Model Predictive Control) with their consistent correction to reflect the constantly changing processes of evolution of an object. The analysis of productive (or technological) situations, for the estimation of which different specialists are involved, is executed on the basis of: exposure of threats; exposure and prognostication of the hidden tendencies and conformities to law of processes development; identification previous unknown conformities to law; the analysis of descriptions of environment and prognostication of their change; forming of optimization recommendations for management processes; visualization of results of the analysis. It is also necessary to take into account the connections between qualitative characteristics of raw material and requirements to the quality of initial products.

Methods of analytical information technologies allow for different kinds of knowledge. For technologists it is evaluation of disturbances and the ability to predict changes in the dynamic properties of processes, and for economists and business leaders is expected performance of technical and economic efficiency.

KEY WORDS: Analytical - information management, analytical control, effective control algorithms

DIFFUSION PROCESS CONTROL WITH USE OF RECOMMENDATION-FORMING SYSTEM

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Removing sugar from beet chips is one of the key processes of sugar production, which largely affects the cost of production, the cost of energy and loss of sugar. Despite the relatively simple flowsheet, process is a complex system where a variety of physical, chemical and biological processes take place.

At most refineries diffusion station is controlled by automated system based on modern microprocessors. The regulated process parameter points (temperature, level, pressure, pH and others) are controlled by the automated system. Despite the relatively high technical level of automation and control algorithms, existing automated systems cannot always respond adequately to the failure of operating practices. This can be explained by the fact that is a series of uncontrollable parameters, which include: quality indexes of raw materials and chips, chip movement, unit load of apparatuses and others are given little attention. Also the failure of operating practices can occur by the breakage or the performance criteria degradation of automation hardware, electrical and mechanical equipment etc., which are not recognized by the control system or by the operator.

Therefore an operator is an integral part of control process of diffusion station, because system performance in case of technological failure when the automated system cannot do it. The effectiveness of his decisions depends on his professionalism, his ability to establish the cause of the failure and act promptly.

Taking into account the complexity of the technological process and seasonality of the sugar refinery operation, it is appropriate to supplement existing automated systems with a subsystem of the decision-making support which would help the operator to assess the situation properly and act promptly.

To achieve this goal we need: methods of data organization and their classification to develop knowledge base and the algorithms parameters selection and of their changes to correct qualitative indexes of diffusion station operation; to develop the production model of process in columnar diffusion apparatuses

KEY WORDS: fuzzy logic, algorithms of logical output, technological control process, transport problem, game theory, structural analysis, functional structure, knowledge base

RESEARCH OF OPERATIONAL PRODUCTION PLANNING OF PREVENTIVE REPAIRS AT BREAD-BAKERY ENTERPRISE

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The important task of timely and constant providing population with large assortment and volume of bread-bakery products is to make up an optimal schedule of planned repairs as the technological line breakage leads to adjustment of plans and production programs of other lines of an enterprise.

The role of operative production planning to provide constant work of food industry enterprise using production resources most efficiently is analyzed. Maintenance and repair of equipment is subdivided into overhaul service; periodic preventive operations; planned repairs. Statistical data on reliability of one type equipment that works under equal terms of experiment are homogeneous and belong to same general totality. Therefore the obtained data are integrated in a single row and processed together. The possibility of implementation of the scheduled repair is predetermined by the availability of resources for this type of repair of certain type of equipment. For optimization of repairing works schedule, a number of different factors and limitations resulting from the specifics of food enterprise work are taken into account.

The calculation of yearly repair works schedule is determined by the technical state of equipment, list of the fixed breakages, and a number of repairing works and fulfillment terms for a year period. When planning repairing works for a year, the prior repair terms, production capacity, assortment that is produced, production costs and reliability of work, should be analyzed for each technological line of an enterprise. Simulation modeling of system functioning allows us to define probable work features of each line and to draw repair works schedule to prevent accidents and emergency repairs and material wastes.

KEY WORDS: Production resources, planning, modeling

INTELLIGENT CONTROL SYSTEMS OF BREAD PRODUCTION

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Increased assortments of bakery products and improving the quality requirements for finished goods make the management of production and maintain optimum works more complex. In this regard, issues of improving automated control systems required special attention. Recently, intelligent control systems have got immense popularity. These include subsystems of decision support and forecasting systems for semi-finished products and finished products. In these methods of fuzzy logic, artificial neural networks and genetic algorithms are widely used. Their use depends on the following features of the object management:

- a large number of raw materials components;
- a variety of processes at all stages of production;
- a high level of uncertainty at different stages of the process;
- non-linear relationship between parameters;

The lack of a mathematical description of many phenomena that characterize the raw materials transformation and semi-finished products and finished products.

In the bread making process microbiological and biochemical processes are dominated. Their occurrence depends on many factors that are difficult to control and even more difficult is to manage them.

Decision-making subsystem concerned with the choice of supplements that should be added to the low quality flour is designed. The control system is based on the mathematical model by fuzzy logic. In accordance with the method of fuzzy inference the matrix of linguistic terms of input and output variables for all types additives is formed and membership functions obtained. Knowledge base of heuristic rules for each additives is developed and logical conclusion about the feasibility of additive use for the certain batch of raw materials is received by Mamdani algorithm application.

Operative correction subsystem is designed to determine the stage of technological regimes, depending on the results obtained in the preceding stage. The main element of the system is a predictive model, which was developed using artificial neural networks. During model developing analysis of the use of networks of different architecture is conducted.

The developing model is used to solve the problem of the search process conditions optimizing which are designed to achieve high quality products. As the optimization algorithm the continuous genetic algorithm that can be used during the work with the real data was selected.

KEY WORDS: fuzzy logic, neural network, genetic algorithm, production of bread

CREATING KNOWLEDGE BASE OF EXPERT SYSTEM WITH ONTOLOGY USE

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Technological processes of food industry are difficult objects for automatic control. There are many methods for automatic control of these objects. One of the famous methods is the technological processes control with the use of expert systems.

The knowledge base is the main component of the expert system. There are many different methods to build a knowledge base of the expert system. Among these methods ontology has its popularity.

Ontology is formally obvious description of the concept of analyzed domain area. Ontology consists of concepts, attributes of concepts and constraints imposed on the concept. Ontology describes basic concepts of the domain area and defines the relationship between them. It is used for creation of knowledge base including a number of concepts.

The knowledge base of this expert system consists of ontology of the domain area and precedents. Ontology of the domain area is built on the basis of detailed analysis of the technological object.

There are many programs used for creation of ontology. One of the famous programs is Protégé. The plugin CLIPStab of Protégé can export ontology construction for use in the expert system, which was created with the help of programming languages of CLIPS expert systems.

The domain area of the rectification unit on a distillery was analyzed. After a detailed analysis there was constructed ontology of the domain area, which will be used to create a knowledge base in an expert system for the technological object control.

In addition, knowledge base will include precedents for technological objects control that were found during the time series analysis obtained from rectification unit.

The jCOLIBRI program make it possible to simulate work of rectification unit with the use of precedents and ontology of the domain area.

Such a control system with the use of expert system will effectively control the rectification unit on a distillery.

KEY WORDS: expert system, ontology, precedent

THE MEAN VALUE THEOREM AND ANALYTIC FUNCTIONS OF A COMPLEX VARIABLE

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There are many articles devoted to local mean value theorems for vector-valued functions, in particular holomorphic functions (see, for example, [1–6] and the extensive bibliography there in; the results of the articles listed in the later are generalized or improved by theorems of [1–6]). The results of this report relates directly to this area and seems to be the first study of the problem of representing the remainder of the Taylor expansion for a holomorphic function in Lagrange form. We find out when and how the expansion well-known in the case of real-valued functions on an interval of the real axis can be transferred to holomorphic functions in a complex domain. Our theorems not only cover the corresponding results of [1, 2, 4–6] but also imply the following intuitively clear fact: If f is a holomorphic function in a neighborhood of the real axis and f takes real values at real values of the argument then the mean value in the remainder of the Taylor expansion, written down in Lagrange form, can be localized more precisely than without using the holomorphy of f . Seemingly, this fact is observed here for the first time. A brief comparison with earlier results in this area is given during the exposition.

We now introduce notations to be used in the article. As usual, R , Z , and N are the sets of reals, integers, and positive integers. Henceforth f is a holomorphic function in a domain D of the complex plane C , ∂D is the boundary of D , and \overline{D} is the closure of D . We denote by $U(\alpha; r) := \{z \in C : |z - \alpha| < r\}$

the open disk of radius $r > 0$ centered at α and let $\arg z$ stand for the argument of a nonzero complexnumber z , $-\pi < \arg z < \pi$. We suppose that the points z_0 and z_1 belong to D .

In this report we study the following question: When is the remainder $Q_n(z_0; z_1; f)$ of the Taylor expansion

$$f(z_1) = \sum_{k=0}^{n-1} \frac{f^{(k)}(z_0)}{k!} (z_1 - z_0)^k + Q_n(z_0; z_1; f)$$

(with $n \in N$) representable in Lagrange form

$$Q_n(z_0; z_1; f) = \frac{f^{(n)}(\xi)}{n!} (z_1 - z_0)$$

and where does ξ lie?

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KEY WORDS: holomorphic function, Taylor expansion, remainder, mean value theorem

MODERN DESIGN OF REGULATION FOR RAISING THE QUALITY OF TECHNOLOGICAL PROCESS

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The thesis is dedicated to increasing the efficiency and quality of process facilities food industry through the using of multivariable regulators and structures that provide invariance under perturbation, compensation delays, cross-links and integral saturation. Proposed structure of the automation system for adaptive control. Discovered that in addition to the traditional criteria for assessing the quality of the operation of automation systems is advisable to use a function of loss that could better characterizes the performance of the processing facility.

Precision control is also related to energy savings. Deviations adjustable parameters of the established technological values, depending on the direction of deviation may result in the following: the re-processing of the product, to use the product for less important purposes, to mixing original material with a material of higher or lower quality. As a result, significant additional energy loss.

The main difficulty of solution accuracy problems associated with the management of the inertia of the object, which affects such factors as regulation speed, maximum dynamic deflection and others. These figures can't be taken into consideration in designing the optimal or quasi-optimal energy consumption in process control systems.

One of the useful tools to maximize accuracy is a function of losses. Loss function is different for different parameters of technological process, but has one common feature: it has a minimum at a value of the parameter specified rules, and tends to increase with deviations decrease as the direction and the direction of increasing value of the set.

Analyzed contemporary approaches for the optimization of the controller parameters, developed the system of diagnosis and considering prediction of the damage or malfunction to the processing facility using control charts and analytical identification.

Formed by a set of criteria for class technological facilities, which allows to choose the right control algorithm and the structure of automation system. Developed recommendations for a control algorithm according to the characteristics of the object and the quality requirements for automation system.

KEY WORDS: Modern design, energy savings, loss function, quality of process

SUMMARIZING RESEARCH DATA ON DYNAMICS OF ICE FORMATION ON THE CYLINDRICAL SURFACE

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Calculating periodic cold accumulators requires determining the values of running and maximum attainable ice thicknesses.

Data on the ice generation were obtained in the direct experimentation on the specially designed stand. Data thus obtained were processed in two ways. The mathematical model obtained from the heat balance of the ice formation process of on a vertical cylindrical surface was refined by the corrective coefficients K_f . Ice layer thickness correction factors were calculated by the corresponding relation for each point in time of the process. Taking into account the experimental data, a number of corrective semi-empirical relations has been developed for a range of water temperatures $+1 \div +10$ °C and refrigerant (R12) $-9 \div -20$ °C. A correcting exponential function in the general form:

$$K_f = C_1 \cdot e^{C_2 \tau}, \quad (1)$$

$$\delta = \delta_{\max} \cdot (1 - C_1 \cdot e^{C_2 \tau}), \quad (2)$$

here: δ - thickness of the ice at the current time (mm); δ_{\max} - maximum ice thickness; τ - time, C1, C2 - correction coefficients. δ_{\max} value is determined either by experimental data or by the developed dimensionless temperature equation.

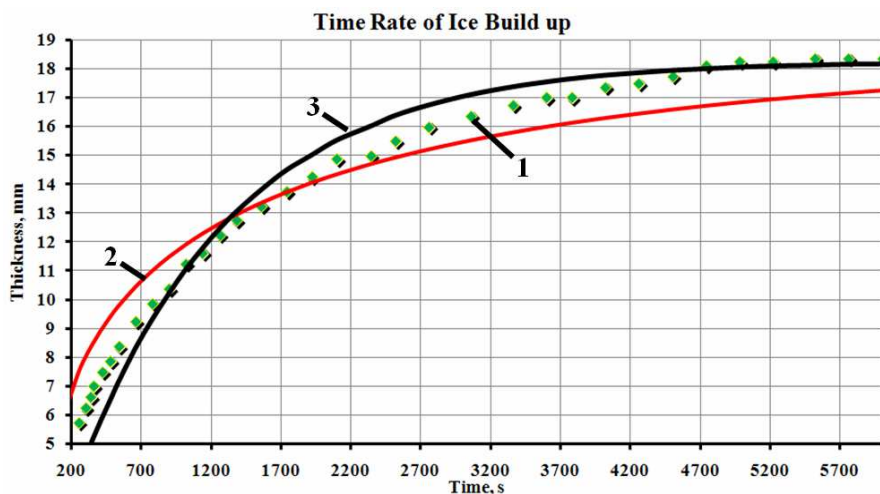


Figure 1 - Comparison of experimental and calculated data under $t_0 = -20$ °C, $t_w = +1,5$ °C: 1 - averaged experimental data, 2 - curve obtained by correcting equation (1), 3 - curve by equation (2)

KEY WORDS: vertical cylindrical surface refrigerated, evaporating refrigerant, heat transfer, thermal conductivity

PLANT FOR FOOD TEMPERATURE CONTROL DURING REFRIGERATING

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Temperature control of foods during freezing is important for the development of refrigeration processing modes, because:

- it is important to know cryoscopic temperature for setting minimal temperature of cooling or supercooling, and to calculate the percentage of frozen water in the product;
- the rate of temperature dropping during freezing impact on the course of crystallization of cellular juice in product and determines the extent of damage to its cellular structure.
- lowering the temperature in freezer will reduce the duration of freezing, improve product quality, but will increase the power consumption.

Currently, standard methods for determining cryoscopic temperature involve the use of a mercury Beckmann thermometer.

The Department of Heat Power and Refrigeration of NUFT has introduced the unit for measuring and recording temperature of product based on thermocouples. It includes the measurement part and signal conversion part. The plant allows simultaneous measuring the temperature of several samples at intervals of 1 sec, the results are automatically displayed and recorded on PC in graphical and tabular form. In 2012-2013 this plant was successfully used to determine the cryoscopic temperature of mixtures for different sorts of ice cream.

KEY WORDS: cryoscopic temperature, determining, freezing

HEAT TRANSFER TO THE FALLING VISCOUS FILMS OF SUGAR SOLUTIONS

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Heat transfer to falling films of sugar solutions within the regimes of evaporation from the film interphase and boiling at forced convection and vacuum.

There is an urgent need in the reliable correlation allowing calculation of heat transfer coefficients to highly concentrated films boiling at vacuum, which refers to the operational regimes of vacuum pans of multistage evaporators. According to the stated objective, a rigorous study into thermo - and hydrodynamic parameters of film flows has been carried out. For this purpose a special experimental rig aimed at the modeling of two - phase flows with independent phases' flow rates formation has been developed and erected.

Experimentation enveloped the regimes of evaporation free interphase surface as well as boiling at forced convection in down falling liquid films of sugar solutions within a wide range of concentrations at atmospheric pressure and vacuum. The solution mass concentration range d within 0...75%.

Analysis of the obtained data has proven, firstly, that the resultant of correlation may be based on the idea of the inter - phase turbulence suppression.

Secondly, experimental data showed that the simple criteria of the onset of the nuclear boiling in - films could be formed with the limiting condition of the steam phase appearing: which is overheating of the heat transfer surface with the given roughness of it. The resultant equation which can be used for the calculations of heat transfer coefficients to the saturated gravitational falling films in pipes is derived. This equation can be used equally within the regime of evaporation from the interphase as well as within the regime of nucleate boiling at forced convection.

KEY WORDS: gravitational descending films, sugar solutions, forced convection, multistage evaporator, vacuum

THE MAIN PRINCIPLES OF FOOD REDUCTION PROCESSES AND EQUIPMENT MATHEMATICAL MODELS CREATION

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The mathematical imitation modelling of the food manufactures technologies can serve as the basis of the information practice of design (IPD) of food production equipment.

The main principles of the corresponding models creation are defined by the IPD type: "mathematical model - intellectual expert system - design automation system". The mathematical modelling method is based on thesis: the technological processes is the multicomponential system of interconnected subjects of inquiry: edible raw materials, technological equipment elements, thermo- mechanical loading means etc. IPD is based on carrying out of the numerical experiments which realize the analytical, algorithm and digital models.

At construction of the *analytical model* of mechanical behaviour of the food medium we are guided by a principle of its conditional division on three groups: 1 - solid particles; 2 - water in various kinds and conditions; 3 - gaseous inclusions. The mathematical model construction of disperse systems behavior in food productions no equilibrium processes is offered. The constitutive relations describe the conditions of elastic - viscous - plastic flow of a solid phase.

The *algorithm model* is based on use of the net-point methods of the decision of the formulated boundary problems. There have been elaborated methods for put problem decision with use of finite element method on spatial parameters and finite difference method on time argument. The calculation algorithms are designed for most typical food technologies processes (compaction, extrusion, filtration, forming and mass transfer of elastic - viscous - plastic food masses).

The program system PLAST-002 ensuring the high level automatic condition of numerical experiments is working out upon these algorithms (*digital model*).

Within the framework of IPD the developed digital models using has allowed to perform a complex design calculation by consideration typical technological operations of disperse materials processing in food productions.

KEY WORDS: mathematic modelling, disperse materials, designing, intellectual expert system

FATIGUE DAMAGE OF TURBINE SHAFTS OF SUGAR PLANTS AT ASYNCHRONOUS CONNECTIONS OF TURBOGENERATOR TO THE POWER NETWORK

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The increase of durability of power equipment of sugar plants is the actual problem. One of the important component part of this problem is the torsional vibration of turbine shafts caused by the action of the reactive electromagnet moments which arise at asynchronous connections of turbogenerator to the power network. In some cases the torsional vibration of turbine shafts leads to theirs essential fatigue damage.

In service conditions of turbogenerators on sugar plants the asynchronous automatic connection of turbogenerator to the power network or its resynchronization are frequently used. In this case the reactive electromagnet moment M_{max} which effect the turbine shaft can exceed in several times the nominal torsional moment M_n of the turbine. For example, our calculations such a reactive electromagnet moment in the case of definite initial angle of phase shift θ between the vector of electromotive force of T-12-2 turbogenerator and the vector of supply-line voltage with account for the step-up transformer on the supply-line by length of 50 km which connect the turbogenerator with the power network of 110 KV gave the following results: in the case $\theta=30^\circ$ $M_{max}=1.85 M_n$; in the case $\theta=60^\circ$ $M_{max}=3.15 M_n$; in the case $\theta=120^\circ$ we have the maximal possible value $M_{max}=4.8 M_n$. At more close location of power network as regard to the sugar plant the values M_{max} may increase in several times because of the decrease of electric resistance of the supply-line.

The calculations of fatigue damage of most strained parts of the turbine shaft at forced torsional vibration were executed with the ANSYS software (modal analysis). The results of calculations have revealed that at definite distance of sugar plant from the power network of 110 KV (that is 50 km) and in the range of phase shift angles $\theta=0...70^\circ$ the fatigue damage of most strained areas of turbine shaft as a result of cyclic torsion over the assigned service time of the turbine (2000 startups) takes place but does not attain the marginal state of the material. However in condition that $\theta \geq 30^\circ$ the level of fatigue damage of the shaft material should be taken into account in calculations of residual durability of turbine shafts.

KEY WORDS: turbine, fatigue damage, asynchronous connections

INFLUENCE OF GAS DIFFUSION SATURATION OF SURFACE ON MATERIAL'S PLASTICITY

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Development and application of various methods of construction elements' strength characteristics improvement by treatment and sputtering of their surfaces by some substances can appreciably modify the modern materials. These methods of treatment lead to the technological structural inhomogeneity of the construction elements. Thus it is important to study physical, chemical and mechanical properties of such elements. Among the progressive techniques of physical-mechanical characteristics improvement we can name the focused radiation-beam furnish of surfaces. It changes the structure of surface layers and makes the sample to be inhomogeneous across its section. The aim of this work is the study of the influence of gaseous medium (at hand ammonium, nitro-hydrogen, nitro-hydrogen-ammonium and argon) on a creep of molybdenum for high temperatures. The techniques of experimental investigation lays in determination of sample's durability in zone of high-temperature corrosive gaseous medium under uniaxial loading. Experiments for investigation of strength characteristics of molybdenum under the physical fields were conducted on modernized apparatus designed in Institute of Strength Problems of NASU. For the experiments we take flat samples of chemically-pure molybdenum of 110x5.7x0.5 mm. Highly refined gas mixture is pumped into optically transparent reactor of quartz (with the sample in it) that was in one of the focuses of ellipsoid mirror heating chamber. The sample was heated by focused radiation-beam technique to 600°C. In 30 mm temperature in heating zone was 1000°C. The loading on sample was stepping and the creep diagram was automatically recorded. In experiment the series of samples was divided on some equal parts, each of them was tested under the different physical fields. Duration, level and intensity of loading for every part of samples are determined experimentally. The results for every chosen factor are analyzed and compared with standard part tested in inert medium (argon) under the loading temperature conditions.

KEY WORDS: corrosive gas, creep, high-temperature, molybdenum

MAGNETIC DRUM SEPARATOR FOR REMOVAL OF FERROMAGNETIC IMPURITIES FROM SUGAR

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According to the current standards (The State Standard of Ukraine N4623-2006 «White Sugar. The Technical Specification») the mass fraction level of ferromagnetic contaminants in white sugar should not exceed 3 mg per 1 kg of the product.

In Ukrainian National University of Food Technologies (Electric Power Supply and Management Department) on the base of previous scientific researches of magnetic field lines configuration and values of electromagnetic forces on ferromagnetic impurities of different sizes in magnet separators work area depending on their poles geometry, the series of magnetic separators were developed for removal of ferromagnetic impurities from granular materials of different food productions (see USSR Inventor's Certificates №1558478, January 26, 1988, №1724375, December 08, 1991 and Patents of Ukraine №13799A, April 25, 1997; №14617A, January 20, 1997; №14897A, February 18, 1997).

In the past years, an experimental model of electromagnetic drum separator for removal of ferromagnetic impurities from sugar has been designed and constructed. Separation efficiency of this device is 5000 kg of sugar per hour. This separator has specific pole geometry for creating high gradient of magnetic field and its concentration on the working area surface for providing sufficient forces of removing even low magnetic contaminants from the sugar flux. The rotation of the drum creates the conditions for guaranteed removal of ferromagnetic impurities in the discharge zone, where the magnetic field is absent. Separation quality complies with current standards.

KEY WORDS: magnetic drum separator, ferromagnetic contaminants in sugar

ESTIMATION OF STEADY-STATE STABILITY LIMIT OF THE ELECTRIC POWER SYSTEM CURRENT REGIME TO IMPROVE RELIABILITY OF POWER SUPPLY

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The task of providing reliable power supply for food industry must be specified according to the production purposes and fulfill the need to ensure stable power enterprises themselves, the reliability of power along with the economic efficiency and electricity quality, which is a major feature of electric power systems (EPS) operation, and sustainability that is one of the most important requirements in EPS operation.

The research resulted in the technique of monitoring the current limit of static stability in the EPS cross section based on the regime criterion of using synchronized measurements voltage phase in electrical network remote sites with visual weighting trajectory. The use of synchronized phase voltage angles, with the application of the proposed method, improves the accuracy of determining the value of the operational, and reserves steady-state stability power system in Ukraine, because the definition of the stability limit holds for the scheme-specific regime situation at the time (on the network topology, load and cover). Power in the cross section is a function, optimally selects mutual angles voltage vectors with high accuracy approximating this dependence, resulting in path weighting, and indicates the largest flow angles within a ten-minute interval between the sequential execution of state estimation and the visualization of the boot process section with almost continuous monitoring of the safety factor value. The proposed methodology and function approximation provide the standard deviation of the points, corresponding to measurements at 0,15-0,7% maximum power.

KEY WORDS: power system, steady-state stability, phase synchronized measurement

REACTIVE POWER COMPENSATION AT FOOD INDUSTRY PLANTS

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The ways of increasing operation efficiency of reactive power compensation on the plants are considered. Small capacitor units may be connected at the individual loads. Greater power-factor corrective effect for a given total capacitor kilovolt-ampere will result in the capacitors located directly at each individual load, since the current is thereby reduced all the way from the load to the source. The first cost of individual capacitors installation will be greater, however, than that for one unit of the same total kilovolt-amperes located at a central point. The greater saving in operating expense due to individual capacitors must be weighed against their increased first cost. The locking circuit against high voltage is presented. The problems of its engineering implementation are considered.

KEY WORDS: reactive power, induction motor, compensation, capacitor

Abstract Oral

Section **NATURAL BIOACTIVE COMPOUNDS, FUNCTIONAL AND TRADITIONAL FOOD PRODUCTS**

Sector A

CHEMICAL CHARACTERIZATION AND BIOACTIVITY OF TWO DIFFERENT SPECIES OF WILD MUSHROOMS: COMPARISON BETWEEN PORTUGUESE AND SERBIAN SAMPLESFilipa S. Reis,^{1,2} Dejan Stojković,³ Marina Soković,³ Jasmina Glamočlija,³ Ana Ćirić,³ Anabela Martins,² Isabel C.F.R. Ferreira^{1,2*}¹CIMO-ESA, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-855 Bragança, Portugal.²School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-854 Bragança, Portugal.³University of Belgrade, Institute for Biological Research "Siniša Stanković", Department of Plant Physiology, Bulevar Despota Stefana 142, 11000 Belgrade, Serbia. *iferreira@ipb.pt

Mushrooms are widely appreciated all over the world for their nutritional properties, and also for their pharmacological value. They have been considered valuable health foods, being a source of many different bioactive compounds such as unsaturated fatty acids, tocopherols, organic acids and phenolic compounds. The present work reports and compares the nutritional value, bioactive compounds and antioxidant properties of two wild edible mushroom species from Portugal and Serbia: *Boletus aereus* and *Calocybe gambosa*. Regarding the nutritional value of the studied species, carbohydrates were the macronutrients found in higher amounts and no major differences were observed between the energetic values of the samples. Mannitol and trehalose were quantified in all the studied samples and it was also possible to quantify rhamnose and fructose in *Boletus aereus* from Serbia. Analyzing the fatty acids profile, unsaturated fatty acids predominated over saturated fatty acids. About tocopherols, β -tocopherol was only found in *Boletus aereus* from Serbia; α -, γ - and δ -isoforms were part of the profile of the Portuguese samples. Protocatechuic acid was only quantified in *Calocybe gambosa* from Portugal. Two acids, *p*-hydroxybenzoic and *p*-coumaric, and the related compound cinnamic acid were found in the four samples analyzed. Concerning the organic acids, Portuguese samples revealed a similar profile, being detected oxalic, malic and fumaric acids; in Serbian species was also possible to quantify quinic and citric acids. *Boletus aereus* from Portugal was the one that revealed the highest antioxidant potential. Overall this study reports a detailed characterization of two appreciated edible mushrooms, valorizing them as a source of nutritional and bioactive compounds.

Acknowledgments

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KEY WORDS: Wild mushrooms, nutritional value, bioactive compounds, antioxidant potential.

FOOD OF THE FUTURE. WHAT WILL IT BE?

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The international community is increasingly trying to look to the future, with particular attention to unsolved problems, among which an important place belongs to the food problem.

Humanity was always facing food shortages, but now it became a global acute problem. It is difficult to characterize the global food problem with sufficient accuracy, since the calculations are suppositive.

According to the estimations, over 800 million people are obtaining hungry diet, causing physical degradation of the organism. Another 1.5 billion people in the world suffer from chronic malnutrition.

Population of the Earth is rapidly increasing. Today it exceeds 7 billion. UN predicts by 2050 it will exceed 9 billion. Moreover, the increase in world population will occur solely by the poorest countries. The population of the 49 poorest countries in the world will double to 1.7 billion people, which will greatly complicate the fight against poverty.

What could be solution of global food problem? What will be the food of the future?

KEY WORDS: Food deficiency, food of the future

ON THE MECHANISMS OF STABILIZATION OF IODINE IN BIOPOLYSACCHARIDES

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It is known that a lack of iodine in the human body leads to violations of the structure and function of the thyroid gland (TG), inadequate production of thyroid hormones and to the occurrence not only of endemic goiter but also of diseases associated with disruption of the functioning of various organs and systems, an imbalance of immune system [1]. One example of the above is a thyroid dysfunction caused by pockets of infection, particularly by chronic tonsillitis, chronic bronchitis, pulmonary tuberculosis. While treating TB patients, intestinal dysbiosis is observed due to the introduction of drugs.

Objective: to estimate iodine deficiency in patients with tuberculosis and elaboration of the method for iodine organification.

The content of iodine in the urine of patients with tuberculosis has been determined by arsenic-cerium method. During the research 150 patients were examined. According to WHO the evaluation of the level of iodine in the urine is the most effective way to diagnose iodine deficiency. Optimal (in terms of iodine) is the median urinary iodine concentration that ranges from 100 to 300 mg / l. Iodine deficiency has been determined in 130 patients (86.7%). Median urinary iodine excretion in 75 patients was less than 20 mg / l (severe deficiency); 25 patients showed moderate deficit, it made 20-49 mg / l, and 30 patients showed mild degree of iodine deficiency (50-99 mg / l). Normal level of iodine intake has been diagnosed only in 20 people.

In order to correct iodine deficiency disorders including tuberculosis, the scientists at the Branch of Razumovsky Moscow State University of Technologies and Management in Meleuz (Republic of Bashkortostan) developed biologically active additives (BAA) called iodine-inulin. Iodine-inulin is a combination of inorganic forms of iodine, such as potassium iodide organic matrix of inulin [positive decision for granting a patent for the invention № 2011147656/13 from 23.11.2011]. Inulin is a natural compound, and like starch it is a reserve carbohydrate having the capacity to be absorbed by the body to some extent. Not fully digested in the stomach and small intestine, inulin excretes a large number of adsorbed unwanted components that induce the phenomenon of dysbiosis and hypothyroidism. [2]

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KEY WORDS: iodine deficiency, tuberculosis, urinary iodine, iodine organification, polysaccharides

TECHNOLOGY OF DIETARY SUPPLEMENTS AND FOOD ANTIANEMIC ORIENTATION WITH STABILIZED IRON HEME

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According to world statistics, about 2 billion people in the world have symptoms of iron deficiency, of which the majority of iron deficiency anemia (IDA), is characterized by impaired hemoglobin synthesis.

There are two ways to solve the problem of iron deficiency anemia: medication and diet. The last is achieved by optimizing the diet and the creation of a new generation of food with micro-ingredients. The main source of iron for humans are food products of animal origin, especially the blood of food that contain iron in the most easily digestible form (in the heme).

Therefore, the establishment of food antianemic focus through the development of technology of dietary supplements from food with stabilized blood heme complex is an urgent task.

The technologies of dietary supplements, "Gemovital", "Redgem", "Fitogem", "Kalgem" blood from the food and plant materials.

Formed physiological, physical, chemical and functional and technological properties of dietary supplements, which are determined by their composition, dispersion, swelling capacity and the partial dissolution and will provide indicators of the quality of various food groups when they are introduced, including sensory, structural and mechanical properties, etc.

In the development of food technology antianemic orientation identified three main objectives of addition: medical and health care, and for everyday meals.

Clinical approbation of additives. The results suggest that the inclusion of these dietary supplements in the diet of patients with reduced hemoglobin contributes to: the normalization of hemoglobin and hemoglobin in erythrocytes.

Developed technologies for food antianemic orientation: bakery, confectionery, meat products, breakfast cereals, confectionery glaze, sweet tiles, fillings, desserts. Also available as a capsules.

New foods antianemic directionality at their inclusion in the diet of up to 200 g/day, as a single product, or in any combination with each other, are an additional source of heme iron, for both healthy and patients with IDA people.

KEY WORDS: Antianemic, heme, iron, dietary, IDA

THE USE OF WHEAT GERM PROCESSING PRODUCTS IN THE TECHNOLOGIES OF FUNCTIONAL BAKERY AND PASTRY PRODUCTS

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An alarming trend in recent decades has been the deterioration of Ukrainians' health, which is largely linked to their unbalanced diet. One way to solve this problem is to create functional foods – a new generation of products with high content of physiologically functional ingredients.

Bakery and pastry products traditionally enjoy great popularity among the Ukrainian population. However these products have low biological and nutritional value which requires finding ways of optimization of their chemical composition. The promising non-traditional raw materials for enriching these products are by-products of flour milling, especially wheat germ, which is a rich source of protein, vitamins, fiber, antioxidants, etc.

We are proposing to create functional bakery and pastry products using syrupy alcoholic extract and powdered extraction oil cake produced from wheat germ. They are dietary supplements and produced in Ukraine under the "Glukorn-100" and "Wheat germ oil cake" trademarks. These supplements are rich sources of protein, dietary fiber, vitamins, antioxidants, minerals, which makes them excellent raw materials for functional foods manufacture.

We have studied the chemical composition and the technological properties of these supplements: the activity of amyolytic and proteolytic enzymes, water-absorbing and fat retention abilities. The influence of supplements on basic processes of preparation of yeast, sponge cake and muffin dough is determined. The effect of supplements on the chemical composition, organoleptic, physical and chemical, structural and mechanical properties of baked products, as well as on the processes that occur during their storage is studied. The digestibility of protein and carbohydrate of the new products *in vitro* is determined.

On the basis of the experimental data, the technologies of functional bakery and pastry products with high nutritional value are developed. The new technologies are provided with regulations and tested at baking and confectionery enterprises in Ukraine.

KEY WORDS: unctional bakery and pastry products, wheat germ

NANOTECHNOLOGIES OF CAROTENOID VEGETATIVE ADDITIVES WITH HYDROPHILIC PROPERTIES

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Nanotechnologies of carotenoid additives including use of complex influence of the processes of thermal treatment (or freezing), mechanodestruction on raw materials during fine-dispersed grinding and antioxidants from natural spices as well as medicinal herbs are developed. Complex application of them leads to mechanodestruction of biological complexes of biopolymers with bound forms of low-molecular BAS (carotenoids, ascorbic acid, phenol compounds, etc.) with the elimination of the latter, their transition to free state with their mass increase up to 1,5...3 times, to mechanodestruction of the biopolymers to their monomers. It influences the preservation and transformation of fat-soluble carotenoids to hydrophilous form. It allows getting carotenoid additives in the form of fine-dispersed powders, pastes, and frozen purees from carotene containing vegetables (CCV), which possess principally new properties connected with a substantial increase of dispersability, assimilability, solubility, content and stability of carotenoids and other BAS in comparison with traditional powders, pastes, and frozen purees.

Increase of the mass portion of carotenoids during thermal treatment and freezing is not connected with isomeric change and can be explained by the transition of some part of carotenoids from the state persistent by biopolymers to free state due to the destruction of a hydrogen bond weakened by thermal treatment (freezing), reduction of induction interaction between them that is fixed by chemical research methods. At the same time a part of molecules of carotenoids can undergo complex formation and structural reconstruction of molecules with biopolymers (proteins, starch, cellulose, etc.) and with phenolic junctions and their fragments, which include hydrophilic groups. However water-soluble forms of carotenoids in the form of water-soluble complexes with biopolymers and their fragments possessing hydrophilic properties are formed.

Normative documents for carotenoid additives in the form of fine-dispersed powders, homogeneous pastes, frozen purees are worked out and approved.

KEY WORDS: nanotechnologies, freezing, mechanodestruction, carotenoid additives, hydrophilic form of carotenoids

NANOTECHNOLOGIES OF FINE-DISPERSED VITAMINOUS, ANTIOXIDATIVE HEALTH-IMPROVING PREMIXES FROM RAW MATERIALS WITH RECORD CHARACTERISTICS

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In KSUFTT large-scale fundamental and applied researches in the field of nutritive nanotechnologies concerning the processing of various plant raw materials, products of beekeeping and animal products with the use of cryogenic "shock" freezing and fine dispersion, which is followed by the processes of mechanodestruction, mechanoactivation, cryodestruction and cryoactivation, which allow getting fine-dispersed additives-premixes and products with conceptually new properties in comparison with traditional technologies are carried out. Nanotechnologies of fine-dispersed vegetative vitaminous, antioxidative additives-premixes in the form of fine-dispersed powders, pastes, puree, frozen concentrates and a wide assortment of health-improving products with their use are elaborated. It has been first revealed and established that complex use of the listed process technologies leads to mechanodestruction or cryomechanodestruction of the complexes (or associates) of biopolymers from low-molecular biologically active substances (vitamins, carotenoids, phenolic compositions, chlorophylls, etc.) with bound forms. It results in fuller utilization of biological potential of raw materials and destruction of bonds between polymers and transition to unbound state, i.e. extraction of latent forms of BAS (2-4 times higher than in charge stock). Mechanism of these processes is revealed. Besides mechanodestruction and mechanocracking of the polymers (protein, cellulose, pectin) to their monomers (amino acids, glucose, galacturonic acid) take place. It is known that the size of molecules of the named low-molecular BAS equals 0,3 to 1,5 Nm, i.e. final products can be received in a form absolutely different from the charge stock – in nanostructured or nanosized form. It was found that properties of such food additives change considerably when achieve nanosize. Their digestibility and solubility is several times bigger than that of traditional products. They possess high gelling properties. Chemical composition and technological effectiveness of the received additives exceed those of all known analogues. They can be added to various foodstuffs, cosmetics and pharmaceutical preparations for VIP lines.

KEY WORDS: nanotechnologies, cryogenic "shock" freezing, cryodestruction, cryoactivation, plant material

METHODS OF INTENSIFYING THE PROCESS OF MEAT SYSTEMS FREEZING

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The problem of specific rotational velocity of freezing-thawing process is rather complex due to peculiarities of thermophysical processes occurring in meat during refrigerated processing. During heat calculations and modeling of the process, final freezing temperature is taken the same for all points of the freezing system. At the same time it should be taken into account that in real process schemes it is different in the center, on the surface and in passing points.

With the purpose of intensifying the process of freezing meat systems it was experimentally proved that temperature gradient through thickness of meat system exposed to freezing is unequal for various layers and changes in time. The higher is the average temperature gradient, the bigger is the coefficient of heat transfer from the surface of the product to external environment, and the lower is the product's temperature conductivity coefficient. Herewith, losses of cold for freezing increase with the raise of water amount in the product. It is worth noting that it is not easy to calculate duration of freezing exactly because the speed of this process depends on a great number of technological factors.

One of the methods of intensifying the freezing process is the creation of two-component (on macro level) heterogeneous (on micro level) non-isothermal meat system that includes some phases. It was analytically proved that during the increase of weight fraction of one of the phases, duration freezing reduces providing evenness of the temperature field for different layers of the product, which is connected with the increase of negative enthalpy that is introduced into the system. It is determined that the degree of initial non-isothermality of particular phases and temperature of refrigerating medium considerably influence both freezing duration and functional-technological properties of meat systems. Taking into consideration intensification of freezing process, the factors which require investigation were determined – weight fraction of phases, dimensioning specifications, chemical composition (correspondingly, thermophysical characteristics), method of application, etc.

The technological model of heterogeneous non-isothermal meat system, parameters of getting which require scientific substantiation and practical elaboration was developed on the basis of the conducted investigations.

KEY WORDS: meat system, freezing (refrigeration), thermophysical processes

PROVING THE CHOICE OF CURATIVE PLANTS FOR OBTAINING ANTIOXIDANT COMPLEXES

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This paper represents an analysis of wide range for curative plants, and also the technology of dry and condensed concentrates with maximal content of bioflavonoids, which are prescribed to both direct consumption and enrichment of traditional food environments.

Searching for the new plant sources of bioflavonoids and establishing the technologies of their extraction from plant raw (with a purpose to use them furthermore in obtaining of the wide range of antioxidant foodstuff) is the topical work, aimed at the protection of human organism from malignant external factors. It has thereby become the purpose of our researches.

The objects researched in this paper are the following plant raw materials: nettle leaves; red beet leaves; syzygium buds; oregano flowers; melissa flowers; peppermint leaves; pepper fruit; thyme leaves; salvia leaves; elder berries and leaves; black currant leaves; hypericum herb; birch buds; chamomile flowers; oak bark; immortelle flowers; calendula flowers; eglantine berries.

There was proved that the usage of curative plant raw material in different vegetation periods of its growth would allow (dependently on their purpose) to obtain the maximal concentrations of various polyphenol compositions – flavonoles, anthocyanins, catechins. We also proposed the technology of complex procession of curative plant raw materials into dry and condensed bioflavonoid concentrates. The products which would be produced according to the new technology are open to competition because of their correspondence to all the modern criteria of quality and safety. This is a crucially important factor of Ukraine's membership in World Trade Organization. We foresee the constantly increasing demand on such products due to worsening ecological situation both in Ukraine and abroad.

KEY WORDS: anti-radical activity, polyphenol compositions, disintegration, extraction, vacuum-concentration

BIOLOGICAL VALUE OF FOOD PROTEIN EXTRACTED FROM GREEN MASS OF SUGAR BEETS

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It is well-known that the biological value of a food product may be defined by not only the content of protein, but also its quality. Therefore, the purpose of this paper is to study the factional composition of proteins from green mass of sugar beets – the index that would determine its influence on proteins' digestibility.

So, the factional composition of proteins extracted from the green mass of sugar beets was studied as one of the main criteria for its biological value. We have confirmed that proteins contain mostly water and salt soluble factions, and this fact provides their better balance by amino acids. The consequence of this fact is the higher grade of proteins' digestibility by proteolythic enzymes in human organism. The re-spreading of factional composition of green mass of sugar beets was also studied for different types of their procession. There was also affirmed that the proteins extracted from green mass of sugar beet are significant due to their high biological value; particularly, they are partly similar to the animal proteins by amino acid content. One of the possible ways to increase the biological value of the biocomponents found in green mass of sugar beets is their procession at the temperatures below zero.

KEY WORDS: sugar beets, green mass, proteins, amino acids, digestibility, proteolythic enzymes, fractioning.

WILD BERRIES AS POTENTIAL RAW MATERIAL FOR PRODUCING FUNCTIONAL FOODSTUFFS

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The wild plants are supposed to become the remarkable object for researches, thanks to their ability to accumulate the larger concentrations of biologically active substances during synthesis than their cultivated analogues may. The global funds of wild raw materials are calculated in 5,320 species.

The authors of this article represent the experimental results for the choice of wild grown plant raw (particularly berries) to create the high-vitamin compositions of fresh frozen products. The purpose of this paper is to provide Ukrainian population with essential biocomponents throughout the year. With a help of standard research methods, we defined the concentration of ascorbic acid, poly-phenol substances, pectin substances, organic acids and sugars in five sorts of berries (raspberries, cranberries, blueberries, black currant, and viburnus). The analysis of qualitative and quantitative indices found in processed raw materials has allowed us to recommend the researched kinds of berries to produce the fresh frozen foodstuffs that should be remarkable due to high organoleptic characteristics, sufficient content of vitamins and vitamin-related substances, and the optimal correlation between sugars and organic acids.

Based on the analysis of experimental data, we have confirmed the conclusions made by other researchers, which concern the ability of wild berries to synthesize and accumulate the concentrations of essential biologically active substances higher than in their cultivated analogues. This is why the introduction of wild grown fruit and berries, which are wide-spread in Ukraine, into the sphere of food technologies, is grounded scientifically and expedient economically.

KEY WORDS: wild berries, nutritional value, biological value, vitamins, pectin substances, organic acids, poly-phenol compounds

PUMPKIN SEED PRE-TREATMENT PRIOR TO COLD PRESSING TO ENHANCE OIL EXTRACTION EFFICIENCY

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Pumpkin seed oil is rich in tocopherols and sterols. Phenolic profile of pumpkin seed oil is diverse and comprises six phenolic acids: protocatechuic, caffeic, syringic, vanillic, p-coumaric and ferulic. Based on its seed oil features and health benefits, pumpkin may be considered as a valuable source for new multi-purpose products for industrial, cosmetic, and pharmaceutical utilisation. Therefore, it is important to determine a suitable extraction technique for pumpkin seed oil which enables maximum extraction efficiency.

Conventional vegetable oil extraction is carried out by solvent extraction or pressing. Solvent oil extraction is usually used for seeds with low lipid content. It is the most efficient method, but its application presents some industrial disadvantages such as security problems and high operation costs. The safety and simplicity of the oil seeds mechanical pressing process is more advantageous than efficient solvent extraction equipment. Furthermore, materials pressed out generally have better preserved native properties. However, extraction by just pressing the seeds is relatively inefficient. It is advisable to research new approaches for oilseeds pre-treatment that also enable better recovery and availability of desirable plant metabolites. Within these pre-treatments, the microwave heating is recommended, due to its special warming mechanism and moderate capital cost.

Pumpkin seeds were subjected to steaming followed by microwave treatment prior to pressing to enhance the extraction efficiency. Steaming treatment during 20 min was used to adjust the moisture content (11..12%) of starting pumpkin seeds and to help heat soften and break down the oil containing cells. As a result the extraction efficiency increased from 32, 8% for control oil sample to 60, 4 % for microwave treated. Consequently, microwave pre-treatment coupled with steaming resulted in pumpkin seed oil extraction efficiency that increased almost twice.

KEY WORDS: pumpkin seed oil, extraction efficiency, steaming, cold pressing

EXTRACTHIN OF HLOROPHYLL-CAROTENOID COMPLEXES FROM THE GREEN PART OF WILD AND CULTIVATED PLANTS

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Chlorophyll - a solar energy that enters in the body of animals and humans, which them ingesting green plants. It is known that in the human body chlorophyll enhances immune function, participates in the synthesis of blood cells, promotes tissue repair, inhibiting pathogens, restores the function of the gastrointestinal tract, activates the action of enzymes involved in the synthesis of vitamins E, A and K.

Along with the green pigments in the chloroplasts of plants are carotenoids that protect them from fotooxidation. In human beings carotenoids exert anticarcinogenic and immunomodulating actions, prevent harmful cholesterol synthesis, inhibit free-radical oxidation of biopolymers, have provitaminnu activity.

The objective is to choose plant material high in chlorophyll and carotenoid and food extractant for maximum extraction of fat-soluble pigments from it.

In order to receive chlorophyll-carotenoid complex, was determine the content of fat-soluble pigments in the higher plants such as fennel, parsley, carrot tops and beet, alfalfa grass, green oats, nettle, plantain. Found, that the highest content of chlorophyll had nettle leaves (0.594 g /%) and carrot tops (0.563 g /%). In other plants its content varied from 0.211 g /% to 0.283 g /%. The maximum carotenoid content was also in nettle leaves (0.138 g /%) and carrot tops (0.124 g /%).

Usually, in food industry using water-alcohol solutions of different concentrations as a solvent. Studies have shown, that a good extraction chlorophylls and carotenoids are 80% aqueous solution of ethanol, wich allows to remove from plant material up to 40 ... 45% chlorophyll and up to 45 ... 55% carotenoid of their total content in the raw materials.

KEY WORDS: Schlorophyll-carotenoid complex, green plants, solution of ethanol

OIL SEEDS AS A SOURCE OF EDIBLE PROTEIN

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Supplying of food by high biological value protein is still actual at the present time. Oil seeds are considered as a source of food and feed protein. Traditionally the source of plant protein is soy seeds. At the same time protein content of other oil seeds is high too and their biological value is sufficient enough. Oil seed protein contains all essential aminoacids. Nevertheless protein production from oil seed is very restricted.

The influence of technological parameters such as solvent content, temperature, duration, enzyme presence on the protein recovery from meal of different oil seed (sunflower, soy, rape) and their functional property was investigated in this work.

The maximal yield of protein isolates from sunflower meal was received with using of alkaline solvent. But protein extraction by neutral solvent such as sodium chloride solution results in better technological properties of obtained protein isolates. The optimum temperature for protein extraction from different meal was 45-50 °C and extracted protein quantity reached its maximum after 40-50 min extraction duration.

Using of proteolytic enzyme during protein extraction resulted in increasing of extracted protein quantity and improving their technological properties. Thus sunflower protein isolate yields were from 20 to 60 % higher in the presence of typsin in comparison with a control. The same effect of trypsin we have observed in case of soy protein isolates recovery. Simultaneously, increasing of solubility, emulsifying and foaming capacity of protein isolate was observed.

Researching of bacterium protease and cellulase effect on the process of protein extraction and technological properties of obtained isolates has shown accelerarion of protein extraction and improving of their properties.

The hydrolysis degree of protein was estimated by electrophoretic separation of polypeptides of obtained protein isolates in SDS-polyacrilamide gel. The increase of polypeptide content of low molecular weight was detected after enzyme treatment.

KEY WORDS: oil seed, protein isolates

LIQUID ACTIVIZATION WHILE BAKING BREADS IN BREADMAKER

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In food technologies water, liquid and moisture are synonyms [2]. In work we expand concept of a liquid and we will treat as a liquid everything that spreads, in particular, the dough also we will consider as a liquid.

According to the book of the recipes recommended by manufacturers of breadmaker, all components share liquid and firm fractions. The traditional technology of preparation of bread brioche gives bread which completely fills the form. If liquid is made active, bread rises under a cover of breadmaker and as this space does not heat the bread top is not baked thoroughly. The made active bread brioche of standard volume is obtained, if pawned components to reduce by 20 %.

If to any standard mix for baking (there exist about 10) to apply technology of activization of a liquid the dough rises enough and gets to non heated zone of breadmaker. To receive bread of the standard sizes, it is necessary to reduce the quantity of pawned components to a third. For this purpose two standard packages of a mix are used for baking of 3 loaves of bread. There are no small packages for preparation by liquid activization of technology only one loaf of bread. It means that the offered technology is absolutely new and was not applied earlier anywhere. The liquid activization technology a can be applied at different stages of baking breads with deenergizing breadmaker or without deenergizing. Breadmaker does not interrupt the program of baking if the switching-off mode lasts less than 20 minutes. In our practice any liquid activization technology takes no more than 5 minutes.

Some variants of technology of liquid activization are offered. Transformation of liquid fraction into foam is one of variants of liquid activization applied to bread brioche. The mathematical model for this technology is constructed. It shows that foam 1, 5 times is more effective than liquid fraction. For transformation of liquid into foam V - technology of beating is used [1].

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KEY WORDS: technology, breadmaker, activization

FREE RADICAL SCAVENGING ACTIVITY, PHENOLIC AND ASCORBIC ACID CONTENT OF JUICE DRINKS WITH PHYTOEXTRACTS

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The interest in the preventive properties of dietary chemicals has increased in recent years. Our goal was to develop new kinds of juice drinks with phytoextracts that can potent antioxidant activity.

We investigated the antioxidant ability, phenolic and ascorbic acid contents of six widely edible medicinal plants - *Rosa cinnamomea* L., *Vaccinium myrtillus* L., *Origanum vulgare* L., *Glycyrrhiza glabra* L., *Sanguisorba officinalis* L., *Crataegus sanguinea*. The results of our previous study showed that tested extracts possess potent antioxidant activity and may be considered as natural source of antioxidants.

The experimental samples of juice drinks with the addition of water phytoextracts were developed. Apple, orange, grapefruit, carrot, red beet and celery juices were used. Total amount of juices in drinks ranged from 12 to 20%, amount of extracts was 5 - 10%. The organoleptic, physicochemical characteristics of experimental drinks were studied.

Standard antioxidant assays assessed the capability of drinks in scavenging 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical. The drinks possessed significant antioxidant activity compared to ascorbic acid. It ranged from 1.12 ± 0.032 to 2.35 ± 0.049 mM of the ascorbic acid equivalent (AAE) antioxidant capacity per 100 ml of drink. Drinks' antioxidant activity correlated with their phenolic content.

Total phenolic content was determined by Folin-Chocalteu assay, it ranged from 11.4 ± 0.48 to 28.2 ± 1.12 mg gallic acid equivalents (GAE) per 100 ml of drink.

The content of ascorbic acid was determined by colorimetric assay. The highest ascorbic acid value was 16.4 ± 0.48 mg per 100 ml of drink.

All experimental samples of drinks have original organoleptic properties and high free radical scavenging activity. Regular use of drinks can provide positive effect on human organism.

KEY WORDS: Juice drinks, antioxidants, extracts, DPPH

PREPARATIVE SIMULATED DISTILLATION IN THE TECHNOLOGICAL PROCESS MANAGEMENT OF NATURAL FLAVOR OBTAINING

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In countries around the world, physical distillation process management of crude petroleum is performed on the results of preparative simulated distillation, which greatly improves the quality of petroleum products and makes its obtaining cheaper. The research purpose was the use of preparative imitated distillation for management of essential oil distillation modes into fractions of different flavor, stable and harmonic characteristics. These fractions are natural concentrated flavors, as well as promising as components of combinational flavors.

Researchers are actual in flavor technologies, quality control of raw material with predicting of its perspective and trends of use in flavored products. Operative (30 - 40 minutes) installation method of boiling range temperature of essential oil components was elaborated to achieve this purpose. This allows to manage organoleptic faction properties and to plan their flavor. Thus it is sufficient to have essential oil samples in grams for such information obtaining which is in 200 times smaller than in real industrial distillation. Nonpolar stationary phase HP-5MS is theoretically and practically substantiated; quartz capillary column 30mx0.25mmx0.25mkm which ensures straight line position close to one another on the graph "retention value - boiling temperature" is chosen. The efficiency of such column is 160 thousand theoretical plates. Conditions of the analysis that ensure maximum correlation between boiling temperatures and Kovats index of aromatic components of essential oils are investigated.

For essential oil fraction obtaining in individual mode of preparative distillation, the fundamentals of resolution column production with the 400 theoretical plates were elaborated; was selected the solid carrier - chromosorb A (manufacturer is "Johns Manville" (USA) and stationary phase - PMS-100 by the production of "Reahim" ("Peaxim"). Process conditions were formed. They are: injector temperature is 200 ° C, column thermostat temperature is 70 - 200 ° C, detector temperature is 200 ° C; carrier gas consumption is 1.0 cm³ / min, hydrogen consumption is 33 cm³ / min, air consumption is 330 cm³ / min, sample volume is 0.5-0.8 mc.

Essential oil identity is proved on all control characteristics during the comparative studies of fractions, obtained by fractional distillation under vacuum and preparative simulated distillation.

KEY WORDS: Simulated distillation, essential oil, preparative excretion, flavor.

**IMPORTANCE FUNCTION APPLICATION (HARRINGTON SCALE) IN THE PROBLEMS OF
MULTIOBJECTIVE OPTIMIZATION IN CONFECTIONERY RECIPES**

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When analyzing technological processes that simultaneously depend on several factors of different nature, results are often received as values of different characteristics - partial criteria. For math modeling of such research important problem is to find the target function - combination of several separate criteria f_1, f_2, \dots, f_N into one general criteria of efficiency $F = F(f_1, f_2, \dots, f_N)$, which is a mandatory component of multiobjective optimization problems. As partial criteria have got different meanings and therefore different units of measurement, the value of partial criteria are to be transferred into dimensionless quantities, by normalizing them with the largest possible value - $\frac{f_k}{f_k^{\max}}, i = \overline{1, N}$,

or in a some other.

However, it happens that the operation of normalizing is not enough to ensure the homogeneity of indicators for their rational amalgamation into a single criteria of effectiveness. For example, among the parameters which values are normalized to a change in the interval $[0;1]$, the value of 0.75 for one of the indicators may be good, but for another - unsatisfactory. To combine these indicators in a correct way it is suggested to apply the scale of importance, which transfers the individual indicators (empirical or psychological numerical form) into numeric values of the scale of importance. The main numeric marks of the scale of importance are the points on the curve, that is increasing from 0 to 1 and is analytically described by the function

$$d(f) = \exp(-\exp(-kf - a)), \quad (1)$$

where a, k - are constant values, different for each criteria, that depend on the numerical values of the criteria.

For example, for the production of cream it is suggested to find optimal correlation of ingredients on technological indexes. For each indicator (partial criteria) a graph of recalculation is built in terms of the function importance (1), or there is a function that approximates separate values of a certain criteria (for example, by the method of the least squares) $d_i = d(f_i), i = \overline{1, N}$. For a generalized estimation the product quality of the criteria of "quality polygon" must be used:

$$F = d_1 d_2 + d_2 d_3 + d_3 d_4 + d_4 d_5 + d_5 d_1, \text{ or } F = \sum_{i=1}^n d_i d_{i+1} + d_1 d_n \quad (2)$$

The advantage of the criteria (2) is its sensitivity to possible excessive reduction of some of the criteria and simplicity in usage. The best pattern is with a maximum value of the function (2).

KEY WORDS: criterion, indexes, technology

BOUNDARY INTEGRAL EQUATIONS FOR PROBLEMS ABOUT PLANE DEFORMATIONS OF LINEAR VISCOELASTIC MEDIUM

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The technological processes of food productions are often related to materials or raw material, mechanical properties of which are viscoelastic. In a plane viscoelastic area $D(t)$, limited by the smooth reserved contour $L(t)$ at $t \geq 0$ integro-differential equation of equilibrium is

$$\mu \Delta \bar{u}(\bar{y}, t) + (\lambda + \mu) \text{grad div} \bar{u}(\bar{y}, t) - \mu \int_0^t q(t - \tau) [\Delta \bar{u}(\bar{y}, \tau) + \frac{1}{3} \text{grad div} \bar{u}(\bar{y}, \tau)] d\tau + \bar{f}(\bar{y}, t; \bar{u}) = \bar{0}$$

(1) at the set tensions $\bar{p}_n(\bar{x}, t)$ in contour point $L(t)$. Explanatory notes: μ, λ are instantly-resilient steel; Δ is Laplace operator; $\bar{u}(\bar{y}, t)$ is a displacement vector; $\bar{f}(\bar{y}, t; \bar{u}) = \rho_0 \bar{m}(\bar{y}, t) [1 - \text{div} \bar{u}(\bar{y}, t)]$ ($\bar{m}(\bar{y}, t)$ is mass force intensity, $\rho_0 = \rho(\bar{y}, 0)$ is material density, $\bar{y} \in D(t)$); $q(t) = ce^{-\beta t} t^{\alpha-1}$ is Rzhanicyn relaxation kernel ($\beta, c > 0$, $\alpha \in (0, 1)$ are parameters of material); \bar{n} is a normal of the given contour point $\bar{x} \in L(t)$.

The solution of this problem is as a sum of partial solution of equation (1) and viscoelastics potentials of a simple layer: $\bar{u}(\bar{y}, t) = \bar{u}[\bar{f}] + \sum_{k=1}^2 e^{-k t} \int_0^t d\tau \int_{L(\tau)} \bar{v}(l, \tau) \cdot \bar{v}^{(k)}(\bar{y} - \bar{x}; t - \tau) dl$, (2)

where $\bar{v}^{(k)}(\bar{y} - \bar{x}; t - \tau)$ is a fundamental solution of equation (1).

The substitution of expression (2) in a boundary condition results in the system of the second type integral equation in relation to a component of the sought vectorial density of potential $\bar{v}(l, t) \in L(t)$

$$\pi v_1(l_0, t) + \int_{L(t)} \sum_{i=1}^2 v_i(l, t) K_{1i}(l, l_0; t) \left| \frac{\partial \bar{x}(l, t)}{\partial l} \right| dl + \int_0^t \tilde{k}(t - \tau) d\tau \int_{L(\tau)} \sum_{i=1}^2 v_i(l, \tau) k_{1i}(l, l_0; t, \tau) \left| \frac{\partial \bar{x}(l, \tau)}{\partial l} \right| dl = \psi_1(l_0, t)$$

(3)

$$\pi v_2(l_0, t) + \int_{L(t)} \sum_{i=1}^2 v_i(l, t) K_{2i}(l, l_0; t) \left| \frac{\partial \bar{x}(l, t)}{\partial l} \right| dl + \int_0^t \tilde{k}(t - \tau) d\tau \int_{L(\tau)} \sum_{i=1}^2 v_i(l, \tau) k_{2i}(l, l_0; t, \tau) \left| \frac{\partial \bar{x}(l, \tau)}{\partial l} \right| dl = \psi_2(l_0, t)$$

where $K_{ij}(l, l_0; t)$ and $k_{ij}(l, l_0; t, \tau)$ are equation kernel; $\tilde{k}(t)$, $\psi_1(l_0, t)$ and $\psi_2(l_0, t)$ are the known functions. The method of "steps at times" is used for numerical calculations of the proved system of integral equation of the 2-nd type (3).

KEY WORDS: Viscoelasticity, relaxation kernel, viscoelastic potential, fundamental solution, potential density, integral equation kernel.

MATHEMATICAL ASPECTS OF DETERMINATION OF THE AVERAGE SPEED

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Mathematical methods are important in the study of various aspects connected with the chemical and technological processes in the food industry.

For research of technological problems it is necessary to be able to use mathematical apparatus, know its limits of permissible use.

Mean value theorem mathematically proves the determination of the average speed of a process described by the function $f(t)$ for a certain period of time, particularly in microbiology and chemical and food technologies.

It is known that the classical Lagrange theorem asserts the following fact:

if real function $f(x)$ is continuous on the segment $[a; b]$ and differentiable inside this segment, then there is a point $x = c; a < c < b$ for which the equality fulfils

$$\frac{f(b) - f(a)}{b - a} = f'(c).$$

The wording of this statement may be altered at that. Namely, if we write down the indicated equality as

$$\frac{f(b) - f(a)}{b - a} = \frac{1}{b - a} \int_a^b f'(t) dt, \text{ the mean value of the derivative turns out to be equal to its value at some}$$

middle point.

The statement of this theorem is true, of course, for each segment $[x_1; x_2] \subset [a; b]$, which will have its own middle point. Thus, each finite-difference ratio of functions $f(x)$ is sure to some value of its derivative, and then we can write the following relationship between two sets:

$$\{f'(x)\} \supset \left\{ \frac{f(x_2) - f(x_1)}{x_2 - x_1} \right\}, x_1, x_2 \in [a; b].$$

Such strict inclusion is satisfied in the general case, but the closures of these sets coincide.

Researches associated with technologies often require computing mean values as a speed $f'(t)$, specified by time t of process passing and a speed $f'(f^{-1}(y))$, characterized by a number y of substance reacted in this process. The monotonic is essential condition for the function $y = f(t)$ here. However, in general, the process is described by a functional dependence that is not monotonic on the given interval.

However, it turns out, if on the time segment $[t_1; t_2]$ the process is determined by the function $f(t)$, which has not infinite levels or the set of its infinite levels is nowhere dense so on the segment $[t_1; t_2]$, there is everywhere dense system of intervals in pairs without common points and $f(t)$ is monotonic on each interval. This fact allows to calculate the mean values of these speeds.

KEY WORDS: technological process, food technology, average speed, mathematical method

FRUIT JELLY MARMALADE RECREATIONAL PURPOSES

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This work is devoted to development of a process of obtaining the fruit and jelly marmalade with pectin as structurant, gelling apple and rhubarb sauce enriched by fruit juice and black elderberry and extracts of herbs (thyme, oregano and violet).

The choice of this raw material is due to the fact that vegetable raw material is a valuable source of biologically active substances, the content of which in traditional marmalade is negligible.

The aim of our work is to obtain marmalade with high nutritive value and high antioxidant activity, as well as with a marked pharmacological effect. Antioxidant effect of medicinal plant extracts, and fruit and vegetable components is caused by the presence of their large number of phenolic nature substances, such as flavonoids, flavonols and anthocyanins. Therefore, their contents in the fruit and vegetable components and proposed phytoextracts was analyzed. Obviously, the presence of herbal components in a marmalade recipe enriches the finished products with a large number of phenolic components; also the effect of marmalade enrichment with catechins, flavonols, anthocyanins by using the enrichments is calculated.

By using of trial brews ratio of ingredients and the optimum technological regimes, which allow to get the finished product of high quality were found, and organoleptic and quality factors of the finished product were estimated.

Determined that the usage of rhubarb puree and elderberry fruit juice totaly of 25-30% and water-alcoholic extracts in an amount of 2-4% allows to eliminate the additional introduction of citric acid to the marmalade masses.

The expediency of usage in marmalade technology the elderberry juice and water-alcoholic extracts of thyme, oregano and violet is confirmed. It allows creating finished product with recreational purposes and good taste, appearance, improved nutritive value and marked pharmacological effect.

KEY WORDS: marmalade, fruit juice elderberry, water and alcoholic extracts of Thyme, Oregano and Viola Tricolor

ELABORATION MIXTURE BASED ON PLANT MATERIALS FOR PREVENTIVE FOOD FORTIFICATION

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Nowadays herbal plant material is still new raw material in the production of food preventative action. However, their use in the food industry is gradually increasing especially in the production variety drinks, soul-milk foods, etc.. With the growth demand and supply of food products attention increases on the use materials with domestic producers. It gives to possibility considerably to enrich and extend the assortment of fito- composition, creating quality products at moderate price for all layers of population.

On the basis of literary data was chosen plant material, they have a high content of biologically active substances, vitamins and micro-and macronutrients that are available and promising and protect the body from oxidation. The structure of our proposed composition comprises: Walnut milky ripeness, Melilotus officinalis (Herba cum Floribus), brier, black currant and Stevia rebaudiana.

In walnut fruit contains vitamins B, A, C and P. Stocks walnut and due to its many beneficial properties.

Melilotus officinalis contains coumarin, coumaric acids essential oil, slime, purine derivatives, fat-like substance. The most important ability of Melilotus is to absorb selenium from the soil and accumulate it.

A brier is rich in flavonols that can reach 83-280 mg% and vitamin C (205-3100 mg%), and B vitamins, pectin and macro-and micronutrients.

Blackcurrant reach high in vitamin C and bioflavonoids, pectin and macro-and micronutrients. The process of extracting bioactive substances herbal plant material was investigational with various extractants. The optimum conditions of extraction are set.

Physical and chemical studies of the got extracts are undertaken. In appearance extracts were transparent, no sediment, with its characteristic taste and aroma of the raw materials.

The compounding of mixture was worked out.on the basis of experimental researches.

In this way the proposed plants to create mixture complement each other and perform antioxidant effect on the body, showing the prospects of using the composition to enrich foods preventive action.

KEY WORDS: herbal plant material, flavonoids, antioxidant effect

THE USE OF ROWAN BERRIES IN BREAD HEALTHY PRODUCTS

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One of the ways to increase the food value of products can be used as functional ingredients of wildy growing berries and products of their processing, as possible sources of vitamins, bioflavonoid, pectin and mineral substances.

The choice of wild rowan as the raw material for enriching of bakery products is conditioned by high maintenance of bioactive substances. They have a large source of raw materials, ecological cleanness, availability and low prime price. As fruit and berry raw materials are seasonal sources, it is expedient to dry out the berries. They can be restored before the use by wetting in different liquids where a swelling process will be.

For getting the high taste qualities, attractiveness and necessary consistency of berries pulp it is necessary to provide the maximal swelling of berries high-molecular substances. The swelling process of the dried up rowan was investigated in water, in the solution of salt by a concentration 5% and in the solution of sucrose by a concentration 5%.

The highest speed of swelling is observed in the sucrose solution, where at 20°C process is completed in 6.5 hours. In water a process lasts 7 hours and in salt solution - 10 hours.

The most fully rowan berry can be restored in water, where a maximum degree of swelling is 96%. In sucrose solution this index is 80%, and in salt solution - 71%.

The influence of water temperature was investigated in the range of 20..60°C. The speed of rowan swelling was increased twice for every 20°C. The time of complete swelling was reduced and made for 40°C 3,5 hour, and for 60°C 2 hours. The maximum degree of swelling is increased and at 20°C is 96%, at 40°C is 125%, and at 60°C is 145%.

Conclusions. The optimal terms of renewal swelling of process of the dried up rowan berries are: temperature is 60°C; time of contact is 120 minutes; a liquid for swelling is water.

KEY WORDS: rowan, swelling degree, functional ingredient.

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| Oral Presentations |
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| Section NATURAL BIOACTIVE COMPOUNDS, FUNCTIONAL AND TRADITIONAL FOOD PRODUCTS |
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| THE OCCURRENCE OF AFLATOXINS IN SERBIA – FROM FEED TO FOOD |
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Serbia one of the largest maize producer and exporter in Europe. Maize is mainly used as a component of animal feed (80%) as well as for human consumption and starch production. Extremely hot and dry conditions followed by drought were present during maize growing season in 2012 and were favorable for mold growth and mycotoxins productions, so high contamination frequency of aflatoxins (AFs) in whole feed-to-food chain were occurred.

During this study, a total of 378 samples of maize (302), maize silage (49) and complete feed (27) were examined for the presence of sum of AFs (B1, B2, G2 and G2). AFs were detected in 211 (69.9%), 19 (38.7%) and 10 (37%) of analyzed maize, maize silage and complete feed samples, respectively.

Serbian Regulation prescribes 50 µg/kg as maximum permitted level for sum of AFs in maize and feed materials. According this Regulation 28.2% of maize, 2.0% maize silage and 4.8% complete feed samples can not be used for animal diet.

Presence of AFs in maize and feed resulted in the appearance of aflatoxin M1 (AFM1) in milk. A survey about AFM1 levels in total of 87 raw and heat-treated milk showed that AFM1 was detected in all examined samples. In contaminated milk samples AFM1 concentrations were distributed in the following way: 9 (10.3%) had concentration between 0.01 and 0.05 µg/kg, 50 (57.5%) had concentration between 0.05 and 0.25 µg/kg and 28 (32.2%) samples had concentration greater than 0.25 µg/kg. Presence of AFM1 in milk resulted in the Regulation changes, and maximum permitted level of AFM1 was changed from 0.05 to 0.5 µg/kg.

The obtained results for AFs occurrence in feed materials and milk confirmed that those samples should be continuously monitored in order to protect the population against the unallowable risk of AFs contamination. The authors acknowledge the financial support of the IPA Project: HUSRB/1002/122/062 ToxFreeFeed, Improvement of safety of corn-based feedstuffs through using more resistant hybrids and management of corn processing

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| KEY WORDS: maize, aflatoksins, milk |
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MAIN ASPECTS OF USAGE OF PLANT RAW MATERIALS WITH DIFFERENT FUNCTIONAL AND TECHNOLOGICAL PROPERTIES IN FARINACEOUS PRODUCTS TECHNOLOGY

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The analysis of chemical structure, the study of physiological and technological qualities of medicinal and aromatic plants, testify their application perceptiveness in bread-baking industry.

The correct choice of plants, their efficient compounding, preparation for production operations allows to ensure the necessary physiological and functional technological properties creation, thus solving relevant problems of the sector towards following directions:

- diversification of bakery products with improved physiological properties, of specific and functional orientation;
- improvement of intensified and traditional technologies, providing colloidal, biochemical, microbiological processes intensification. These raw materials content of scarce for flour intermediate products micro- and macroelements, some vitamins, organic acids allows to consider them as enzymatic activity regulators, efficient enricher for yeast and lactic acid bacteria activation (Humulus, Rosa canina, Berberis, Aronia, Craetegus);
- prevention of bakery products spoilage due to compounds with antibiotic properties content during highly microbiologically contaminated flour processing, at the time of fortified products, whole-grain bread, containing more contaminated with microorganisms ingredients, production (Humulus, Hypericum, Anethum graveolens seeds);
- development and introduction of technologies for national bakery products and products without yeast. Potentially detrimental microflora suppressing compounds availability and fermentative microorganisms resistance to them allows to develop measures of specific bread-baking intermediate products composition control, yeast and lactic acid bacteria development during sourdough propagation regulation in dilution cycle, their technological stabilization in production cycle, obtain end products with significant consumer-relevant properties, pronounced flavor, high assimilability (Humulus, Pimpinella anisum, Illicium);
- raw materials antioxidant properties make it possible to use them as substances alternative to food additives for preventing long-term products oxidative spoilage.

Thus medicinal and aromatic raw materials usage in farinaceous products technology including bread-baking enables solve in complex the branch problems, ensures the obtainment of products with high consumer-relevant properties, physiological value, microbiological attributes and safety during the changing of production conditions.

KEY WORDS: medicinal, aromatic raw materials, quality

CONTROLLING THE PROCESS OF GEL FORMING IN JELLY PRODUCTION

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Different jelly confectionary products such as candies, fruit jellies, marshmallows, have always enjoyed great consumer demand. Traditional jelly forming agents such as agar and the like (polysaccharides derived from red seaweed) have been used for their production. They are able to form gels binding significant amount of water, which is an important food-processing factor. Besides, due to their ability to accumulate in their tissues the elements contained in seawater seaweeds are used as therapeutic means. It is due to the fact, that the Black sea algae production, which is both a raw material for gelling agents and the ocean oxygen generator, is at the moment limited by the Ministry of the Environment of Ukraine. Thus, the satisfaction of the present demand for seaweed at is an acute problem of today

In our view a more effective way to reduce the input of gelling agents during the production of jelly-based products is the development of the technologies of jelly items of the reduced gelling agent input capable of saving gelling agents and with the same or improved functional properties. These will allow to increase the amount and the range of jelly products as well as their cost

To achieve this we have to study the mechanism of gel forming of polysaccharides of red seaweed as well as the effect of various chemical additives and physical fields on the changes of main functional properties of solutions and gels. The understanding of the mechanism

To achieve this we have to study the mechanism of gel forming of polysaccharides of red seaweed as well as the effect of various chemical additives and physical fields on the changes of main functional properties of solutions and gels

The understanding of the mechanism of these substances' structure formation will let us consciously influence the gel forming capability of polysaccharides of red seaweed. And the improvement of the functional properties, that is the increase of the temperature and the duration of gelling of solutions, the increase of the strength and the temperature of melting of gels, will contribute to reducing the input of this valuable raw material

Based on the theoretical and experimental researches we can make a conclusion that it is possible to control the gel forming process in jelly production, if to put in compounding mixture modifying additions, or to apply the different physical fields. On the basis of the researches the new technologies of jellies production with reduced on 25-60% expense of gelling agents from red seaweeds are developed and introduced

KEY WORDS: gelling agents, gel formation process,

ENERGY CLOSED CONTOUR IN FOOD TECHNOLOGY

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Presence in food technologies cooking process material flows means the appearance of secondary energy resources. The source of the latter may be the primary energy in the form of chemical, electrical or thermal energy. While secondary energy resources may be that shown in solid, liquid, steam, gas, or steam media. In most cases are the most energy efficient vapor streams, as they contain the heat of phase transition. However, energomaterial flows with a significantly lower potential to play an important role in software of companies.

Offered the use of a direct interaction between the input and output streams of energy. This interaction can be via the heat exchange surface without intermediate energomaterial coolant or with its use. It may be used or not used energy transformation of secondary energy resources and energy-political "cost" of such transformations by 1-2 orders of magnitude smaller behavior of result in potentials. Readily available in the processes of transformation of the secondary vapor are indicators corresponding to the primary and such transformations are the most effective and also their implementation is technically available to large enterprises sixth. Some of the equipment of this purpose are catching heat pumps with mechanical or thermal compression. At the level of propotection it is proposed nearly 20 designs systems, including heat pumps, arranged on the basis of the Carnot cycle, which can potentially transform low-potential energy flows into highly-potential.

Important in achieving low-energy effects is used recuperative tion flows to regenerate their thermodynamic parameters or without. A significant part of the food technology characterized by the possibility of use of secondary energy resources to create additional material flows and their transformations.

KEY WORDS: energy, temperature, material flows, secondary resources, lower potential, heat pumps, cycle, highly-potential

PURPOSEFULLY ALTERED PROPERTIES OF MEAT PRODUCTS BY NANOCOMPOSITES

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The globalization of the food industry and as a result the expansion of raw materials sources creates a problem of proper control, quality assurance and safety of raw materials and finished products.

Primary factors, technological and microbiological parameters of raw materials, production management, conditions of storage (temperature fluctuations, humidity, intensity of technological conditions affecting the process of biochemical and physical-chemical nature) have an affect on product quality during storage.

Conditions of storage are secondary but not less important factors. It is the presence or absence of active oxygen that causes fat oxidation, moisture condensation on the surface (worsens organoleptic characteristics and lead to premature products deterioration), a water activity A_w , the presence of micro-organisms and substances that provide the minimum concentration bacteriostatic or bactericidal effect in the product.

Therefore, it becomes urgent to develop innovative methods of purposeful changes in the properties of food raw materials used in the production of meat and meat contained products, modification of characteristics of raw materials and how it is processed by physico-chemical and biochemical methods.

This modification can take place at the stage of raw materials, its dispersion, modelling recipes and manufacturing techniques, as well as at the stage of the finished products storage while using elements of "active packaging".

The results obtained for the change in micro-and protein-containing raw material nanolevels characteristics, as well as the production of stable dispersants and builders of the organic and inorganic functional characteristics allowed the development of new technological solutions to improve the functional and technological characteristics of minced and pate weight based on meat.

These combined and standardized on micro-and nanoscale systems have pronounced technological characteristics thermostability which are stable to changes in pH and letting to improve or stabilize the sensor performance products of the product shelf life.

Modern meat production technologies are used the set of measures designed to minimise the product contact with the environment in order to the extending date for consumption improving sanitary product conditions.

Test conducted research of industrial products with micronized iron, spritely ethanol, activated silver and their combination had prolonged bacteriostatic effects.

Results confirming the triple possibility increase time storage of first grade boiled sausages were obtained during storage compare to the control without the use of nanocomposites.

KEY WORDS: meat production, modification, nanocomposites, bacteriostatic, packaging

SPECIAL PURPOSE CONFECTIONARY CONCEPTION

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The confectionary is in great favor with all masses of population, that's why it is necessary to develop special confectionary with the composition which meets the threpsology requirements for all groups of people. The experience of NUFT researchers enabled special purpose confectionary conception formation according to which the classification dividing confectionary into 5 groups has been developed. The first group includes confectionary of functional purpose. Health-improving properties are stipulated by physiologically functional ingredients which enter into the confectionary composition in the amount of 10-50% from the daily rate. The second group includes confectionary acceptable for consumption by people suffering from alimentary disorders like iron-deficiency anemia, iodine deficiency, osteoporosis. Physiological components have to enter their composition in the amount of more than 50% from the daily rate. The third group includes dietary purpose confectionary acceptable for the consumption by people suffering from pancreatic diabetes, celiac disease, phenylketonuria. Confectionary appointed for people suffering from pancreatic diabetes must contain no more than 10% of sucrose; confectionary appointed for people suffering from celiac disease must contain no more than 10mg/kg of gluten; confectionary appointed for people suffering from phenylketonuria must contain no more than 1% of protein and no more than 54 mg of phenylalanine. The forth group includes confectionary of dietary-functional purpose appointed for people suffering from pancreatic diabetes, celiac disease, phenylketonuria. These products contain physiologically functional ingredients in the amount of 10-50% from the daily rate. The fifth group includes confectionary of medical purpose which is to be consumed on doctor's orders.

The researchers from NUFT have developed innovation technologies and receipts of competitive pastry products of special purpose. The products have been shown at international exhibitions many times and have received prestigious awards such as Grand Prix, Innovations Triumph, Quality Triumph. Technologies and receipts are protected by the patents of Ukraine.

KEY WORDS: pastry wares, conception, health, nutrition.

SWEETENERS OF NEW GENERATION AND THEIR USING IN PRODUCTION OF VARIOUS GROUPS OF CONFECTIONARY

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Sweeteners of new generation - it is the polyols with properties of prebiotics (laktitol, eritritol, maltitol, izomaltitol). Studies to determine their physico - chemical properties (solubility at different temperatures, surface tension of the solutions of various concentrations, properties of sorption-desorption), their influence on the processes of foam and jelly creation, heat and mass transfer processes have shown the possibility of their use in the production of confectionery products amorphous structure (caramel, iris), jelly structure (marmalade, candies with fruit - berry and jelly corps), foam coalescing structure (zephyr, pastila, marshmallow, protein filled pastry cookies), crystallization-coalescing structure (cookies prolonged, sugar cookies, filled pastry shortcut), coagulation-crystallization structure (biscuits, cakes, muffins, gingerbread).

With the use of method of mathematical multifactor experiment planning was determined an optimal number of sweeteners for different groups of confectionery products. With the help of modern tool methods was determined an influence of a a new generation of sugar substitutes on the reological and adhesion properties of various confectionery masses. Was determined the influence of sugar substitutes on the heat treatment of: processes baking of biscuits, cakes, muffins; processes of drying of waffles, shortcut albumen whip cookies; combined process of baking – drying of cookies prolonged, sugar cookies, pastry shortcut. Was researched the influens of a new generation of sugar substitutes on the sorbtion- desorbition processes of various groups of confectionery products, defined their effect on the value of the equilibrium moisture content for different values of the a_w , set a warranty period of storage.

The study showed that the rational use of a new generation of sugar substitutes provides confectionery products, made on their basis, the status of «a functional food product», the status of the product «of low calorie content», status of the product with « reduced the glycemic index».

KEY WORDS: new sweeteners, confectionery products, research.

AN ACCELERATED MATURATION OF THE LIQUEUR AND VODKA DRINKS WITH THE ASCORBIC ACID

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The manufacturing of many distilled alcohol drinks such as brandy, calvados, whiskey, tequila and liqueur, includes a stage of maturation. This technological process means the aging of the spirits in the oak barrels during long time from several months till 20-30 years. An exposure of alcohol-containing material to the oak wood in the presence of air oxygen is accompanying with the dissolving of the wood components in the liquid phase.

Simultaneously with the extraction of natural substances the oxidation-recovery processes involving extracted substances are occurring, resulting in formation of other components. The combination of these and newly extracted substances in alcoholic beverage gives it a taste and flavor that assess the quality of the finished product.

The key condition of successful redox processes is the sufficient amount of oxidizing agents while the reducing substances are the many natural compounds such polyphenols and products of alcohol fermentation. In order to accelerate the oxidizing ability of dissolved oxygen we propose to use ascorbic acid as prooxidant agent. Previously we described the rapid oxidation processes in the vodka with the adding of ascorbic acid. The ascorbic acid acts as a supplier of electrons in the interaction with dissolved oxygen resulting hydroxyl radical, whose oxidizing ability is stronger, than of molecular oxygen itself. Therefore, the aging processes in the alcohol drink can be provided more actively and rapidly.

In order to assess the efficacy of proposed aging method we used two examples of the liqueur and vodka drinks – the coffee liqueur and flavored vodka Starka (*Old vodka*). The results of chromatographic analysis showed that in the samples with the addition of ascorbic acid in the presence of oak wood after 4 and 2 months of aging, respectively, a modest increase in the concentration of acetaldehyde, ethyl acetate compared with a control samples that stored 4 months with the conventional technology, were observed. An accelerated maturation also gave better organoleptic properties to the drinks – more rich aroma and smooth taste.

KEY WORDS: maturation, alcohol drinks, ascorbic acid

THE COMPETITIVENESS OF TYPE HOP PELLETS 90 OF THE DOMESTIC PRODUCTION

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Analysis of the current state of the hops application methods in brewing has a clear tendency of using hop products like pellets, ethanol extracts, carbon dioxide extracts and isomerised extracts, which help greatly to reduce losses of bitter substances and essential oils. The best way to use bitter substances with the providing of high quality of beer is the usage of type pellets 90, which contain the full range of valuable hop substances.

Ukraine has established the production of hop products based upon the improved technology by the authors. There have been analyzed the biochemical characteristics of type pellets 90 produced from aroma and bitter hop varieties of domestic and foreign origin determining the number and composition of bitter substances, essential oils and their brewing value has been determined. There has been made a comparative analysis of pellets quality after 12-and 18-month of storage in vacuum packing under unregulated temperature conditions and in the refrigerator.

It was found that the optimal conditions for storage of hop pellets are low temperatures, airtight packaging and inert gas environment; pellets of bitter hops varieties store better than pellets of aroma varieties.

Based on comparative biochemical and technological assessment, there has been graded the competitiveness of domestically produced pellets. Hop pellets from varieties Clone 18 and Zlato Polissya correspond to the characteristics of pellets from the Czech variety Zhatetsky (Zaats, mid-early Chervenyyak). Hop pellets from Polessky variety correspond to pellets of the English Northern Brewer variety, and pellets from varieties Slavianka and Zagrava varieties far exceed the world analogues by the composition and quality of bitter substances and essential oils.

KEY WORDS: competitiveness, pellet hops, bitter substances, brewing quality.

COMPARATIVE CHEMICAL ANALYSIS OF ICE CREAMS PRODUCED IN DIFFERENT COUNTRIES

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In early 20th century the weight fraction of milk fats in ice creams was 8.5 to 16.0 %; sugar, 14 to 16 %, dry substances 32 to 43 %; nonfat milk solids, 9 to 12 % or 7.0 to 10.5 %, depending on the fat content. Gelatin was used as a stabilizer. Fruit ices and sorbets were made of pure fruit juices. Later the range of fat content widened significantly, stretching from 0.5 to 20.0 %. For high fat contents the producers reduced nonfat milk solids to prevent excessive lactose crystallization. Gelatin was gradually replaced with cheaper and more efficient polysaccharides and their compounded systems with emulsifiers. Ices with fats and sugar at 14.0 and 15.5 %, respectively, display the best organoleptic profiles; therefore such proportions have become the most popular.

Currently in the USA and Canada the ices traditionally contain at least 10 % milk fats, 10 % nonfat milk solids, 13 to 15 % sugar, and 35.6 to 36.0 % dry substances. For premium ices nonfat milk solids fall between 14 to 18 %, fats, 15 to 16 %, and proteins, at least 2.95 %. Up to 2 % may be replaced with cocoa, chocolate, and peanut fats. Lately "light" (5 to 7.5 % fats), milk (3 to 5 %) and no fat ices (15 % sugar) have been increasingly popular. In Europe and England fats in ices normally makes at least 5 %, nonfat milk solids, up to 12 %, sugar, 13 %, dry substances, at least 30 %, milk proteins, at least 2.5 %. In recently appeared ices fats content may vary from 2.5 to 5.0 %. In India ices traditionally contain at least 8 to 10 % fats, 9.5 to 10 % nonfat milk solids, sugar up to 14.5 or 15 %, dry substances, at least 36 %. Brazilian and Japanese ices will have at least 3 % fats, and at least 8 % with nonfat milk solids at 10 to 11 %, sugar, 14.5 to 15%, dry substances, at least 28 %, proteins, at least 2.5 to 3.5 %.

Ukrainian ices, compared to Russian, feature a wider range of fat content (0.05 to 20 %), and are lower in sugars (up to 15.5 % for milk ices and up to 14 % for cream and full cream ices). For Russian ices the top sugar content is 17.0 to 17.5 %. It even reached as high as 18 to 20 % in Soviet times. Therefore, whilst the nonfat milk solids are virtually unchanged (10 %), the dry fraction balance in Ukrainian ices is leveled with fats. Reduction of sugars in Ukrainian ices is viewed as consistent with the international practice.

In Ukraine non-milk ices are rather low in dry substances, compensated with the use of stabilization systems, and combined ices are not divided into milk and fruit, fruit and milk, and fruit ices. Therefore, the domestic assortment of ices, especially those featuring vegetable fats, requires further development based on scientifically proven recipes, with account for international experience.

KEY WORDS: comparative analysis, chemical composition, ice cream.

USE OF GRAPES PROCESSING PRODUCTS IN DEVELOPING INNOVATION CONFECTIONERY TECHNOLOGIES

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Confectionary products are labeled as a high-caloric foodstuffs with a high content of carbohydrates, fat and the low content of biologically active components.

Recently, much more attention is focused on the scientific researches and the development of ways of processing plant raw materials with high content of biologically active substances.

When formulating the confectionery articles the nontraditional types of raw materials are not only to provide the unique biochemical properties. They are intended for bearing certain function-technological properties in order to provide the confectionary articles with original organoleptic properties (flavour, smell, structure) and with the proper quality in the course of storage. The promising direction is represented by developing technologies for new kinds of confectionary articles with the use of grapes processing products. For confectionary industry the most interesting are grapes peel and the seeds as sources of biologically active substances such as vitamins, macro- and microelements, phenol compounds, plant fiber, organic acids, irreplaceable amino acids, are of the intense interest.

The technology of processing of grapes marc has been developed. The results are hydrolized puree and jam with higher pectin content, which were applied as a base for further production of confectionary.

The function-technological properties of grapes raw materials and impact on changes in physical-chemical and structural-mechanical properties of semi-finished products and the final products have been investigated.

Puree, supplies, jelly with sugar from grapes peel are recommended to use as fillings for caramel and wads, in production of the cream in order to extend the expiry date and to improve the organoleptic properties, in production of whipped candy substance (such as soufflé), fruit jelly centers of candies and marshmallow.

Thus, the use of grapes processing products enables us to offer new assortment of confectionary with natural dyes, antioxidants, increased nutritive and biological value, possessing original organoleptic properties.

KEY WORDS: grape marc, confectionery, hydrolized puree.

AROMATIK COMPLEX OF ROSE TABLE WINES MADE OF PINOT NOIR AND CABERNET-SAUVIGNON

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This research article presents the study of the aromatic complex of pink table wines. The objects of research were rose dry wines made of Pinot Noir and Cabernet-Sauvignon. Wines were prepared in conditions of micro winemaking by the schemes that included processing without maceration, maceration on mash 3 and 6 hours, mash fermentation to alcohol content by 2% vol. and using preparations, based on glutathione of yeasts, tannin and sulfur dioxide. The feature of aroma is the presence of fruit and berry tones in rose wines - barberry, dogwood, raspberry, strawberry, red currant. Dairy tones (including cream) are also quite common. All samples were organoleptically evaluated, which revealed that all samples have the aforementioned aromatic tones, at that rose wines from Pinot Noir have more bright and varied aromas. While varietal characteristics started to appear in wines of Cabernet Sauvignon.

Also in the obtained samples the qualitative composition and quantitative content of aroma complex was determined by gas-liquid chromatography. The percentage of the main groups of substances responsible for the aroma of pink table wines was determined. Main representatives of the higher alcohols, esters, acids, and lactones, which cause particular flavor of this type of wine, were found.

Thus, the use of preparations based on glutathione of yeast can increase the level of positive aromatic compounds. These preparations can save terpene alcohols, lactones and esters from oxidation, in such way improve the organoleptic characteristics of the samples.

KEY WORDS: Rose wine, aroma compounds, Pinot Noir, Cabernet Sauvignon, gas-liquid chromatography.

REMOVING OIL PHOSPHOLIPIDS

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Phospholipids oil in its composition containing the remains of amino acids, carbohydrates, organic acids, mineral substances. The variety of structure defines versatility of functions in biological membranes. Difil properties of phospholipids can use them to stabilize emulsions.

Refined oil contains phospholipids, which are removed during compression and extraction of lipids from the seeds and fruits of oil. Removal of phospholipids from the oil refining stage is obligatory because they flooring while the following stages: bleaching, neutralization, deodorization and hydrogenation bother of manufacturing operations and increase the use of material resources. The ability of phospholipids sorb water, swell by some of its excess and waste use aggregate stability during hydration. On the thermodynamic stability and aggregation of phospholipids in oil affect moisture, temperature, features fractional composition of phospholipids, the nature of other related substances, adsorption and chemical interaction between phospholipids and glycerides.

Technology refining oil provides hydration of fine droplets of oil distillate at a temperature of 60-70 °C. To extract heavy hydrogenated phospholipids provide solutions to make phosphoric or citric acid. The resulting phospholipid emulsion to dry immediately after removal, since it is available substrate for microbial growth. After drying the phosphatide concentrate are dark brown.

A hydration during use oil surfactant solutions inaktyvnyh substances with subsequent cooling and separation of oil and phospholipid emulsion. Withdrawn phospholipid emulsion has a light yellow color, kept for thirty days without visible microbial spoilage.

KEY WORDS: phospholipides, vegetable oil, threetsilglicerid, hydration, difil properties.

POTENTIAL OF UTILIZATION OF BIOLOGICALLY ACTIVE COMPOUNDS OF GREEN TEA IN FOOD INDUSTRY

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The benefits of green tea have been known since ancient times. For hundreds of years it was used to cure various ailments. The benefits of green tea are also proven by modern scientists.

Many beneficial properties of green tea are due to its richness in various compounds.

Among such beneficial compounds of green tea are polyphenols. Polyphenols themselves are still actively studied by many scientists in medicine they are used for the prevention of cardiovascular diseases and cancer.

Tea polyphenols can be used as biologically active food supplements as well as, they can be useful to develop functional food products with different functionality.

The polyphenols possess strong antioxidant properties. They also provide antimicrobial activity against main food pathogens. Added to the ordinary foods they can serve as a source of antioxidants, as well as natural preservatives, significantly increasing products shelf-life.

Tea polyphenols are efficient for weight control. Their regular consumption is causing visceral fat decrease in the organism.

Other remarkable compound, which can be found in tea leaves is amino acid theanine.

Theanine is crossing hemato-encephalic barrier and has psychoactive properties. Human clinical trials have shown L-theanine to promote an alert state of relaxation without drowsiness. Additional human clinical research suggests that Suntheanine may have applications in improving the quality of sleep, decreasing blood pressure, diminishing normal symptoms of premenstrual syndrome, improving learning performance, heightening mental acuity, promoting concentration, reducing negative side effects of caffeine and supporting the immune system.

L-theanine was approved in Japan for unlimited use in all foods, including chocolates, soft drinks, and herb teas, except infant foods.

In the USA it received GRAS status.

Tea is the second after the water is the most widely consumed beverage in the world. Utilization of its bioactive compounds is opening new prospects to develop healthy and functional food.

KEY WORDS: green tea, polyphenols, theanine

INFLUENCE OF LACTOSE FERMENTATIVE YEAST ON FERMENTED SERUM AND MALT DRINK PARAMETERS

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One of the least unprofitable and non-waste technologies of lactoserum processing is manufacture of fermentation drinks with the addition of rye fermented malt. For conduct of fermentation process it is reasonable to use the special microorganisms able to utilize lactose with formation of alcohol and carbon dioxide.

Influence of different lactose fermentative yeast races (*Zygosaccharomyces lactis* 868-K, *Saccharomyces lactis* 95, *Kluyveromyces lactis* 469) on physical and chemical parameters of fermented wort in comparison with the standard ones was investigated. The results prove the highest fermentative activity of *Zygosaccharomyces lactis* 868-K yeast, in particular: ethyl alcohol content – 1.0 v. %, sodium hydroxide solution acidity with concentration of 1 mol/dm³ per 100 cm³ of drink – 3,5 cm³, drink stability at 20 °C – 5 days. Physical and chemical parameters of wort fermented with *Saccharomyces lactis* 95 and *Kluyveromyces lactis* 469 yeast are considerable lower than the standard ones which points at rather low activity of ferments catalyzing lactose hydrolysis.

For investigation of influence lactose fermentative yeast on organoleptic parameters, there were identified waste products of fermentation in distillate of fermented serum and malt drink by gas and chromatographic method by actual techniques of definition of C₁-C₅ spirits developed by scientists of Basic Scientific Research Laboratory of National University of Food Technologies. After the contents of waste fermentation products, wort fermented with *Zygosaccharomyces lactis* 868-K yeast, which is characterized by low concentrations of n-propane (1,84 mg/dm³), isobutane (29.30 mg/dm³), acetaldehyde (27 mg/dm³) and high concentrations of 2-methyl-1-butanol (58.59 mg/dm³) and 3-methyl-1-butanol (211.11 mg/dm³) has higher parameters. In wort fermented by *Saccharomyces lactis* 95 and *Kluyveromyces lactis* 469 yeast, high concentrations both of n-propane (157.53 mg/dm³ and 33.29 mg/dm³, respectively), isobutane (261,80 mg/dm³ and 32.27 mg/dm³, respectively), and acetaldehyde (229.04 mg/dm³ and 172,48 mg/dm³, respectively) are accumulated. Moreover, such trial samples have low concentrations of 2-methyl-1-butanol (20.78 mg/dm³ and 173.52 mg/dm³, respectively) and 3-methyl-1-butanol (6.24 mg/dm³ and 17.56 mg/dm³), which influence on formation of a general fermented drink aroma.

As it can be seen from experimental research, biosynthesis of fermentation waste products can be defined as the result of regulatory functions of a yeast cell. Presence of *Zygosaccharomyces lactis* 868-K yeast strain in nutrient medium positively influences on producer's metabolism by stimulating biosynthesis or transformation of nutrient medium aromatic substances.

KEY WORDS: fermentation waste products, serum and malt drink.

ENLARGEMENT OF BEER TYPES QUANTITY AND DRINKS, WITH HEALTH PROPHYLACTIC AND MEDICAL PROPERTIES

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In the conditions of a sharp competition and struggle for commodity markets, a topical problem of nonalcoholic beer branch of Ukraine is the enlargement of assortment of beer and drinks of a health-improving / protecting direction, producing of profitable and competitive products of high quality and long term of guarantee storage.

Usage of new hop products in brewing will allow to brew beer of different kinds of high quality with the optimal specific bitterness, inherent hop aroma and taste, with excellent physical and chemical characteristics. Bitter substances, polyphenols and essential oil of hops are biologically active compounds, which possess not only preventive, but also medical properties and positively influence humans' health.

According to the latest data of the foreign scientists, special attention is given to research of hop prenilated flavonoid xanthohumol, and isoxanthohumol, possessing considerable antioxidant, antiviral, antimicrobial, anti-inflammatory properties and anticancerogenic action. These compounds influence the cell metabolism, inhibiting the reactions, causing generation of cancer cells. In the brewing technology, after the moment of mash hopping, 70 % of xanthohumol is being isomerised into isoxanthohumol, while in the end beer remains only 30 % of this substance.

Now there are different topical means of more rational utilization of useful hop substances for the developing of new types of beer and drinks with preventive properties with the increased biological value on the basis of the content and form of xanthohumol.

There has been done the research of hop varieties of the Ukrainian selection in relation to their content of xanthohumol. Ruslan and Xantha varieties were chosen due to the highest content of xanthohumol in their lupulin. There was developed a procedure of xanthohumol ethanol extract production, that allows to receive a new biologically active additive for enrichment of beer and soft drinks with xanthohumol and enlargement of assortment of drinks, with health prophylactic and medical properties.

KEY WORDS: biologically active compounds, xanthohumol, isoxanthohumol, beer, health-improving / protecting properties

WATER CONDITION OF THE ICE CREAM WITH DIFFERENT COMPOSITION

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Low-fat, fruit and vegetable ice cream as well as sorbet contain more than 10-15 percent of water than traditional kinds of ice cream. An excess of unbound and weakly bound water in these types of ice cream often cause a formation of coarse-crystalline structure. Therefore, the technology and the composition of low-fat and non-fat ice cream i.e., without dairy ingredients, need to be significantly improved. The most important condition of structure formation of ice cream with high water content is a supremely binding of water with the help of polysaccharides, proteins and sugars. Moreover, in the ice cream production the greatest attention should be paid to treatments of ageing, freezing, hardening and storage.

Water condition of the ice cream mixes and ice cream with different composition was studied on various processing stages. As the result, the composition of the ice cream has been improved by means of using multifunctional raw materials as crops, fruits and vegetables, which have structure-forming, emulsifying, foaming and stabilizing properties. Water binding and structure-forming ability of raw material was examined. A freezing point of the ice cream mixes with the new composition has been established as well as the amount of frozen-out water has been calculated in a wide range of temperature and also at the technological important temperatures. Ice crystal size and shape were determined in samples of hardened ice cream with different composition. Grinding size and composition of raw material proved to influence on the ice crystal shape as well as the ice crystal ability to grow, considerably. The evidence has been found that the most effective freezing-out of water occurs during freezing of the ice cream mixes at temperature from the freezing point to minus (5-6) °C and the following cooling of ice cream up to minus 10 °C. The ice formation stops in the time of low-temperature hardening (at minus (35-40) °C). The same nature of water freezing-out was established in all kinds of ice cream. However, in the production of ice cream, which freezing point is low, e.g., low-fat ice cream and ice cream with fruit or vegetable purees, should use low temperature for hardening. It has been found that the structure of ice cream heavily depend on a freezing speed, storage temperature and its duration. Recommendations for the production of ice cream with high water content have been developed. These recommendations are supposed to improve the ice cream quality remarkably.

KEY WORDS: ice cream, raw material, water condition, frozen out water, ice formation.

OBTAINING QUERCETIN AND STUDING ITS STARCH ENCAPSULATION

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Modern conditions doesn't allow to get all the necessary food antioxidants, consequently, it is necessary dietary supplements of antioxidant action.

Developing the new technology for encapsulation of flavonoid compounds with the use of polysaccharides for increasing their bioavailability, prolonging biological activity and creating of direct action delivery systems is another actual problem. Quercetin, which belongs to compounds of P-vitamin activity, exhibits antispasmodic, antioxidant, antitumor and anti-inflammatory actions. Therefore, the aim of the work was to extract quercetin and develop starch encapsulation technologies which allow to retain low-molecular substances, increasing their solubility.

We have extracted rutin from *Sophora japonica* L. fruits and hydrolysed it for deriving quercetin.

By freezing low concentrations of aqueous dispersions of starch we derived the porous starch, subsequently applied as encapsulating agent. We had studied the sorption of quercetin on the porous starch suspensions under different conditions.

Physics-chemical research of the adsorption product showed that there is chemical interaction between the molecules of starch and quercetin.

Thus, we have used maltodextrin and soluble starch Hi-Cap 100 ("National Starch Food Innovation" (USA)) as adsorbent.

To gain water-soluble composition, the encapsulation of quercetin starch was investigated at different ratios of components. We have shown that the use of Hi-Cap 100 starch runs efficient encapsulation of Quercetin creating water-soluble composition under the ratio of components - Quercetin: starch: water: - 1: 25: 2500.

In the case of maltodextrin, the complete quercetin dissolution was not observed. It is quite likely that the structure of maltodextrin is not able to form incorporating complexes of molecular quercetin.

Thus, we proposed new method to produce water-soluble additives with P-vitamin, action which is based on quercetin by its encapsulation with the help of water soluble starch modifications.

KEY WORDS: flavonoid, quercetin, starch, adsorption, encapsulation.

THE THEORY OF VARIATION MODELLING THE QUALITY OF MEAT AND MEAT CONTAINING PRODUCTS

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The food industry globalization and the raw materials sources expansion create the proper control, quality assurance and safety of raw materials and finished products problems.

Therefore, it becomes urgent to develop innovative methods of purposeful changes in the food raw materials properties, which are used in the meat and meat contained products, the raw materials characteristics modification and how it is processed by physico-chemical and biochemical methods.

The modern classification of meat products estimation and products containing meat are given, approaches for maintenance of their quality are presented at a variation combination of processing methods of raw materials preparation.

A scientific concept of quality meat and meat containing products development and possible ways of its realization has been suggested.

The technological basic raw meat characteristics, poultry meat and by-products in moderate conditions of heat treatment, with food salts availability in the system have been studied and systematized.

The methodology has been developed and the designing multi-foods application program in according to the modern nutrition theories has been improved on the technologies analysis basis and systematization industry raw materials.

Interdependence between buffer capacity, technological and rheological characteristics of raw materials, solutions of hydrocolloids, forcemeats and pastes has been proved. Specific technological mixes and methods of technological influence on stabilization of product quality have been developed; stabilizers containing protein, protein-fatty emulsions, and beet dye have been developed and tested under the conditions of the moderate and high-temperature heating.

The results obtained for the change characteristics, as well as the production of stable dispersants and builders of the organic and inorganic functional characteristics allowed the development of new technological solutions to improve the functional and technological characteristics of minced and pate weight based on meat.

Technologies of the combined meat products, meat and meat-vegetative canned food, and also products for schoolchildren nutrition have been developed and clinically tested.

KEY WORDS: technology, algorithmization of quality, meat products, meat containing products

USING OF NEW GENERATION SUGAR REPLACERS IN BISQUITS PRODUCTION

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Pastry products, especially sponge cakes are very popular among the population of Ukraine. Basic substance which gives a sweet taste to confectionary products is sugar. The sugar is not recommended for diabetic patients. For developing of pastry products that can be safe for people with diabetes we need to use sugar replacers with low Glycemic Index.

We have done research to use lactitol, isomaltitol, erytritol and maltitol in bisquits technology. Also we did research of viscosity and surface tension of sugar replacers water solutions, influence of sugar replacers on lathering and melange foam resistance, organoleptic, physicochemical and structural factors of a product.

We found that maximal viscosity of isomaltitol solutions is 3.2 MPa*sec., and minimal viscosity of erytritol solutions is 1.9 MPa*sec. Surface tension of all polioils is less (on 11-15%) than sugars what makes them more perspective for using in foam products.

We found that lactitol, maltitol, erytritol have a positive influence on a lathering.

Lathering of mélange-maltitol system is by 16%, mélange-lactitol system – by 18% and finally mélange-erytritol system – by 29% more than lathering of mélange-sugar system. But lathering of mélange-isomalt system is by 8% less.

It means that definite sugar replacers can be used in bisquit production.

Porosity and volumetric weight are very important indexes of sponge cakes quality. Bisquitswith lactitol and maltitol have bigger porosity and volumetric weight instead of bisquits with sugar.

We found out that erytritol and isomaltitol decrease porosity and volumetric weight while producing of bisquits by standard technology.

New bisquits with erytritol and isomalt were made by realization of complex technological decisions. They are close to traditional bisquits by organoleptical and structural indicators.

Compositions and technologies of bisquits with new generation sugar replacers – lactitol, isomaltitol, erytritol, maltitol were made by results of research.

KEY WORDS: bisquits, technology, sugar replacers, glycemic index.

USE OF AMMONIUM DIHYDROGEN PHOSPHATE DURING DIFFUSION JUICE PURIFICATION

Svetlana Olyanskaya¹, Vita Tsurulnikova¹

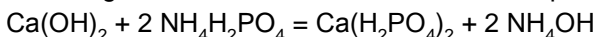
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Further improvement of the technological scheme is possible by increasing the effect of treatment directly in the extraction process, the intensification of chemical and adsorption processes at different stages of treatment using high-coagulants, flocculants and cheap natural sorbents.

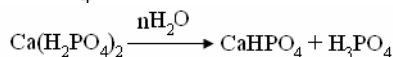
Methods of purifying diffusion juice are suggested, that allow to intensify chemical and adsorption processes in the first and final stages by introducing in the filtered preliming juice or filtered juice 1st carbonatation chemical reagent - ammonium dihydrogen phosphate.

After studying various methods for possible mechanisms formation of calcium phosphates and hydroxyapatite in natural conditions that are presented in the books and works in the chemistry of phosphorus and phosphorus compounds, we suggested the mechanism of formation of hydroxyapatite in the lime juice purification using ammonium dihydrogen phosphate.

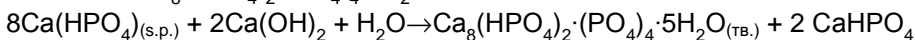
1. First, generated a less stable monocalcium phosphate $\text{Ca}(\text{H}_2\text{PO}_4)_2$:



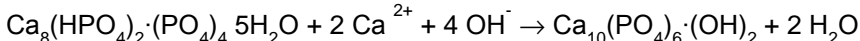
2. Monocalcium phosphate is dissolved in a large excess of water and hydrolyzed to phosphate dicalcium CaHPO_4 :



3. Dicalcium phosphate in a narrow zone of neutral values pH during hydrolysis forms oktacalcium phosphate- $\text{Ca}_8(\text{HPO}_4)_2 \cdot (\text{PO}_4)_4 \cdot 5\text{H}_2\text{O}$:



4. Metastable oktacalcium phosphate, alike as an amorphous calcium phosphate is a precursor (formed as an intermediate product) in obtaining more stable phases, such as hydroxyapatite $\text{Ca}_{10}(\text{PO}_4)_6 \cdot (\text{OH})_2$:



Thus, the use of ammonium dihydrogen phosphate in the first or final purification step of the raw juice helps to intensify the chemical and adsorption processes in consequence the formation of hydroxyapatite with a high specific surface area, to improve cleanliness and to reduce the viscosity of the purified juice and syrup, to increase the yield and quality white sugar.

KEY WORDS: Raw juice purification, filtered juice 1st carbonation, ammonium dihydrogen phosphate, hydroxyapatite, adsorption processes.

IMPROVEMENT OF THE TECHNOLOGY OF MEAT AND MEAT CONTAINING PRODUCTS USING INTERMEDIATE PRODUCT FROM MUSHROOM

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Nowadays, the animal proteins deficiency diet in the population led to the intensive development of new tendencies in meat products technology. Besides, it is the optimal components (meat and non-meat food components) which contain protein to get well-balanced according to the food products biological value of high quality.

The analysis of the latest investigations and publications showed that mushroom raw material is one of the perspective sources of vegetative protein due to vast expansion, high nutritive value and presence of the corresponding functional properties. Accordingly, necessary to implement new technologies in the meat industry and in the food industry in general.

The researches are devoted to the scientific grounds and development of photogenic additives technology and combined meat products that contain these additives. On basis of the research of *Pleurotus Ostreatus* mushrooms, it has been worked out the technology of powder-like intermediate product from mushrooms and structured intermediate product from mushrooms that makes possible to get safe food products.

As a result of multiple investigations, the technology of the pate production with proteins and food fibres of vegetable origin was developed.

Theoretically based and experimentally verified technology combined with the use of meat and intermediate product from mushrooms. The influence of their on physical-chemical, functional-technological, structural-mechanical, microbiological characteristics of pate has been investigated.

In the present work, chemical composition, biological values, microbiological and organoleptic indexes of the developed products are investigated.

As a general conclusion it can be stated, the obtained results confirm the possibility of effective use of meat products with intermediate product from mushrooms.

KEY WORDS: mushrooms product, meat and meat containing products, product safety, technology.

GAME MEAT CHARACTERISTICS

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Ukrainian market represents a wide range of meat products made from traditional raw meat. Delicacies making from wild animals meat are very popular today. These meats have a unique taste characteristics and a large amount of nutrients. Production of such products is very promising.

In contrast to the domestic animals meat the game meat contains more minerals and vitamins and less fat: it is deposited upon the inwards and subcutaneous tissues. Game meat is richer in nitrogenous substances and proteins (because of the low fat content and complete protein, vitamins and some minerals, especially calcium, iron and phosphorus). Good game digestibility due to favourable composition of purine compounds and creatine positive impact on the autonomic nervous system of humans. Due to the small fat venison meat has reduced energy performance, so it is recommended to expand the menu as well as for the preparation of daily meals.

Game meat has darker colour than meat poultry, not as tender, contains more protein (23-25%) and extractives which give it a peculiar taste and flavour (slightly bitter with a resinous flavour), but less fat (1-2%).

Protein Meat spotted deer and wild boar with a high biological value, contain no limiting amino acids. Meat is rich in lysine, leucine and isoleucine.

The study of amino acid composition indicates a high content of tryptophan in meat - 1.37 and 1.11 g/100 g protein in the meat of wild boar and deer, respectively, which correlates with high albumin-globulin fraction. Wild game meat amino acid composition does not yield the same traditional animals, and the contents of some amino acids (threonine, tryptophan and phenylalanine).

The total essential and essential amino-acids amount in the game meat is higher than in controls, an average of 1.63 and 0.24 g/100 g protein in the meat of wild boar and spotted deer, respectively.

KEY WORDS: amino acid composition, energy value, game meat, spotted deer, wild boar.

LOW-CALORIE MEAT TECHNOLOGY DEVELOPMENT

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The imbalance between human body energy and consumed meals amount is the most urgent problem today. Widespread diseases are overweight and obesity.

It was believed that bran obtained during the processing of high-quality grain flour is incidental and low-value products. Food products are widely put wheat bran in order to enrich their dietary fiber. Fiber wheat bran swelling in the stomach and rapidly increasing in volume creates the illusion of fullness, preventing overeating and thus dialling of overweight and obesity. Dietary fiber Just Fiber - is a multipurpose food additive that replaces high-calorie bulking and reduces the energy value of product. Fibres thermos table, good bind of moisture and fat, enhance the action of emulsifiers, significantly improving the structure and texture of the finished product, stabilize flavour and aroma.

In split meat preparations fibers stabilize their rheological properties, improve process of formation and eliminate *accumulation the fat* in the walls forming apparatus. Significantly reduced loss during frying foods. When product freezing hydroxyl groups and cellulose molecules join water, not allowing them to crystallize. So the next time frozen ice crystals do not destroy muscle tissue, preventing water leakage and meat juice. Thus greatly reduced moisture loss during defrosting and heat treatment.

Due to the high content the ballast substances, dietary fiber Just Fiber indispensable in the recipes of dietary products designed for clinical nutrition. Dietary fiber has Just Fiber good connection with plant and animal proteins, so they can be used in various recipes.

Using wheat bran and bamboo fiber in recipes split preparations reduces calories and get a product with high physical-chemical and organoleptic characteristics.

KEY WORDS: dietary fiber, functional products, meat preparations, wheat bran.

INFLUENCE OF PECTIN-ALGINATE COMPLEX ON EGG-WHITE FOAMING PROCESS

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Current trends for healthy nutrition are the foundation for scientists on choosing structure stabilizers with natural origin and their application in food technology. More and more industrials are choosing recipes using pectin, agar, gums etc.

The effect of interaction of pectins, with different degrees of methoxylation, and sodium alginate on the egg white foaming process, which is the basis for different confectionery: protein creams, marshmallows and candy, protein-churned semis for cakes and pastries.

It was established that the introduction of selected additives in complexes reduces their concentration comparatively to a single use, improves the egg white foaming ability and stabilizes foam system, so the synergistic effects of pectin and alginate in the formation of foam systems have been proved.

Complexes of pectins and sodium alginate, which are recommended for creating recipes of protein creams, namely high-methoxy pectin - sodium alginate: 0.6% and 0.4%, respectively; amidated low-methoxy pectin - sodium alginate: 0.3% and 0, 8%, respectively were formed.

The research shows that the use of proposed complexes of structure-forming agents reduce the concentration of sugar in the protein cream without affecting its structural, mechanical and microbiological parameters. Foam remains stable while reducing the amount of sugar in the recipe by 25% either using complex 'high-methoxy pectin - sodium alginate' or complex 'amidated low-methoxy pectin - sodium alginate'. Microbiological indicators of all samples correspond to norms stipulated in DSTU 18.06-95 "Cakes and pastries" and the content of MAFAM for samples with complexes of stabilizers is much smaller than in the control sample. This proves the positive effect of pectin and sodium alginate on the stability of creams to microbiological contamination.

The caloric value of protein-churned semis for cakes and pastries was reduced. Creams became lush, soft texture without losing resistance to separation.

KEY WORDS: complex, pectin, sodium alginate, foam system, structure forming agents.

**RESEARCH OF INFLUENCE OF GRADIENTS ON TEMPERATURE AND MOISTURE
ON CONDUCTUS MOISTLY EXCHANGE**

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It is known that for different mass of capacious materials the gradient of temperature influences on the gradient of moisture. Does this conformity to law take place for identical mass of capacious materials?

For an answer for it we are execute scientific researches with the elementary layers of grain of corn. These data can be used for the improvement of technology of drying of grain.

Research of conducts moistly exchange between the elementary layers of grain of corn at the different values of temperature and humidity is presented in a table.1.

Table 1 - Moistly exchange between the elementary layers of grain of corn

| Temperature of layers of grain °C | Initial humidity of grain, % | | Duration of contact, hours. | Eventual humidity of grain, % | | Difference of humidity of layers of grain, % | |
|-----------------------------------|------------------------------|------|-----------------------------|-------------------------------|------|--|----------|
| | raw | dry | | raw | dry | initial | eventual |
| 20 | 23,9 | 9,6 | 6 | 20,7 | 12,7 | 14,3 | 8,0 |
| 55 | 23,9 | 9,6 | 2 | 19,6 | 13,6 | 14,3 | 6,0 |
| 20 | 20,7 | 12,7 | 18 | 18,4 | 14,5 | 8,0 | 3,9 |
| 55 | 19,6 | 13,6 | 2 | 18,0 | 14,4 | 6,0 | 3,6 |
| 20 | 18,4 | 14,5 | 24 | 17,7 | 14,8 | 3,9 | 2,9 |
| 55 | 18,0 | 14,4 | 2 | 17,0 | 14,6 | 3,6 | 2,4 |
| 20 | 17,7 | 14,8 | 24 | 17,6 | 14,7 | 2,9 | 2,9 |
| 55 | 17,0 | 14,6 | 2 | 17,0 | 14,6 | 2,4 | 2,4 |

At the different parameters of grain of both contacting layers (temperature, moistly of content), value of speed it was moistly changed an exchange from the least values ($0,85 \times 10^{-2}$ %/min) to most ($7,8 \times 10^{-2}$ %/min).

The most values of speed of conducts moistly exchange were observed at the beginning of experience (first 20...40 min), at most motive potential - difference of moisture or /and temperatures of layers of grain. Duration of period of most values of speed of moistly to the exchange is straight related to humidity of layers of grain and in reverse dependence on their temperature.

At different values moisture moves the gradient of temperature only into the side of her less values.

Conclusions:

1. Researches are not educe influence to the gradient of temperature ($\nabla\theta$) on the gradient of humidity (∇w).
2. Speed of diffusion of moisture straight proportional to the temperature of peripheral layers of grain.

KEY WORDS: layer of grain, drying, convection, warmth, humidity, gradient.

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| Oral Presentations |
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| Section: GLOBAL CHALLENGES AND COMPETITIVENESS |
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| THE COMPETITIVENESS OF THE PERSONNEL AS A MEANS OF ENSURING EFFICIENCY OF A COMPANY ACTIVITY |
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| <u>Viktoriya Moskalenko¹</u> |
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The main competitive advantage of any company that seeks to strengthen its position in global markets is a professional core of human resources. Formation of human resources deserves special attention. Ancillary activity of the HR Departments does not meet existing situation. In a highly competitive condition personnel services are called to be active helpers for senior managers, initiators of the development of methods that help to increase business activity of the groups, identification of reserves of efficiency of their economic activity by using techniques of group work, case studies and implementation of their results.

In today's rapid obsolescence of skills the ability of companies to raise skills of their employees is a critical factor for success. In characteristically unstable periods for the food industry appears acute problem of staff development, but only in a crisis condition of the management concept development appears prerequisite for economic growth.

Development of human resources is traditionally based on the educational processes that are managed and funded by enterprise for which these educational processes intended. Learning objectives is a development of intellectual potential of the employees. The high level of keeping of competitiveness is impossible without new technologies that require new knowledge, while the actual process of obtaining education and training is no less important than its formal outcome or achieved level of education. The reasons for priority of the investments in staff development are: the need to improve the professional level and its compliance with the strategic goals of the enterprise, ensuring the survival of the enterprise.

Measures that promote the development of human potential as a rule provide increased productivity therefore their financing corresponds to the principle of economical efficiency of the costs.

The strategic goal of the development of human resources is caused by the choice of enterprise strategy and the principles that underlie of the personnel policy and overall personnel's management. For the strategy of human resources development is important its compliance with the overall strategy of the company that developed by the chiefs.

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| KEY WORDS: human resources management, staff potential, competitive |
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COMPETITIVE PRODUCTS DAIRY INDUSTRY

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According to the State Statistics Service of Ukraine annually reduced consumption of milk and dairy products (in terms of milk per person). In 2011, consumption was 205 kg against 206 kg in 2010.

Milk is a perfect food which is created by nature. Dairy products are essential food for infants and valuable food for consumers, regardless of age, because they have protein with a balanced amino acid composition of minerals, vitamins and immunomodulators.

Today the Ukrainian market has more than 250 names of dairy products. Recently there has been expanding the product range through the use of canned fruit and vegetable ingredients in yogurt and children's cheese. Flavor ingredients can satisfy the needs of consumers and to increase the consumption of dairy products, which is attractive for use not only in Ukraine.

One of the problems of the dairy industry is a source of raw materials. Increase the competitiveness of the dairy industry producers possibly by setting up manufacturing facilities of vertical integration of agricultural and processing enterprises. In developed countries: Denmark, Great Britain, Italy - production, processing and marketing of dairy products combined in one complex. Combining manufactures various sectors of the economy (forage production, milk) in integrated complexes provide smooth and high quality raw materials and guaranteed the safety of food products. This practice is now being implemented in Ukraine, including baby food factory "Agusha" (t. Vyshneve Kyiv region) Ltd. "Bilotserkivskiy Milk Factory" (v. Tomilivka of the Bilocerktivskogo district of the Kievian region). The primary task of the state is to create a competitive environment and protect consumers from low quality dairy products.

KEY WORDS: competitiveness, the dairy industry, dairy production, vertical integration.

THE MAIN CRITERIA FOR ASSESSING THE LEVEL OF FOOD SECURITY OF A STATE

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Ensuring food security of the nation at the present stage should be seen not only as a strategic goal of the domestic food market, but also as the basis of sovereignty, economic security and social stability of the state as a major lever of its independence in international relations and geopolitical strategy.

The strategic goals of the domestic food market are:

- To guarantee food security;
- Achieving levels of food consumption to science-based standards;
- Ensuring the competitiveness of agricultural products and food products in foreign and domestic markets.

For this purpose a strategic task to address the problem of food security is to ensure the availability and adequacy of food consumption for all segments of the population mainly due to domestic agricultural production.

In recent years the real incomes of the population of Ukraine have decreased significantly, and have changed their structure. The economic situation in the country led to changes in the cost structure of the population. However, even with a significant reduction in income minimal nutritional needs that cannot be cut exist. Reduced food consumption leads to unpredictable consequences, worsening demographic situation in the country, public health, increased mortality, reduced fertility. The deterioration of quality of life leads to the necessary actions consumers in replacing quality but relatively expensive goods for cheaper that clearly traced on the example of food consumption of Ukraine's population during this period.

Considering these factors of food security the main evaluation criteria of its level which are as follows:

- Criterion food independence;
- The criterion of adequacy of food consumption (daily per capita caloric diet should not be lower than 2.5 thousand calories);
- The criterion of availability of food consumption (expenditures for food should not exceed 60% of household income).

KEY WORDS: food security, consumption level, scientifically based standards, the competitiveness of domestic products, food demand.

FOOD SECURITY UNDER CONDITIONS OF GLOBALIZATION

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Under conditions of globalization basic and strategically important condition for maintaining economic, social stability and sovereignty of the state is ensuring its food security.

The need to ensure food security as a component of economic security arises due to the protection of public interest, such as social stability, meeting nutritional needs, independence from imports, development of domestic production of food products, creation of reserve stocks to stabilize food supply. The main criterion for food security is the ability of the country to provide people with food at full self-sufficiency.

The essence of the category of "economic security" should be understood as a level of food security of the population, which guarantees social and political stability in society, ensures survival and development of the nation, the individual, the family, sustainable economic development.

Assessment of food security is defined by:

- Physical availability of food, which includes the availability of food throughout the country in the desired range;
- Economic accessibility of food, which consists of the fact that the level of income, regardless of a person's social status and residence allows him to buy food at least at the minimum level of consumption;
- Safety of food for consumers that is the ability to prevent production, sale and consumption of low-quality products that can affect human health negatively.

It is advisable to solve the problem of food security of Ukraine's population according to the defined sequence of stages:

Stage 1: Achieving the level of production required for providing the whole population with food. At this stage it is expedient to form agricultural strategy to reform agricultural units, and develop the necessary legal framework.

Stage 2: Ensure sustainable and stable development of agriculture through domestic production needed to ensure a balance of the internal market.

Stage 3: Creating conditions for the development of multifunctional agriculture as a sector of the economy, the competitiveness of which is the main driving force to strengthen the strategic position in the domestic and global agricultural markets.

Stage 4: Innovative development of the agricultural sector of economy, which would ensure the production of organic agricultural products with efficient and latest technologies.

KEY WORDS: food security, food problem, nutrition, agricultural sector of economy.

MAIN PROBLEMS OF ENSURING FOOD SECURITY OF COUNTRY

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At the present moment, the main task is to create a sustainable food security system of Ukraine based on the effective development of agroindustrial complex, the functioning of balanced food market of the country and increasing economic accessibility of population to the foodstuffs. The problem of ensuring food security of country includes various aspects.

Politico-economic aspect of food security is the effective use of agroindustrial potential of country for stable providing population in food at the required level, regardless of the adverse conditions in international relations or unfavourable trends on the world market. Socio-economic aspect prescribes the ability of foods to provide physical and economic availability of necessary amount and assortment of foodstuffs for all categories of populations.

Food security characterizes the possibility of production, realization and consumption of the ecological and high quality food and drinking-water which don't harm on the health of population and provide the rational balanced feeding.

Scale of strategic food reserve of country and sufficiency of operative food stocks are defined by capabilities of the providing people with food in the proportions to the consumer basket and the necessity of supporting the balance of supply and demand conditions and price situation on the food market.

Presets of base foodstuffs and their physical availability are provided by domestic agroindustrial complex. The level and rates of extended recovery of agroindustrial complex are the basis of national food security and indicates its export potential. Economic availability of food is characterized by the level of development of economy, which determines the amount of income, which influences on the level of purchasing possibility of population to buy foodstuffs at prices that are established in the food market.

In modern conditions the essential threats for food security of country are: the significant reduction of resource and production potential of agricultural complex in connection with the declining of soil fertility, the accelerated disposal of fixed assets without their replenishment, the curtailment of production in some sectors of agroindustrial complex, the degradation of system of seed and pedigree business, the imperfection of organizational and economic mechanisms, the inadequate legislation, the increasing of food imports, the decreasing of living standards.

KEY WORDS: food security, agroindustrial complex, food, foodstuffs.

MANAGEMENT OF THE PRODUCTS COMPETITIVENESS OF THE ENTERPRISE IN MARKETING SYSTEM

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The high competitiveness of products is provided when the enterprises manage the products rationally, taking into account all possible factors on it influence.

In the most general view management is a certain type of co-operation which exists between two subjects: one of which in this co-operation is in position of the management subject, and the second is in position of management object.

One of the most substantial characteristics of management process of products is the complication competitiveness. Complication is explained as the large internal variety of processes and objects, and also as the necessity of various external factors. They have the substantial influence on the state of object management and the possibility of achievement the state desired by them.

The practice of making unavailable decision can be explained by the complication of weak formalization of processes and phenomena, labour intensiveness of multidimensional estimations. It is developed and accepted the effective decision that is not always true.

The increasing quality of management decision follows to link with the complex analysis and account of multidimensional features of alternatives with enlist of different factors, limitations and criteria which influence on the results, including such ways which can be hard added to the quantitative measuring. For decisions made in the marketing environment, in strategic planning it is important to pay attention to the partners' opinions, that interests can be cause to the different result.

In the limits of traditionally common methods of making decision it is not possible to take into account all these features. Therefore we suggest to use ratings estimations, and also the elaborations and introductions of complex conception of management competitiveness that has: the capabilities of forming and adjustment of targets and strategies of the enterprise development according to the attained level of competitiveness; the methods of management competitiveness; organizationally economic mechanism of management competitiveness support, the basis of which is made program and special purpose complex blocks, which represent necessary organizational, economical and technological measures in their interdependence, realization of which is promoting the effective realization of administrative decision in this sphere of activity.

KEY WORDS: competitiveness, products, management.

PROSPECTS FOR RAIL TRANSIT IN UKRAINE

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The importance of modern railway technologies will increase, because the transport users require higher speeds, reliability, capacity and effectiveness.

Relocation of goods by the railway is more attractive than motor transportation due to the rapid growth of the world trade, long hauls and less expense. At the same time the high speed railways are considered to be the substitution for short air transportation, and the use of railways increases the airport capacity for long-haul flights maintenance.

New railway technologies allow to expand the railway system capacity. Railway transport popularity is enhanced by natural disasters such as storms, heavy show-falls that prove that railways play an important role in transportation of people and goods in emergency cases.

Also, roads and airports overload causes the cargo and passengers delay. So railway transport is becoming more and more important factor of the global trade.

Favorable geographical location of Ukraine, just in the center of Eurasian transport system determines its development as a transit nation. Trans-European railway E 30, which starts in Berlin intersects Ukraine on the route Mostyska – Lviv – Kyiv and follows to Moscow. On the territory of Poland it is intersected by highways E 59 and E 65 and creates the opportunity for the fast railway communication between almost all European countries.

But the transit potential of our country is not used enough: the cargo traffic between Europe and Russian Federation through the territory of Belarus is 5 times more than the cargo traffic through the territory of Ukraine. In 2007 the total transit volume was 387 mln tons and in 2011 it was 2.6 time less. Because of some problems, there is a risk of transit cargo reorientation bypass Ukraine, and it will cause some loses in the State Ukrainian budget revenue. But state policy strategic priorities should increase the effective use of Ukrainian transit potential.

KEY WORDS: railway transport, railway traffic, transit

SOCIO-ECONOMIC DEVELOPMENT OF ENTERPRISE: ESSENCE AND SPECIFIC ASPECTS

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Increase of GDP per capita, scientific and technical development, increase of standard of living and social standards are basic directions of the development of every country.

Integration of the Ukrainian economy in foreign economic its unstable character, processes of globalization, strengthening of the influence of innovative information and communication technologies, require from modern scientists to find none theoretical approaches, ways and methods of economic stabilization, directions of subsequent development of domestic enterprises and socio-economic infrastructure of the country.

In spite of considerable scientific work in the theory of development, the questions of socio-economic development of enterprises is not sufficiently studied, that makes it actual to further study this problem.

The term «socio-economic development» represents cross-correlation dependence between the level of economic development and solution of social problems of the country and its business entities.

Various changes of internal character, and changes resulted from interaction of socio-economic systems with the factors of environment are considered to be a fundamental principle and source of development of an enterprise. Contradiction between the limited economic resources and human economic demands are key element of the process.

In terms of economy, socio-economic development, as a rule, is measured by coefficients and absolute values which represent the efficiency of enterprises operation. To estimate the social constituent, it's more acceptable to use quality indexes, which is determined by specifics of objects of estimation.

Economic development has undulating character: increase entails slump. Therefore the subsequent study of socio-economic development of enterprise on principles of his recurrence comes very important.

KEY WORDS: development, changes, economy growth, socio-economic development.

IMPROVEMENT OF INVESTMENT MANAGEMENT AT FOOD INDUSTRY ENTERPRISES

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To increase the competitiveness of the food industry to improve the management of investments. Controlling is one of the modern tools of improvement of investment management at enterprises.

Investment controlling is a system of methods and instruments aimed at investment management support that comprises information support, planning, coordination, control and internal consulting.

The need for implementation of the investment controlling system at food industry enterprises occurs in following cases:

- 1) one-time development of a large-scale and long-term investment project;
- 2) continued implementation of small-scale but influential in operational activity real investment projects;
- 3) creation of a program of real investments with long implementation period.

Establishment of the investment controlling system at a food industry enterprise requires a certain sequence of actions:

- 1) determination of the object of controlling, which means the formation of investment proposals within a particular purpose of enterprise's activity;
- 2) setting goals and objectives for investment controlling at each stage of preparation and implementation of individual investment projects and the investment program as a whole;
- 3) formation of the system of priority criteria and their quantitative standards according to which the degree of achievement of the objectives of projects within the investment program will be determined;
- 4) organization of the monitoring system of priority indicators and formation of the set of action algorithms to correct the critical deviations of values of indicators from their quantitative standards;
- 5) development of the reporting system in an individual investment project and the investment program of an enterprise as a whole and the establishment of frequency of its filling; coordination of organizational and functional aspects of the investment controlling system at an enterprise.

KEY WORDS: investment, investment activities, investment controlling, monitoring.

CAPITAL CONSOLIDATION AS FACTOR OF COMPETITIVENESS

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Summary. The research of the role of capital consolidation for country's economic development and competitiveness.

Processes of the capital consolidation and the development of its various forms, such as transnational corporations is a main feature of the global economy. Thereby the study of the role of capital consolidation is especially important to provide economic development and competitiveness.

Consolidation of enterprises' capital – is a process of merging enterprises' capital in order to increase efficiency, maximize profits and enhance competitive advantage in the market.

The base of the competitive enterprises and respective branches of the economy constitute the basis of the country's competitiveness. In the global economy, only countries with a high level of consolidation of the economy can achieve a high level of competitiveness.

Thus, to improve the competitiveness of the country it is necessary to stimulate the companies consolidation to create own transnational corporations, financial and industrial groups and strategic alliances, etc.

Conclusion. Thus, companies in developed countries actively use various forms of capital consolidation as a tool of competitive strategy. It does not only increase the companies' competitiveness but also facilitates the growth of the economy as a whole.

KEY WORDS: consolidation of enterprises' capital, country's international competitiveness.

PRESENT STATE AND PROSPECTS OF OIL INDUSTRY IN UKRAINE

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Effective functioning of the food industry in any country, and especially in Ukraine, which has very favorable conditions for its development, is one of the leading structurally forming parts of the entire economy.

In the present economic conditions among the world's major food markets market of vegetable oil is the most dynamic in its development. Thus, the further participation of Ukraine in the world market of vegetable oil is very important.

Oil and fat industry in Ukraine is one of the most profitable sectors of the agro-industrial complex, which forms the budget and has a strong export potential and is dynamically develops over the last decade.

Active development of oil and fat industry requires an appropriate level of ensuring of oil raw materials. The leaders and the main producers of sunflower seeds are Russia, Ukraine, countries of the EU-27 and Argentina. They use oil seed for making oil and margarine and also for production of sunflower cake and meal, which are rich in protein and are intensively used for feeding animals.

Oil products are in increasing demand in the world market, due to two main factors:

- increasing use in human nutrition oils and fats of vegetable origin due to their physiological benefits and more affordable prices compared to animal fats;
- dynamic growth in worldwide production of biodiesel from vegetable oils regarding the fact of progressive increase in prices for mineral energy and reduction of their natural resources.

Taking into account prospects of further growth in demand for oil in the world market, oil and fat production in Ukraine has a tendency for further development. The process of consolidation of land around agricultural holdings will increase further redistribution of ownership of vegetable oil plants, will start technology of oil production, and will improve to meet the requirements of foreign customers. So, we can say with full responsibility that this is one of the main and perspective components to strengthen the export potential of agriculture industry complex of Ukraine.

KEY WORDS: oil and fat industry, factors of development.

AGROINDUSTRIAL INTEGRATION IN UKRAINE

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Agroindustrial integration is the strategically important process of national economic development, as it determines the efficiency of agricultural production, generates growth in food processing and food security of the country.

Unfortunately, the state of the development of agroindustrial integration does not fully fulfill current consumer and industrial demand. Thus, in 2011 the import of live animals and animal products was 41.3% of net revenue from the sale of businesses of producers, imports of crop production - 20%. The active stimulator of agroindustrial integration is the growing demand of foreign markets for agricultural products. Thus, the export of live animals and animal products in 2011 amounted to 37.3%, crop production - 62.3%.

The development of agroindustrial integration in Ukraine is in the following forms:

1. Contracted form of integration interaction without legal entity.
2. Cooperative form of association of capital and labor, businesses and individuals.
3. Agroindustrial holding a form of the association of agricultural and industrial enterprises controlled by the same owner (initiator of integration).

In 2011 the estimated number of farms was 9538 units, private - 9228, including business associations - 5118, private - 3228, production cooperatives - 510, others – 372, state - 310. This statistic confirms the significant role of agricultural holdings in the economic development of Ukraine. In addition, the profitability of agricultural production in the holding structure forms the profitability of agricultural production in general. Thus, the average level of profitability of agricultural production was 27.0%, the profitability of business entities - 26.4%.

Legal registration of agricultural structures occurs in these ways: through the creation of a management company as the central link structure of the holding company, "shell" holding company, which operates as a single structure with real managerial authority, but in which ownership of the subsidiaries of the holding owned structures doesn't relate to the holding.

KEY WORDS: agriculture, integration, holding development.

FORMATION OF DOMESTIC CONSUMER MARKET OF ORGANIC PRODUCTS IN UKRAINE

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Since 1992, the organic products market has been developing in Ukraine. This is evidenced by the growth areas of organic farmland, number of organic farms and amount of organic production. Domestic consumer market of organic products hasn't formed yet, because 90% of the total amount of organic products production has exported in the form of agricultural raw materials, Ukrainian enterprises haven't produced their own finished organic products. Most market operators attributed this situation to the lack of legislation in this field, consumer awareness of the benefits of organic products and its high cost compared to the standard products.

However, the naturalness and organic nature of products is one of the competitive advantages in the market, used by most manufacturers of food products in Ukraine. The market is full of products using the label and advertising with terms such as "natural," "organic," "eco-friendly" and various prefix "bio", although usually such products are not certified according to environmental standards. Such products are more expensive than usual, but are widespread and in high demand. Those consumers who buy products with such words and phrases which are used in label and advertising actually are the potential domestic market of organic products.

KEY WORDS: organic products, organic products market, production of organic products, perspectives of organic production in Ukraine.

PR COLOURS: PURPOSES, METHODS, EFFICIENCY

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It is important for any kind of organization to know what employees, potential customers and buyers think about its work. Furthermore each organization would like to influence these people's train of thought, creating an image of a solid and trustworthy company in their minds. Apparently, these two factors became the basis of creation of such kind of management as PR-technologies.

Let's consider the classification of Public Relations by colour, so-called "colour PR". It is a well-known fact that certain colours may bring negative or positive associations. That's why, it's so important not to make a mistake. There are a lot of kinds of "colour" PR, but everyone chooses which colour to prefer. Nowadays PR types are determined depending on the aims (colour PR). The management of a certain company should choose which type (white, black, gray, pink, blood red, khaki, yellow, green or gold PR) is more appropriate for the organization in certain conditions depending on company's policy and strategy. All these types of PR have their purposes and yield different results.

To receive evident results, it is necessary to carry out goal-oriented PR-actions because the results are always in direct proportion to the objectives. This classification confirms that PR is a very complex, controversial, but also an interesting and colourful science. And despite of the PR colour, it will always be PR. Do not be afraid of the phrase "Public Relations" because its main goal is to "reach out" to people.

For centuries, the main function of PR was to create the trust: the trust of consumers to a company, the population's trust to a state, the voters' trust to candidates. No matter in what kind of human activity PR was used and how it was named in a certain historical period, it is chiefly the same, only a set of techniques and technologies is changed.

KEY WORDS: PR, purposes, methods, efficiency, management.

PROBLEMS OF INTELLECTUAL PROPERTY COMMERCIALIZATION IN UKRAINE

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Intellectual product is one of the most important components of economic, scientific and manufacturing potential of the country.

The importance of adequate policy in the intellectual property sphere turned into a real axiom in countries with good social and technological development in the 19th century. Intellectual property has become a basis of price structure in the most of intensive markets. Currently the part of intellectual property in the total world trade share is more than 20%. It is supposed that in the next 10 years the volume of intellectual property sales will significantly increase.

The participation of Ukraine in the world intellectual processes is miserable, its share in the possession of the leading innovative technologies is very low and soon it will turn into absolutely insignificant. The ignoring of problems connected with the use of intellectual property will turn into big problems for both: the state and society. The lack of funding of the projects connected with the use of the intellectual property, has led to the fact that it descended to the 75th position. Unfortunately there is a great possibility that this decline will continue.

The Intellectual property in Ukraine is not used in a proper way and that's why it doesn't increase the capitalization of the company. The investigation of conditions of capitalization and commercialization of intellectual property objects at the level of entity in current conditions of market relations has become an urgent task which helps to develop the innovative process that support the growth of GDP and the creation of entirely new innovation economy based on intellectual property and production of competitive products.

The analysis of scientific studies on intellectual property problems, shows that intellectual property is getting more and more important for development of modern economics, it has become a "must be" in competitiveness of business organizations. Mostly only legal aspects connected with the formation and use of the intellectual property are described in scientific literature. In recent years a lot of publications have appeared. These publications describe economical aspects of intellectual property use, they say that it helps to develop the economics of the company; in particular they pay attention to the commercial use of intellectual property objects and to the problems of recording, evaluation and defense of the intellectual property.

KEY WORDS: intellectual product, Intellectual property, economic, market, business.

HOW TO IMPROVE COMPETITIVENESS OF FOOD INDUSTRY ENTERPRISES

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To improve competitiveness of a product, that is achieve its highest quality according to world standards at a relatively low price is possible only by introduction of modern, advanced technology and machines, efficient methods of labour organization and management, by innovation and investment development of production. This requires government support in the form of appropriate laws and regulations which have to stimulate innovation process and create favorable conditions for local and foreign investment.

Today, there are difficulties and obstacles which make it impossible to improve competitiveness of food products in full compliance with international requirements.

By this time, the Ministry of Health had not reviewed all medical and biological requirements and sanitary standards of quality of food resources and food products, they were adopted in 1989 in the former Soviet Union and are so outdated that in the distant approach do not meet international requirements as to the number of indicators and on their values. For many years there is no support for at all levels initiative to implementate the state program on the development of methods measuring ratings, food resources, products and additives.

There isn't regulated legal framework for the use and distribution of genetically modified organisms in Ukraine. Laboratories at enterprises are unable control food resources for GMO because of lack of necessary procedure and equipment. Recently the situation on world food markets has become more complicated significantly because of decrease in production of agricultural raw for food purposes, which led to decrease in production of finished products and a substantial rise in prices.

Taking into account significant potential of agro-industrial complex, Ukraine with appropriate government support can take a leading position in the global food market.

KEY WORDS: competitiveness, food industry enterprises.

STRATEGIES AGAINST FOOD WASTE IN EUROPE

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Food waste is an issue of importance to global food security and good environmental governance, directly linked with environmental (e.g. energy, climate change, availability of resources), economic (e.g. resource efficiency, price volatility, increasing costs, consumption, waste management, commodity markets, consumption) and social (e.g. health, equality) impacts. Up to 1/3 – 1/2 of the world food production is not consumed, leading to negative impacts throughout the food supply chain and households. There is a pressing need to prevent and reduce food waste to make the transition to a resource efficient Europe.

FUSIONS (Food Use for Social Innovation by Optimising waste prevention Strategies) will contribute to achieving a Resource Efficient Europe by significantly reducing food waste. It will achieve this through a comprehensive and experienced European partnership covering all key actors across the food supply chain, including regulatory, business, NGOs and knowledge institutes, all with strong links to consumer organisations. FUSIONS will establish a tiered European multi-stakeholder Platform to generate a shared vision and strategy to prevent food loss and reduce food waste across the supply chain through social innovation: new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations.

The overall aim of the project is to contribute significantly to the harmonisation of food waste monitoring, feasibility of social innovative measures for optimised food use in the food chain and the development of a Common Food Waste Policy for EU27. Utilising the policy and behavioural change recommendations from the delivery of the key objectives, the FUSIONS European multi-stakeholder platform will enable, encourage, engage and support key actors across Europe in delivering a 50% reduction in food waste and a 20% reduction in the food chains resource inputs by 2020.

KEY WORDS: food waste, food security, resource efficiency, food supply chain, waste prevention.

THE ROLE OF QUALITY IN FOOD SAFETY

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Demand on food is increasing in the world market, as the population of planet grew by more than milliard of people for twelve years of the XXI century. The situation in agrarian sector influences on a production and providing of population a sufficient amount of foodstuffs.

The area of arable land on the planet decreases due to active processes of erosion, salinization, desertification and degradation of whole regions annually on 14-16 million hectares. Potential of land is used unevenly: in the USA the degree of plowed area is only 12%, in Ukraine – about 57%. So, countries with low arable land have significant reserves of increase production, in case urgent need of food.

Ukraine enters to the list of the countries that export food to other countries, however the problems for providing domestic market with high quality, safe for life and health food domestic production becoming are more acute.

The components of food safety are: 1) high quality food products and safe for life and health of population, 2) the availability of food products, 3) adherence of rational consumption norms per day (the sum of products per unit mass of certain types of products and their energy value, is 3000 calories a day), 4) the national food products must prevail on the domestic market (more than 80%).

Limit food safety is estimated at food imports from 18% to 35% of total demand.

Particular attention must be given to the question of independence from imported food of poor quality such product groups as meat and meat products, fish and fishery products, fruits, berries and grapes, vegetables, nuts, however import of these products above export.

Considering that milk and dairy products, meat and meat products, fish and other sea foods refer to foods with a high risk to human health, the growth of imports of these products makes finding ways to improve the quality and safety of these species production of both domestic and foreign origin.

KEY WORDS: food safety, product quality, export, import.

FACTORS OF INFLUENCE ON COMPETITIVENESS OF DAIRY ENTERPRISES

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The special attention in the process of the estimation of competitiveness should be paid to the study of the objective phenomena or processes that have a direct influence on the competitive advantages. Talking into account approaches to the definition and classification of factors of competitiveness, a set of factors affecting the competitiveness of dairy enterprises in economic conditions formed. They are:

- macro economic factors: the legal regulation of the dairy market, the customs policy in the field of food and agricultural products, long-term programs of development of the agricultural sector, the level of infrastructure development, the demand on dairy products, income level of population, price of the product, level of competition at the market for dairy products, the reputation of the country in the international food market, participating of the state in trade associations, currency exchange rate fluctuations etc.;

- micro level factors: the cost price of product, the quality of milk and dairy products, energy consumption in the production of dairy products, certification of dairy products, introduction of new technology and modern equipment, qualification of dairy industry staff, cooperation with partners abroad, organizational and technical level of production processes, distribution channels of dairy products;

- meso level factors: historical and ethnic features and traditions of management in agriculture, industry programs of dairy sector development and its relationship with programs of related industries development, efficiency of functioning of branch professional associations, introduction and support of grant programs with the assistance of international funds and professional associations, existence of incentives for business development in the dairy industry, creations of integration formations for milk processing, the investment attractiveness of the industry and so on.

According to offered approach the factors of competitiveness of enterprises of dairy industry are incorporated in three groups: macroeconomic, that is not subject to direct influence of subjects of dairy market products, but determined by a public policy and market environment in a country; meso level factors, that have direct influence on efficiency of dairy enterprises functioning; micro level factors, that is formed directly by the subjects of dairy products market.

KEY WORDS: competitiveness of enterprises, dairy industry, factors.

THE WAYS OF THE COMPETITIVENESS INCREASE OF THE HOSPITALITY INDUSTRY ENTERPRISES

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Today the hospitality industry is one of the industries with the most dynamic development and increasing level of competition in the world. According to the data of the World Travel and Tourism Council this sphere employs about 260 million people, according to the forecasts of this organization the annual growth in the hospitality industry is expected at the level of 4.4%.

At the same time it should be noted that the hotel industry relates to labour-intensive industries: every worker employed in the hospitality industry of the USA, brings on average 16-20 thousand dollars of income annually to the company (in wholesale trade - 286 thousand dollars), while the costs of wages at the enterprises of the hospitality industry are 25-20% of turnover (in wholesale trade - 5%). These particular factors restrain the development of enterprises in this sector and at the same time create conditions for the strong competition in this industry.

Intensification of hotel and restaurant business development can be observed in Ukraine as well. This circumstance stipulates the creation of competitive advantages for domestic hospitality industry enterprises. **The main directions of increasing of competitiveness** of the enterprises of the hospitality industry are:

- 1) Increasing of the domestic enterprises competitiveness by the controlling system introduction which is the complex management system of the enterprises activity effectiveness on the basis of the target indicators system development.
- 2) Improvement of the provided services quality and changing of standards ISO of the series 9000 in order to ensure their link to the enterprise competitiveness.
- 3) Ensuring Ukrainian hotels representation in all global reservation systems (Amadeus, Galileo, Sabre, Worldspan).

KEY WORDS: competitiveness, hospitality industry, investments, reservation systems, controlling

SOME ISSUES ON QUALITY MAINTENANCE OF FOODSTUFF IN THE NATIONWIDE PROBLEM OF FOOD SAFETY

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The problem of ensuring food safety in the country has always been urgent. The state of public food safety is assessed by the following criteria: physical availability of foodstuff, i.e. their wide choice throughout the country at any time; their economic availability – income level regardless of person's social status and place of residence allows their purchase at least at the minimal rate of consumption; their safety for consumers – prevention of production, realization and consumption of non-quality products, etc.

Nowadays the problem of alimentary raw materials and foodstuff is the key one, as it is one of the main factors of assuring human health and preservation of nation's gene pool. A lot of responsible scientists, manufacturers and consumers, public organizations consider it necessary to adopt standards, laws which would guarantee safety and use of foodstuff, to take measures required for their fulfillment and to determine responsibility for their breach. Though, the reality is that these measures are not perceived as they oppose interests (first of all economic, financial ones) of manufacturers, mediators, sellers and other parties interested in "enrichment by all means".

Maintenance of food safety and safety of foodstuff must be of systematic nature, including agricultural production, procurement, processing, preservation, realization, and solving problem of physical and economic availability of foodstuff. Here, the role of state is extremely important. It is necessary to develop National strategy for ensuring food safety. Adoption of Law "On food safety" is essential. Besides, it would be reasonable to organize an effective system of foodstuff control via combination of all the functions of foodstuff safety maintenance in one establishment - Agency for Food Safety of Ministry of Agrarian Policy and Food of Ukraine - which would be responsible for food safety with well-defined duties. Finally, cultivation of culture of safe food manufacturing and consumption must become an extremely important task for mass media, state and public organization.

KEY WORDS: food safety, quality of products, safety of foodstuff, state

METHODICAL ASPECTS OF STATE POLICY'S FORMATION FOR MACHINE-BUILDING COMPLEX'S DEVELOPMENT OF THE AGRICULTURAL SECTOR' ENTERPRISES

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During the existence of Ukraine as an independent state the government implemented certain steps to ensure the needs of agricultural enterprises in high-tech permanent assets of production to overcome the problem situation: as a result of low agricultural producers' solvency they do not have the funds to purchase the equipment, and engineering plants have the lack of working capital due to lower demand for its products, forced to cut their production.

One of the last steps in this direction was the development, and then approval "State program of development of the national machinery for agroindustrial complex for 2007-2010" and "State program of technical policy in agroindustrial complex until 2011." Like a number of previous measures of improving the situation in the field of mechanical engineering, the programs implemented only partially. The main reasons of the low level implementation are the lack of inheritable approaches in implementing of large-scale government programs approved by the previous government, the global economic crisis, and so on. But it should be noted the fact that professionals who were involved in the development of programs did not have a proper foundation in the form of a clearly stated policy on this issue. During its formulation, in our view, it is necessary to answer to a few questions: 1. Should we focus on providing almost all kinds of technological means of growing, harvesting, storage and processing of agricultural products by domestic factories? If not, what priorities should be on this nomenclature?

2. In what way the state is going to solve the problem of farmers' solvency in the process of expanded reproduction of capital goods and, on the other hand, support the agricultural sector of mechanic engineering in trying to meet effective demand?

3. Should programs' Development from the perspective of state policy of mechanic engineering's development for the purposes of agriculture be based on scenario analysis or clearly defined benchmarks?

Answers to these questions can serve as a basis for the formation of a cohesive machinery development policy for agroindustrial complex enterprises.

KEY WORDS: agroindustrial complex, mechanic engineering, state policy

PECULIARITIES OF ASSESSING THE LEVEL OF COMPETITIVENESS OF DAIRY INDUSTRY ENTERPRISES

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The modern market economy of Ukraine is formed and developed simultaneously with intensifying of competitive activity in the world, that acquires more global scales every year. In such terms possibilities of the stable economic growth both of economy of Ukraine on the whole and separate commodity producer depend on the effective decision of such point, as increase of competitiveness level of each business entity. For this reason research, assessment and search of ways of forming and development of an enterprise competitiveness of enterprises in the modern business environment is quite problematic. Today there are a number of methods of evaluating competitiveness; however, the basic problem of their application is a considerable degree of subjectivism and impossibility of obtaining of reliable information for realization of assessment. Therefore a further improvement is needed by the process of development of theoretical and methodological aspects of management and assessment of competitiveness of enterprise, that must use the integral index of general level of competitiveness that combines the complex assessment of the level of competitive potential of an enterprise and competitiveness of products, for the sake of providing and exposure of backlogs of competitiveness of enterprise in the future. Methods of assessment of competitiveness level, described in foreign economic literature, are characterized by the greater variety of approaches, by application of wider methodological tool of analysis of economic situation inside enterprise and environment. The sequence of realization of assessment of competitiveness of dairy industry enterprises in the conditions of eurointegration should combine these approaches and be based on the analysis of competition environment, study of separate criteria of competitiveness and calculation of integral index of enterprise competitiveness. The intensity of competition among the existent producers of dairy products depends on many factors and can be show up in different forms: price competition, promotional fight, introduction of new products, the highest level of service and quality assurance. Thus, examining the peculiarities of competitiveness of the dairy industry in Ukraine, we can come to conclusion that the primary source of competitiveness is to improve the production process and improve product quality, and create state favorable business environment in which domestic producers can continually develop their competitive advantages and to hold and maintain a strong position in certain segments of the domestic and world markets, developed system of market institutions, possessing considerable intellectual capital and investment resources, flexible response to changing global market conditions and, accordingly, diversification of production and so on.

KEY WORDS: competitiveness, the assessment, dairy industry.

MANAGEMENT OF THE INVESTMENT PROCESS

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Characterizing the modern state of investments in Ukraine, it is possible to note that the state has not currently obtained serious achievements in providing national competitiveness and investment attractiveness. Out-of-date assets cannot be the reliable base of competitive activity and investment attractiveness. Investments in their updating bring no advantages to the private capital. The increase of competitiveness and investment attractiveness of economy must become a strategic task. It is necessary to choose key trends which will be able to generate the real presentation of other spheres of economy. Food industry can become a priority direction.

Investment activity of enterprise is the purposefully carried out search process of essential investment resources, choice effective objects of investing, forming of the investment program balanced on select parameters and providing its realization. In modern crisis terms, high efficiency of investments is the determinant of development and stable viability of enterprises. For the successful solution of complex investing issues and acceptance of reasonable administrative decisions relating prediction and choice of strategic directions of investment activity, forming the balanced investment portfolio and comprehensive examination of separate objects of investing construction, there is a necessity in more precise and effective management of investing process.

Ukraine's development in modern conditions of transformation of economic relations requires effective government control of investment processes.

The process of investing Ukrainian industries on this stage of development, meet the following problems that hinder the creation of positive investment climate: imperfection of the tax system; low solvent demand of subjects of economic activity; considerable volumes of debt of enterprises to the state and non-state financial institutes; absence of reliable defense guarantors of foreign capital; absence of the profile crediting programs; a low level of trust of population to the banking system.

KEY WORDS: investments, investment activity, control, efficiency, development , process

UKRAINIAN SUGAR BEET PRODUCTION

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The main task of the sugar industry in Ukraine is to provide people, according to the research that is based on physiological norms of consumption, the end product - sugar. The long shelf life of sugar makes it a strategic product, and its production, along with other branches of the food industry, is the basis of national security.

However, in recent years this strategic sector of the food industry is in crisis, is far behind a number of foreign countries with the production efficiency. Over the past twenty years the amount of sugar in Ukraine is significantly reduced.

Analysis of the industry shows that in the period of transition to the market economy, without state regulation and production management, the development of sugar production was carried out mainly by the extensive factors. The current state of the industry is characterized by a structural imbalance, retarded growth and a significant decline in production volumes. The main reasons are: general economic crisis, the destruction of the public administration system and systemless transition to a deregulated market, loss of state influence on economic processes in the manufacture, control of the production and sale of products, lack of reasonable pricing in sugar and related food industries as well as inadequate legislation for efficient functioning of the market conditions.

It is necessary to take measures to promote domestic sugar to foreign markets, to continue the practice of preferential loans to sugar factories for working capital to finance the cost of the purchase of sugar beet seed, fertilizer, fuel and material resources for the preparation of sugar plants, to protect the domestic market from unwanted receipts of white sugar produced from raw sugar cane, sugar-products and sweeteners, to ensure revival of the sugar industry and stabilization the indexes of its development.

KEY WORDS: sugar branch, sugar beet, sugar.

POTENTIAL OF UKRAINE'S FOOD INDUSTRY TO ENSURE FOOD SAFETY

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The concept of food safety deals with several aspects:

1. Physical availability of food – a systematic flow of food to the consumer in the scope and range that meet science-based standards of consumption. In 2000-2007, food production demonstrated steadily growth (8-20% per year). Slight downturn in 2008-2009 and 2011, was partially offset by rising production in 2010 and 2012 (by 3,2 and 1,5%). Thus, according to the State Statistics Service the level of provision by main types of food as a percentage of science-based standards is: grain and its derivatives – 192,9%, meat and meat products – 91,4, milk and dairy products – 106,7 eggs – 109,5, potatoes – 110,0, vegetables and melons – 105,3, fruits, berries and grapes – 74,0%.

2. Economic availability of food, i.e. every citizen should have sufficient income to purchase a minimum set of food. In 2012, food prices remained virtually unchanged (CPI varied by month within 99,1-100,3%). On the other hand, the growth of nominal income (about 14%), the share of food in consumer spending Ukrainian average is 54%, which is the highest among all countries with emerging markets.

3. Stability of access to food, namely socio-economic system of the country should ensure the availability of food for every citizen in the long run. Food industry plays a special role in solving the food problem in any country which is not only the final link in the production of finished food products, but also an organizer and integrator for the effective functioning of the food complex in the state. Available potential of the food industry in the country is almost completely can meet the needs of the population in the major foods that are competitive in quality and price. Sector has considerable export potential (one-third of exports of agro-industrial complex and more than 10% of total exports in 2012 accounted for the food industry), which provides a positive balance of foreign trade in this commodity group.

4. Food safety, i.e. guaranteed the minimum requirements for safety and quality of food products and raw materials.

KEY WORDS: food safety, capacity, food industry, food.

ORGANIC BABY FOOD AS A COMPONENT OF FOOD PRODUCTION COMPETITIVENESS IMPROVING

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The competitiveness of Ukrainian agrarian sector can be achieved through the development of organic production. The pace of worldwide development of organic food production suggests a further increase in demand for these products. Considering the market for organic products it should be noted that the trends of its development meet the increasing purchasing power of the population and the culture of consumption, which is only beginning to form in our country. The formation and development of preventive and functional food products segment as well as the promotion offer of products targeted at specific consumer segments are especially important for the formation of an organic products market.

In the context of organic production the production of organic baby food is of particular significance. As a nutrient demand in children is quite different than in adults, there are special requirements for raw materials, technology and packaging in the production of baby food. Baby food must be adapted to the needs of a child's body.

The demand for organic baby food will increase. It should be noted that more preference is given to baby food products manufactured in environmentally sound conditions. This applies especially to families living in ecologically unfavorable areas. Therefore the manufacturing of organically-friendly baby products is becoming increasingly important.

It can be assumed that the main obstacle for the intensive development of Ukrainian market of organic baby food is the price. At the same time, price characteristics of similar imported products on the Ukrainian market far exceed the Ukrainian ones.

Consumer surveys have revealed that the Ukrainian families with young children have no confidence in the domestic producers. Well-known brands of foreign baby food manufacturers have great confidence and, therefore, they are in great demand. In consumers' perception, organic products are most often associated with countries having eco-friendly territories and agriculture. Over the long period of time, when baby food was not among the priorities of the state policy, the Ukrainian market of baby food production was captured by the similar products manufacturers from Germany, Netherlands, France, Russia and other countries. Restoring the presence of Ukrainian producers on baby food market is a laborious and continuous process. But above all, there must be an appropriate legal basis and firm control over the compliance with its requirements concerning the quality of output products.

KEY WORDS: organic, baby food, competitiveness, organic production.

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| Oral Presentations |
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| Section YOUNG FOOD SCIENTISTS - VISION OF THE FUTURE |
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| ANTIMICROBIAL AND ANTIADHESIVE PROPERTIES OF SURFACTANTS SYNTHESIZED BY <i>ACINETOBACTER CALCOACETICUS</i> IMV B-7241 |
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| <u>Konon Anastasiia</u> |
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A promising field of practical application of microbial surfactants is within the creation of modern antimicrobial and antiadhesive agents for use in food industry and agriculture.

In previous studies oil-oxidizing bacteria was isolated from the oil polluted soil and identified as *Acinetobacter calcoaceticus* IMV B-7241. The ability of this strain to synthesize the exocellular surfactant (complex of glyco-, amino- and neutral lipids) during growth on different substrates was determined.

The aim of this work was to study the influence of surfactants of *A. calcoaceticus* IMV B-7241 on some bacteria (including phytopathogenic) and also to investigate the antiadhesive properties of these preparations.

The following preparations were used in experiments: preparation 1 – supernatant of cultural liquid, preparation 2 – solution of surfactant extracted from the supernatant (preparation 1) with the mixture of chloroform and methanol (2:1); preparation 3 – water phase remaining after surfactant extraction.

It was shown that preparation 1 (0.22 mg/mL) of *A. calcoaceticus* IMV B-7241 decreased living cells quantity of *Bacillus subtilis* BT-2 by 100 %, *Escherichia coli* IEM-1 – 67 % and *Saccharomyces cerevisiae* OB-3 – 48 %. It was determined that in the case of the addition of preparation 2 (0.15 mg/mL) in phytopathogen cells suspension of all investigated test cultures survival was 10 %. The activating action of preparation 3 on some bacterial strains growth was observed. It can be explained by the presence of other biologically active substances (not surfactants) in water phase.

It was also shown that after treatment of different materials (glass, steel, linoleum, plastic) by preparation 2 (0.0023 mg/mL) quantity of attached *B. subtilis* BT-2 and *E. coli* IEM-1 cells decreased by 12–20 %. It should be noted that antimicrobial and antiadhesive activity of surfactant preparations was depended on physiological state of *B. subtilis* BT-2 cells.

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| KEY WORDS: Biosurfactants, <i>Acinetobacter calcoaceticus</i> IMV B-7241, antimicrobial and antiadhesive properties |
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FOREIGN LANGUAGES FOR SPECIFIC PURPOSES: GENERAL EXPERIENCE

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Foreign languages for Specific Purposes in National University for Food Technologies are a learner-centered approach to teaching foreign languages as an additional language, which focuses on developing communicative competence in a specific discipline, such as engineering, technology, academic writing and learning. Students are also exposed to academic culture and real world communication practice. These classes focus on the development of job-specific foreign language skills for students who seek to enter or advance in their professions.

To help facilitate the integration of internationally educated professionals (IEPs) into professional workforce, the job-related foreign languages department in National University for Food Technologies has established the foreign languages for Specific Purposes (FLSP) Program.

The FLSP Program is an enhanced foreign language program designed to provide IEPs with exposure to the professional context and field specific language communication training in order to best use their technical expertise in their future professional sphere of activity. Currently, we offer programs for those with a background in: Engineering, Technology, Hotel and Management, Tourism, Science and Technology. Our students also learn about cross-cultural awareness, especially as it applies to the workplace. Upon completing the course, students can expect to have the language skills they need to be independent and successful in their professional or academic careers.

Foreign languages for Specific Purposes will provide students with opportunities to improve their foreign language skills, particularly in the area of technical communication: the process of creating, designing, and transmitting technical information so that people who may be unfamiliar with engineering terms and practices can understand the information easily and use it effectively and efficiently. The anticipated outcome is that students will have the language skills necessary to independently facilitate their own successful participation in further professional or academic activities. This course continues from the foundation built in the "Foreign languages for Professionals" course in the areas of writing and oral communication, and will focus on refining effective strategies for clear, concise technical communication. The program content also incorporates grammar and culture elements relevant to internationally educated engineering professionals working.

KEY WORDS: course, foreign languages, internationally educated professionals, language skills, program, Specific Purposes.

GENETIC ENGINEERING AND ENVIRONMENTAL IMPACT IN WESTERN CAMEROON

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Human causes of global environmental change are invariably linked to inconsistencies in the relationship between biotechnology innovations and ecological system. The dependence of agriculture on chemicals to maintain productivity in marginal landscapes of western Cameroon and the desire to increase the performance level of the land productivities resulted in contamination to the global environment with toxic pesticides and fertilizer nutrients that change the course of biogeochemical cycles. This requires the development of approaches clear and rigorous intellectual as well as the implementation of devices providing theory and practice optimal safety. It also calls for a scientific effort, prospective and evaluative increased permanent and must include, in particular exploring the consequences economic and social. It is therefore imperative that researchers accept and take care goals that at first might appear as constraints. The necessary biotechnological protocols are available, but scale-up techniques are limiting, particularly with respect to the cultivation and processing of alternative non-recalcitrant raw materials in stressful environments. The development and global implementation of biotechnological approaches can contribute urgently needed solutions to problems associated with inefficiencies in the industrial ecology of agricultural and energy resources.

KEY WORDS: Agriculture, Biotechnology, Ecology, Climate, Genetic engineering.(

THE USE PRODUCTS OF GRAPES PROCESSING IN DEVELOPING INNOVATION CONFECTIONERY TECHNOLOGIES

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Confectionery products are labeled as a high-caloric foodstuffs with high content of carbohydrates, fat and low content of biologically active components.

Recently, much more attention is focused upon the scientific research and the development of ways of processing plant raw materials with high content of biologically active substances.

When formulating the confectionery articles the nontraditional types of raw materials are not only to provide the unique biochemical properties. They are intended for bearing certain function-technological properties in order to provide the confectionery articles with original organoleptic properties (flavour, smell, structure) and with the proper quality in the course of storage. The promising direction is represented by developing technologies for new kinds of confectionery articles with the use of grapes processing products.

For confectionery industry great interesting have grapes peel and the seeds as a sources of biologically active substances such as vitamins, macro- and microelements, phenol compounds, plant fiber, organic acids, irreplaceable amino acids, polyunsaturated fatty acids, are of the intense interest.

The technology of processing of grapes marc has been developed. The results are hydrolized puree and jam with higher pectin content, which were applied as a base for further production of confectionery.

The function-technological properties of grapes raw materials and impact on changes in physical-chemical and structural-mechanical properties of semi-finished products and the final products have been investigated.

Puree, supplies, jelly with sugar from grapes peel are recommend to use as fillings for caramel and wads, in production of the cream in order to extend the expiry date and to improve the organoleptic properties, in production of whipped candy substance (such as soufflé), fruit jelly centers of candies and marshmallow.

Thus, the use of grapes processing products enables us to offer new assortment of confectionery with natural dyes, antioxidants, increased nutritive and biological value, possessing original organoleptic properties.

KEY WORDS: grapes, food processing, grape marc, confectionery, phenolic and pectin.

SUNFLOWER SEED DRYING IN A VIBRO-FLUIDIZED BED UNDER INFRARED HEATING

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Traditionally, in the Ukraine and Russia drying sunflower seeds carried by the convective process in drum, tunnel, shaft and recirculation dryers, the main advantage of which is higher productivity. However, the dryers are quite energy intensive, overall and provide uneven heating of seeds, because they do not take into account the specificity of sunflower seeds as an object of drying. Different chemical composition of the seeds shell (husk) and the core causes varying degrees of moisture due to be removed during drying. Keep in mind also that the seed husks of confectionery sunflower varieties are not tight to the core, that is, between the husk and the kernel has an air cavity. Thus, the seed is made up of components that differ sharply on the thermodynamic properties.

More promising for drying sunflower seeds look volumetric method of the heat, of which, in recent years the most widely used infrared and microwave. They can provide a uniform heating of the entire seed or more intense heating of the core. In addition, there is no need to use air as a heat agent, which reduces the energy consumption for the drying process. Promising in this respect is the combination of infrared or microwave heating and active contact seeds with poorly heated or not heated air, which provides, for example, fluidized bed, vibro-fluidized bed or centrifugal fluidized bed. In addition, for certain values of the operating parameters should be to create conditions of the drying process, which will support a temperature gradient from the center of the core to the husk. This, as a result, will provide the same direction, concentration and temperature diffusion of moisture.

We carried out a series of experiments in drying sunflower varieties of "Titanic" in the vibro-fluidized bed with infrared heating. We investigated the change of the average moisture content and temperature of product bed during drying, depending on the heat flux. For the test of the product pre-defined physical and mechanical properties. Using the experimental data of the curves as drying, drying speed and temperature at different points in the product. The curves drying rate approximated by the least squares method in the computer application.

For a preliminary assessment on the effect of processing on the quality of the dried seeds used average integral temperature of the product during drying.

These results will form the basis for the development of industrial apparatus for sunflower seeds drying.

KEY WORDS: drying, sunflower seeds, radiating heating

PROSPECTS OF USING COMBINED PHYSICAL EFFECTS IN VIBROEXTRACTION FROM PLANT RAW MATERIALS

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In processing industries, the problems of the rational use of plant raw materials, increase in the efficiency of extraction of desired components from them, and acceleration of the process at all scale levels are topical. In this connection, the search of new methods of intensification, in particular, of the vibroextraction process in the solid body–liquid system, specifically, by using different combined physical effects is continued. In this context, the simultaneous action by low-frequency and high-frequency vibrations on interacting phases deserves particular attention. To activate internal mass transfer and increase the intensity of the process in the interface layer of interacting phases, it was proposed to introduce high-frequency mechanical vibrations generated by a high-frequency radiator, set in the working volume of an apparatus, in addition to low-frequency mechanical vibrations of a vibromixing system.

To check this hypothesis, we performed an investigation of the extraction process in a “cereal plant raw material–water” system on the developed periodic vibroextractor with combined power supply.

We investigated the extraction process of desired components in the “cereal plant raw material–water” system in an apparatus with a volume of 15 l. The frequency of low-frequency mechanical vibrations of the vibromixing device was changed from 1 to 4 Hz, and the amplitude was 20 mm; the excitation power of the radiator was changed from 20 to 100 W. Based on the results of investigations, we constructed extraction curves and determined volume mass-transfer coefficients and equilibrium concentrations for the dry substance in the extract. It was established that, in combination with low-frequency vibrations of the perforated disk with the container, the high-frequency spectrum of mechanical vibrations generated by the radiator provides intensive mass transfer in the solid phase and, at the same time, mass removal of extractive substances from its surface.

KEYWORDS: vibroextraction, desired component, high-frequency radiator

IMMUNOMODULATING PROPERTIES OF A MOLECULAR COMPLEX FORMED BY THE YEAST RNA AND TILORONE

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Because of a great health problems due to different immunodeficiency-causing diseases, the screening and investigation of immunomodulative drugs is of the greatest value. We have earlier shown molecular complexes (MC) formed during interactions of a synthetic low molecular mass ligand - tilorone-HCl with yeast RNA are able to induce the synthesis of α/β -interferons (α/β -IFNs) both in *in vivo* and *in vitro* conditions. A lot of known IFN-inducing preparations are found to possess immunomodulating properties, so we have evaluated some of them for MC mentioned above. The changes of expression levels of human T- and B-lymphocytes have been determined by a rosette-forming test. Oxygen-generating activity of murine spleen phagocytes has been evaluated using the NCT-test (tetrazolium blue reduction accompanied by calculation of NCT-positive cells and peroxidase activity of phagocytes).

The MC has been found to increase the levels of T-lymphocyte surface receptors by 25–30%, the B-lymphocyte receptors keeping their control level. Our investigations have shown a tendency of NCT-positive cells number following administration of average MC doses. Similar pattern has been seen with peroxidase activity of phagocytic system. These data permit to conclude the MC to possess some immunomodulating properties.

KEY WORDS: yeast RNA, tilorone, immunomodulator, immune response, lymphocytic cell.

TECHNOLOGICAL ADVANTAGES OF USING CYCLIC DISTILLATION PROCESS IN THE PRODUCTION OF ETHANOL FOOD GRADE

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The one of the main factor that provides high quality of ethanol food grade is distillation columns. Nowadays before the producers are strict market conditions on qualitative of ethanol, and reduced specific energy costs per unit of output. Nowadays manufacturers have strict conditions on the quantitative and organoleptic indicators of alcohol quality. At once market conditions dictate reduced specific energy costs per unit of output. This problem can be solved only by constantly improving technology of removing impurities by increasing the efficiency of mass transfer. Application of cyclic modes is one of the methods to increase the efficiency of interaction phases in distillation column, which essentially boils down to a circular motion phases in the contact zone. Mass transfer occurs on a tray in the absence of fluid flow. This allows you to achieve hydrodynamic regime that close to the ideal displacement as in a liquid, and a pair in real conditions. There is observed especially significant difference between standard and cyclic processes at high reflux. This scheme of contact phase makes it possible to get number of structural and technological advantages : reduce the number of trays in the column 2 ... 2.5 times; reduce square of trays in 1.5 ... 2 times; reduce steam consumption is 1.5 2, 5 times; increase the load on the liquid 1.5 ... 2 times; improve quality and increase the additional output of ethanol.

Let demonstrate the benefits of the transfer distillation column in cyclic mode on the example of the column final purification and column of concentration of impurities.

The Column of the final purification of ethanol, operating in the hydroselection mode: reduces the content of methanol in 1.3 ... 2 times, reduces the aldehydes content of 0.2 mg / liter; increases oxidation ethanol per 1 ... 2 min; improves organoleptic properties of ethanol. This specific steam consumption in the cyclic mode is 0.3 ... 0.4 kg / liter (for bubble column in standard mode is 0.6 ... 0.8 kg / liter).

The Column of impurities concentration performs the function of additional hydroselection column for the purification of contaminated flows. Release of additional ethanol for 3 ... 4% is possible due to the higher concentration of impurities main character (esters and aldehydes) namely of 0.6 ... 0.7% of plant capacity and specific consumption of steam 0.07 ... 0.08 kg / liter (for bubble column in standard mode is 0.3 ... 0.4 kg / liter).

Distillation column in a cyclic mode allow to reduce capital costs for the construction of new and reconstruction of existing ethanol plant, while reducing the cost and improving the quality of the final product.

KEY WORDS: cyclic distillation process, ethanol plant, column concentration of impurities, column of final purification, ethanol food grade.

STATUS OF WORK ACCIDENTS IN FOOD INDUSTRY

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The aim of this work is carrying out of statistical analysis of occupational injuries among Food Industry employees. The object of research is occupational injury in Food Industry for 2003-2011 period. Status of occupational injury in Ukraine was analyzed for 2003-2011 period.

We show a results of occupational injury dynamic research in Food Industry of Ukraine from 2003 to 2011 years. Distribution for male and female injured employees on enterprises of Food Industry was performed. Indexes of injury rate and heaviness were calculated. And finally, distribution of accidents for main reasons, sorts of events, profession group, age, work experience was performed.

In recent years, industrial injuries, both general and fatal in Ukraine reduced. It is encouraging that this is happening at increasing production volumes and increased business. Despite the decline in Ukraine level, both general and fatal injuries, he remains unacceptably high and exceeds the performance of European countries.

In order to establish the most significant and hazards that pose the highest risk of injury, when were analyzed by grouping indicators of injury accidents and fatalities by uniform signs, such as an event, cause, profession of the victim, and defined particle distribution of accidents for each feature . Determine the status, trends and magnitude of the problem of occupational injuries in the food industry, the laws and the impact of various factors on injuries. Established traumatic profession in some sectors of the food industry, revealed qualitative and quantitative parameters of reasons and factors that characterize the current state of injury by type of work performed, which makes this topic relevant.

Exploration of labor safety conditions and also of occupational injury reasons and circumstances is useful for developing of sound and effective ways for prevent and reduce the occupational injury, illnesses and worker's traumatism.

The results of research shows, that in food industry of Ukraine during 2003-2011 the number of work accidents was decreased almost in 4 times.

Big part of injuries accounted for experience workers who have service record over than 20 years and for workers with professional experience less than one year. We should to pay special attention during the primary and second instructing on the workplace. Besides, it is necessary to improve quality of instructing, intensify the control for low-skilled workers. It is necessary to enlarge the responsibility of all level directors on branch enterprises with aim to prevent the labor safety law violation which leads to work accidents.

The frequency of injuries decreased, but the severity of injuries is still high. That means, the accidents became more dangerous. Average frequency of injuries C_f amounts 2.3 and severity of injuries index C_{ih} amounts 34.3 – both of them for period from 2003 to 2011. It indicates that, despite decline of total number of accidents in food industry, the severity of injuries is increasing and it's necessary to take crucial and complex measures for reduce these rates.

Lately modern manufacture work in course international law of labor safety, where for rationale of prevention measures usually using a results of injury risk analysis. Choosing and reasoning of occupational injury prevention ways and measures is provided with consideration of risk factor.

That's why the next important step of exploration is developing of effective prophylactic measures for occupational injury prevention by definition of influence pattern on accidents which caused by technical, organizational, social, economic and manufacture reasons.

KEY WORDS: safety and health at work, occupational injury, frequency of injury coefficient, partial loss of working capacity coefficient, injury heaviness coefficient.

ANALYSIS OF THE IMPLEMENTATION OF WIND POWER-STATIONS IN UKRAINE

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As of 01.01.2009, the total installed capacity of wind power-stations of the united energy system of Ukraine is 83.9 MW.

Wind flow power increases in proportion to the cube of speed. Therefore the choice of a platform in terms of maximum wind speed is critical for the subsequent work of wind power-stations. However, even taking into account the most favourable location for the development of wind energy areas, the wind speed depends on various factors: surrounding terrain, small-scale structure of the Earth's surface and the presence of natural and man-made objects. Wind power-stations construction with nominal capacity of less than 20-50 MW is impractical, this applies also to the installation of wind turbines with a capacity below 2 MW.

Choice of a place for almost all existing wind power-stations was carried out with the help of common but sometimes insufficient information about weather conditions, hasty finding and allocating the land, which resulted to lower electricity generation in some wind power-stations up to 30%.

Wind turbines were installed inefficiently, so that under certain wind directions they over each other. This led to the fact that the coefficient of nominal rated power wind turbines at different types of power plants differs twice as much (0,09 - 0,04). Average coefficient of rated power is 0.083. According to the data from wind-power station Donzulavska this coefficient does not exceed 0.07. High time consumption for repairing and maintenance of the equipment due to imperfect wind turbines have influenced the coefficient level.

That is why currently it is of the highest importance to have a new system for monitoring weather conditions, preferably with a base of at least 5 years.

KEY WORDS: Wind power-stations, wind turbines, monitoring, nominal capacity, constuction

USE OF TOPOLOGICAL INDICES FOR MATHEMATICAL MODELING OF CHEMICAL COMPOUNDS AND THEIR PROPERTIES

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Topological index as a term emerged in the late 40-ies of the 20th century. It is invariant of molecular graph problems in computer chemistry, ie a value that describes the structure and properties of molecules. Earlier this index was used to describe the spatial structure of the compound, in this paper the authors propose systematic zing topological indices, to apply them to mathematical and computer modeling structures of chemical compounds and chemical processes in order to predict their properties. There are two types of topological indices: local (differential) and global (cumulative). The differential indices include, for example, the Bonchyev index, integrated – Wiener index.

The value of the same topological index for several different molecular graphs overlap. The smaller of these matches - the so-called higher discriminant power of the index. This ability is an important characteristic index. To increase its number of topological indices can be combined into one super index.

Computational complexity is another important characteristic topological index. Most indices are computed using fast algorithms.

Topological indices are used in computer chemistry for a wide range of general and special tasks. These challenges include: the search for substances with predetermined properties (search dependencies like "structure-property") the primary filtration structural information for without repetition generation molecular graphs given type, previous comparison of molecular graphs in their testing isomorphism and several others. Topological index depends only on the molecule structure, but not on its composition, because the molecules of identical structure (at the level of structural formulas) but different composition, such as furan and thiophene will have equal indices. To overcome this difficulty has been proposed by a number of indices, such as indices of electronegativity.

KEY WORDS: structure-property, topological index, electronegativity.

THE ANALYSIS OF NEW REDUCTION PROJECT OF METHOD AUTHENTICATION POTENTIALLY DANGEROUS OBJECTS

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The majority of thousand registered potentially dangerous objects majority does not create considerable problems and does not influence substantially on safety of population and environment possible. Emergency situations on such objects, mostly, does not spread even outside a workshop and does not fall under classification of "extraordinary situation". In addition, through legislative vagueness and different interpretations of questions in this sphere, in some regions potentially dangerous objects take into account twice.

Permanent growth of amount potentially dangerous objects caused and from to a great extent that existing regulatory acts expressly do not establish exact including excluding criteria taking or not taking of them info potentially dangerous objects and the duties of economic entity in relation to the implementation of authentication procedure of potentially of dangerous objects.

To establish more transparent and simplified authentication procedure of potentially dangerous objects and bring the proper requirements in accordance with legislative the project of changes to Statute about the passport system of potentially dangerous objects.

At the same time increased responsibility of economic entity in procedure implementation of authentication. Nomenclature of hazardous substances a presence of which on an enterprises is the reason for the implementation authentication of potentially dangerous objects is limited by the list of hazardous substances. Quantitative norms of hazardous substances are determinated. So only objects on which total mass of hazardous substances (Q) does not exceed the value of threshold mass (P) for the objects of high danger of 2 class of danger, but anymore 0,01p, if the condition of $R > q > 0,01p$ is executed, are acknowledged potentially dangerous.

KEY WORDS: dangerous objects, hazardous substance, emergency situations.

SOME FEATURES OF FOOD PROCESSING INDUSTRY CALCULATIONS OF DYNAMIC LOADS

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The paper focuses on inadequate lighting of strength calculations of equipment components of food processing industry in the academic and specific literature. Such equipment includes plates and shells, shafts, beams and other elements that have dynamic impact. Often these elements are continuous systems or systems with distributed parameters, an updated calculation of which causes some difficulties. This equipment is taken to maintain in the simplified scheme, without distributed constants, or without any dynamic loads at all. However, studies show that such weightless equipment calculations hide the error up to 17%.

The aim of this work - to develop an engineering method of calculation of distributed parameter systems undergoing transverse vibrations and shock, as well as explore the accuracy of the solution of these systems according to the account number of harmonics in this kind of load, bring engineering calculation method to a specific number.

For example, the article gives a dynamic calculation on the transverse vibrations of stone trap blade for root washing equipment and impact from a collision of blade with a root. This calculation is made on the basis of fourth order partial differential equations for the transverse vibrations of loaded core. This equation is represented in the initial parameters by the Fourier method through the dynamic Krylov features. Solution of the problem is illustrated by a numerical example previous to strain and bending moment calculations.

Solution of transcendental equations we obtained in numerical form in a computer package MathCAD.

It concludes with an approximate solution for the system replacement with distributed parameters of weightless console with one reduced mass. It also shows how to get a fairly accurate result by bringing the mass console to the mass concentration (as root).

Given that such strikes roots in different sections at the same time can be a little, get a significant stress in the blade jamming, which can cause it to break. To reduce the design stresses should be in a landing support ring blades provide a flexible connection. This can be a spiral or helical spring or a rubber bushing.

KEY WORDS: food processing industry, transverse vibrations

STATUS AND PROSPECTS OF THE DEVELOPMENT OF THE VACUUM AND SF6 INSULATED HIGH-VOLTAGE SWITCHING EQUIPMENT

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To date, replacing outdated high voltage switches come modern vacuum switches and SF6 insulated high and very high voltage. These electrical devices are rapidly evolving and improving. The use of sulfur hexafluoride as arc-extinguishing medium efficiently compared with compressed air and oil. Vacuum switches in turn is completely safe for the environment and have a very long service life. In the world there is a tendency to move to such high voltage switches and their gradual replacement of obsolete oil and air switches.

KEY WORDS: vacuum switches and SF6 insulated high-voltage

RESEARCH OF ROASTING PROCESS FOR PRODUCTION OF CAMEL MALT

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In the conditions of the market competition producers of beer are compelled to increase the range of let-out production. Increase in the range possibly at the expense of release of dark grades of beer in which structure along with light grades of malt are added specially. In this regard by production of dark grades of beer the need for high-quality special grades of malt (caramel and roasted) increases. Caramel malt - is strongly colored aromatic product obtained from fresh sprouted pale malt which is sugared and roasted.

One of the key processes in the production of caramel and roasted malt is the process of heat treatment, resulting in the product getting a unique color and flavor [1].

Based on analysis of published data in the design of devices for heat treatment of malt, new design of the fryer with a fundamental new technical solutions designed and made laboratory apparatus for experimental studies. The basic technological parameters of malt change during the heat treatment and describing its quality. For experimental studies of the process of roasting malt designed and assembled experimental stand.

One of the most energy-intensive processes for the preparation of caramel malt is roasting beans, and the quality of roasting largely determines the final physiochemical and sensory characteristics of caramel malt.

The experimental data have allowed identification of the main factors affecting the efficiency in the process of roasting malt, and their range of variation: speed of the screw –20-30 min⁻¹; the temperature inside the chamber – 160-180 °C; roasting time – 140-180 min.

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KEY WORDS: Caramel malt, beer, roasting

LABELLING IN THE PRODUCT LIFE CYCLE

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Sales is a crucial stage the product life cycle. Production is meaningless if the product will not be realized. Successful labeling should assist in this.

Product label is very important and key tool in competition for consumers' preferences. It is hard to overestimate the influence of labeling, because the buyer makes opinion about product and the need to purchase according to the type of label, the kind or quality of the information printed on it. When the market is close to filling a similar range of products, a special role is given just to the label.

Required for sales label information must meet three simple criteria: functionality, attractiveness to customers and excellence. It must be clearly labeled brand, product name. The label should stand out and be the best among the labels.

Let's look at the Belarusian products. What's missing in the marking Belarusian food labels? Why Belarusian baby food is not popular? On the label there is no information about the absence of GMOs, GMIs.

On the label you will find information about the functioning of the various systems in the enterprise (HACCP, ISO). This information will be understood by specialists, but hardly by ordinary buyers. Information on the label should be clear to consumers. It is they who decide to buy or not. The labels of the Belarusian products are not marked "natural product", although many manufacturers have the right to do so.

In connection with the entry of Russia into the WTO, Belarus, as member country of the Customs Union, should approach labeling of domestic products with the "CE". This immediately highlights the product in the market and attracts the attention of buyers.

Thus, the proper labeling information commodity packaging, which attracts buyers, will accelerate the implementation of its demand and the placing on the consumer market.

KEY WORDS: Sales, life cycle, labeling, product label, label information, demand.

ANALYSIS OF DYNAMIC STABILITY OF ELECTRIC POWER SYSTEMS WITH ACCOUNT OF NPP TURBINE POWER REGULATOR

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Power supply of food industry has special requirements for electric power quality. Application of modern turbines electrohydraulic control systems helped to solve some of the major problems in the operation of power equipment and power in general, namely increasing the stability of the unit, which is achieved by the introduction of high-speed tuning power, and meet the requirements of modern standards of frequency and power turbines. To perform pulsed discharge of emergency automatics, turbine shall equip control system with integrated electro hydraulically operator, which provides fast converting electrical signals into hydraulic impact on the main turbine servomotors. Since 1980, all units of NPP turbines Turboatom K-1000-60/1500 (-2,-2M) are set on electrohydraulic control system (EHCS), the electronic part which is developed by state enterprise Shevchenko's Plant, Kharkiv. The scope of problems solved by electrohydraulic control systems includes turn turbines, turbo synchronization with the system, the regulation of electric power, control steam pressure in steam generator, maintaining network frequency under static characteristic "frequency-power" to prevent accidental increase of turbine generator speed when disconnected from the network and subsequent speed withdrawal at nominal level. With industrial complex calculation of transients in complex electric power system (the development of Electrodynamics Institute of National Academy of Sciences of Ukraine) calculations of transient processes both with accounting EHCR power plant turbines and without it were performed. The results of long-term dynamics calculations for two-phase circuit near node of Zaporizhia NPP 750 kV proved the correctness of turbine power regulator modeling.

KEY WORDS: Long-term dynamics calculations, power regulator of turbine, electrohydraulic control system

STUDY OF TEMPERATURE COMPENSATION OF WIRE LINES SAGGING

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Temperature compensation of sagging is performed using power elements that are attached to wires and act on it. Now used trucks, spring and hydropneumatic temperature compensators are used. Creation of temperature compensation device for submarine that could satisfy the requirements of operation may happen if elements with negative temperature elongation. These alloys can be used as active temperature compensation devices to compensate for temperature sag wire line. This heat medium (air) will be converted into mechanical work in the element, made of materials with shape memory (EPF). Using the unique material properties of EPF, you can have zero or negative extension wire transmission line with increasing temperature. Characterization of strains temperature compensator material EPF is as follows: at the beginning and end of martensitic transformation under $M_s \approx 282$ °K, $M_f \approx 278$ °K, and the beginning and end of the reverse martensitic transformation under $A_s \approx 285$ °K, $A_f \approx 306$ °K.

With increasing temperature the length of the wire increases, the attraction of T along the wire decreases. When the ambient temperature reaches the temperature of the beginning of the reverse martensitic transformation temperature compensator, it begins to change its length, pulling wire. With further increase in temperature wire continues to increase its length, and temperature compensator decline. At the point A_f , temperature compensator fully restores its shape. As the temperature compensator by the presence of hysteresis it continues to maintain its shape ($A_f - M_s$). Lowering the temperature to the point of beginning direct martensitic transformation (point M_s) causes deformation of temperature compensator.

KEY WORDS: Temperature compensation, wire lines sagging

ANALYSIS OF SOLAR PANELS USE TO COVER PEAK LOADS OF INDUSTRIAL REFRIGERATORS

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The graph of generated electricity solar panels and schedule electricity consumption of industrial refrigeration units, depending on weather conditions have very similar characteristics. Refrigeration machine consumes the maximum amount of energy in summer and solar cell generates the maximum amount of energy; oppositely, in winter there is minimum consumption and generation. Comparing with other types of renewable energy graphs differ significantly. This allows us to assume that for power supply of refrigeration units, it is the most effectively to use solar energy. Thus, it is possible to combine these two systems into one, and by using the solar panels cover refrigerator peak power, by applying energy-efficient construction of solar panels.

KEY WORDS: Graph, generation, electricity, solar panels, refrigeration.

ANALYSIS OF THE IMPLEMENTATION OF WIND POWER-STATIONS IN UKRAINE

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As of 01.01.2009, the total installed capacity of wind power-stations of the united energy system of Ukraine is 83.9 MW.

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Choice of a place for almost all existing wind power-stations was carried out with the help of common but sometimes insufficient information about weather conditions, hasty finding and allocating the land, which resulted to lower electricity generation in some wind power-stations up to 30%.

Wind turbines were installed inefficiently, so that under certain wind directions they over each other. This led to the fact that the coefficient of nominal rated power wind turbines at different types of power plants differs twice as much (0,09 - 0,04). Average coefficient of rated power is 0.083. According to the data from wind-power station Donzulavska this coefficient does not exceed 0.07. High time consumption for repairing and maintenance of the equipment due to imperfect wind turbines have influenced the coefficient level.

That is why currently it is of the highest importance to have a new system for monitoring weather conditions, preferably with a base of at least 5 years.

KEY WORDS: Wind power-stations, wind turbines, monitoring, nominal capacity, constuction

THE APPROACH TO THE COORDINATION PROBLEM SOLUTION IN COMPLEX HIERARCHICAL SYSTEMS WITH INCREASED PERFORMANCE

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The coordination problem solution became necessary with the rise of complex hierarchical systems. Its purpose is to find the optimal interactions between subsystems of a complex object. In order to solve the coordination problem it is necessary to analyze the object, to select subsystems, to form a complex on the basis of selected subsystems.

Usually subsystems are represented as a system of differential equations or in coordinate state, but the sufficiency of the obtained mathematical model is one of the main problems of subsystems selection because of the objects complexity.

The simulation models have an advantage compared with analytical models as well as they make possible to solve complex tasks during the coordination problem solution. The simulation models take into account the discrete or continuous elements, nonlinear characteristics, random effects, and others. The simulation modeling allows to simulate the behavior of the system over the time, there is also the ability to manage time in the model: to slow processes when they occur quickly and accelerate the model systems with slow change. In addition, there are tools for objects behavior simulation. The real experiments with those objects are expensive, impossible or dangerous. During the simulation of complex dynamic systems, the large number of real factors can not be taken into account, as it extremely complicates the model. Therefore, only a limited number of factors are entered into the model. Those factors are considered as the most significant for various reasons.

As in many real systems, there is no information what kind of external (or internal or structure) influence effects on model's element, so it makes sense to develop a method of "perturbed" element search of the simulated system. In order to solve this problem neural network (NN) can be used as a search element.

The coordinator can determine the impact on the identified element with the help of obtained information about the perturbation location in the system by using the neural network. It is predicted that the use of neural network, as a search element, should lead to increased performance of decentralized control systems of complex objects.

KEY WORDS: Coordination, neural network, complex systems, nonlinear characteristics.

Poster Presentations

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| Section FOOD EXPERTISE AND SAFETY |
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| DIRECTIONS OF ECOLOGICAL SAFETY INCREASING OF ALCOHOL BIOTECHNOLOGY |
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Alcohol industry in Ukraine is one of the most important in food industry, because ethanol is the raw material for the manufacture of a number of valuable products such as high quality alcoholic beverages, wine, fuel and technical ethanol, etc. However, alcohol production is energy intensive and accompanied by a significant number of contaminated waste.

One of the progressive trends of reduction of anthropogenic impact of alcohol production on the environment is greening, i.e. introduction of technological methods that reduce expense of raw materials, energy and formation amounts of harmful waste.

The most spacious and polluted element of alcohol production waste from grain and molasses is post-alcohol distillery slops, the total volume of which exceeds 3 million m³ for all enterprises of Ukraine. This waste has high contamination due to organic substances (chemical oxygen demand is 30-60 thousand mg/dm³) and when thrown in to the environment it severely affects biosphere. National and foreign scientists have suggested a number of effective means of greening alcohol technologies, namely:

- The processing of molasses: increase of fermented wort concentration by yeast recycling in anaerobic stage and vacuuming brew during fermentation, which reduces the resistivity distillery slops yield by 20-40%, the use of lactic acid bacteria for acidification wort instead of inorganic acid which give distillery slops high feeding value, etc.
- The processing of grain: using complex enzyme preparates (EP) of different selective action for the degradation of starch and other polysaccharides; excluding the use of EP for liquefaction and saccharification of starch by glucoamylase which producers in this wort; the maximum rotation of distillery slops filtrate for preparing mixture; energycombination by using technology streams of different thermal capacity for heating and cooling mediums without additional expenses steam and refrigerants, etc.

The given measures will reduce unit expenses of raw materials, heat and reduce the amount of pollution discharges and emissions into the environment.

KEY WORDS: Ethanol, technology, waste, pollution, greening production

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| THE FORMATION OF CARCINOGENIC COMPOUNDS IN PRODUCTION OF FOODSTUFFS |
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The extraordinary problem of production of quality foodstuffs is that they have various harmful substances, heavy metals and radionuclides. As a rule, the harmful impurities in small concentrations remain out of attention. The most dangerous things for human health are cancerogenic substances which contained in negligible concentrations in foodstuffs and cause malignant formations in organism. Their content in products can be identified by only a few laboratories in Ukraine. One of the most dangerous carcinogen is N - nitrozodymetylamin wich is formed during formation amine groups under the influence of temperature.

Nitrates are normal products of metabolism of nitrogenous substances for any plant and animal organism, so there are not any products «without nitrates» in nature. The acceptable daily dose of nitrates for an adult is 325 mg per day. Maximum allowable concentrations of nitrates are defined for vegetables and fruits.

Nitrosamines are formed during production of many foodstuffs. Thus, they are contained in a large number in different beverages (juice, beer and Scottish whiskey), foodstuffs (dairy products, smoked products, pates, fruit and fruit and vegetable puree), cosmetics, cigarettes. They are mainly formed during thermal processing of foodstuffs - extraction, concentration, drying, etc.

Nitrate content in canned products of plant origin is, mg/kg: vegetable juice – no more than 70...340, vegetable puree – to 160, canned vegetables – 50, fruit and vegetables canned 200. Maximum allowable concentrations of nitrates in dry dairy mixtures is 30 mg/kg in most European countries.

The concentration of N-nitrozodymetylaminu in most sorts of beer is 40...70 µg/kg, the main part is accumulated during production of malt (N content - nitrozodymetylaminu in brewery malt is 300 µg/kg). The average N content - nitrozodymetylaminu in most varieties of cheese is 0,9 µg/kg, but in some areas it reaches to 9,1 µg/kg.

KEY WORDS: food, nitrosamines, carcinogens

YELLOW SUGARS FROM BEETS AND ENVIRONMENTAL SAFETY

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Everyone knows that white sugar due to its distinctive taste is among the basic food. It easily and completely digested and as an energy source has advantages over other food. But the use of excessive amounts of sugar can cause a number of diseases. White sugar, like all refined products, is almost completely devoid of the whole complex of minerals and aminoacids, in contrast to yellow, the bitter along with coloring substances containing organic impurities is necessary for the human body. In Ukraine, there is a tendency to expand the range of sugar products by producing various kinds of yellow sugar beets. On the surface of the crystal in the film crystal solution contains complex minerals and amino acids, including essential. Currently yellow sugars are produced in accordance with the provisional specification approved by regional certification centers. It is important to establish the safety of the product as yellow sugar production process involves a number of operations that can theoretically lead to revenues of dangerous or even toxic substances in its composition. Now the sugar beet is registered in the State Register of pesticides and agrochemicals: Agila, Dan-S, Vanguard. In the production of sugar disinfectants, defoamers, agents are used for reducing scale and other chemicals. As disinfectors formaldehyde, bleach, poisons of amines, hydrogen peroxide, and others are used. These chemicals are used to kill microorganisms in industrial solutions and to disinfect water that comes into production. In order to reduce the surface tension of viscous solutions surfactants are used, to reduce foam defoamers such as "EROL AMC 8076", "EROL HFX 851 MOD 1 F", "ESTER C", "DEFOSPUM HWK", "BREOX FCC", "Rypoks-6", "Propynol B-400", flocculants are used. These substances increase the deposition of suspended particles. As a result, chromatographic studies have revealed the presence of organochlorine pesticides in yellow sugar II and III crystallization, namely heptachlor, DDT, DDE, but their concentration does not exceed acceptable regulation.

KEY WORDS: Yellow sugar, safety, organochlorine pesticides, defoamers, disinfectant

BIOCHEMICAL PURIFICATION OF WASTEWATER OIL PROCESSING PRODUCTS

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Water is one of the most important components of the environment. Every food enterprise as a result of washing equipment, car tanks and infiltration of technical oils into water produces wastewater oil processing products.

As oil products in wastewater are in the form of soluble or emulsified state, it does not allow to solve completely the problem of removing these contaminants from wastewater. The most effective way to dispose dissolved and digestible fractions of oil products is biochemical wastewater purification.

We have identified key indicators of wastewater oil processing products by food companies, and proved that they are suitable for biochemical purification, namely: the concentration of oil products is 80 mg/dm^3 , BOD – $130 \text{ mgO}_2/\text{dm}^3$, COD – $300 \text{ mgO}_2/\text{dm}^3$, suspended substances – 125 mg/dm^3 , pH 6.9 – 7.3, nitrogen of ammonium salts – 36 mg/dm^3 , nitrites – 0.298 mg/dm^3 , nitrates – 0.25 mg/dm^3 . We have suggested a combination of an airtank-clarifier with a pinotank to intensify the process of biochemical purification of wastewater oil processing products. This structure includes the first stage – a pinotank of gas-liquid countercurrent mode in which during a short time period the processes of biosorption are taking place, and the second stage – a clarifier of aeration, drainage and suspended layers areas, the latter of which will ensure the maintenance of sludge with sorbed contamination, where the process of oil products oxidation takes place.

To determine the benefits of the block of biochemical oxidation the research was done. The results show the experimental confirmation of a positive impact of the pinotank on the process of impurities removal. For example, the efficiency of removal of oil products increased from 93.2% to 98.5%. In our opinion the factor that caused the raising efficiency of wastewater treatment is the pinotank itself where biosorption process of oil products in foam layers is taking place.

KEY WORDS: wastewater, oil products, biochemical purification, pinotank, airtank-clarifier

MINIMAL BACTERICIDAL CONCENTRATIONS OF DISINFECTANTS BASED ON SALTS OF POLYHEXAMETHYLENEGUANIDINE

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Sanitization and disinfection are the major factors to ensure food safety. These protective measures are used to remove all undesirable materials (food residues, microorganisms) from surfaces to a level at which they have a minimal risk to the quality or the safety of the product. Therefore it is important to select an effective and safe disinfectant.

Polyguanidines (polyhexamethyleneguanidine chloride, PHMG-Ch, and phosphate, PHMG-Ph), are perspective disinfectants with a low toxicity and a high efficiency. Combination of disinfectants can be used to prevent the development of bacterial resistance.

The aim of this study was determination of the minimal inhibitory and bactericidal concentrations of combined disinfectants based on PHMG-Ch and PHMG-Ph with the peroxide and ammonium persulfate. Bacterial strains *Echerichia coli* IEM-1, *Bacillus subtilis* BT-2, *Staphylococcus aureus* BMS-1 were used as the test cultures in experiments.

It was shown, that a solution containing PHMG, peroxide and persulfate was the most effective against Gram-negative bacterium *E. coli*. Bactericidal effect was observed at the concentration 23 mkg/ml, and inhibiting effect was at the concentration 12 mkg/ml. All combined solutions with the concentration 12 mkg/ml had strong inhibiting effect on Gram-positive spore-forming bacterium *B. subtilis*. Solutions of PHMG with peroxide and persulfate, PHMG with persulfate showed a bacteriostatic effect on population of *S. aureus* at the concentration of 6 mkg/ml, and bactericidal effect at the concentration 12 mkg/ml. It was twice less than the minimum effective concentration of the solution PHMG.

It was established minimal bacteriostatic and bactericidal concentrations of combined disinfectants. The combined solutions of PHMG with peroxide and persulfate have the highest activity against the test microorganisms than solutions of individual substances. Peroxide and persulfate didn't show the high level of bactericidal activity, but they intensified action of PHMG as a part of the combined solutions.

KEY WORDS: the bactericidal action, Polyhexamethyleneguanidine, combined solutions.

YEAST SURVIVING IN WHEAT BREAD

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Yeasts have been known to humans for thousands of years as they have been used in traditional fermentation processes like bread making. Nowadays yeasts are received by selection in industrial processes but not from nature components. The main aim of selection is to increase the fermentation activities. As a result the new strains of baker's yeasts have unique properties like thermo resistance. This study is intended to check the yeast surviving in wheat bread.

Bread baked with 1.5% and 3% yeasts was used. The malt broth was used to restore the sub lethally damaged yeast's cells after bread baking. At first phase of research the crumb of bread from the middle and from the crust were culturing for 3 hours in malt broth. After finishing of cultivation 1 ml of suspension has been spread on the wort-agar medium. It was shown that the crumbs of bread contain 1 CFU/g of yeast.

At the next stage of the research the period of crumb cultivation in malt broth has been increased and became 4, 18 and 24 h. After 4 hours of the fermentation yeast cells on wort agar were not found. The results of research showed that 6 and 2 colonies of yeast grew after 18 hours of cultivation and seeding of 1 ml suspension of sample 1 and sample 2 on wort agar, respectively. After 24 hours of cultivation the microbiological monitoring of the objects found that the number of yeast colonies was 8 and 3, respectively.

This study showed that baker's yeasts can survive in wheat bread after heat stressing and receiving sub lethally injures. The exposure time increasing of bread's crumb in malt broth will allow further study of the mechanism of yeast regeneration

KEY WORDS: Bread, yeasts, cultivation, malt broth.

DEVELOPING METHODOLOGY FOR ATOMIC ABSORPTION DETERMINATION OF METALLIC ELEMENTS IN NATURAL WATER

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Water is an integral part of the environment, a participant of the most important processes in living organisms - photosynthesis and metabolism, as well as the environment and at the same time a reagent for many technological and chemical processes. Therefore, the quality of drinking water and the one used in manufacturing processes requires strict control. Currently Ukraine has the regulatory guidance document (RD 52.24.347-95), which regulates the use of atomic absorption spectroscopy with electrothermal atomization (ETAAS) for the determination of metallic elements in natural water. It is known that the sensitivity of the method is sufficient for direct ETAAS determination of these elements, but the process of atomization is significantly affected by salt composition of natural water, which reduces accuracy of determination. Therefore, to develop reliable methods it is critical to study multicomponent systems that mimic various kinds of natural objects. In this paper, we explore how macrocomponent composition of natural waters impact atomization of chromium (Cr III, VI), lead (Pb) and aluminium (Al). The experiments have been performed using 'Saturn 3' spectrophotometer (Severodonetsk, Ukraine). Determination has been performed according to the single-beam scheme with deuterium background compensation. It's been shown that the ascorbic acid is the optimal chemical modifier for electrothermal determination of aluminium and lead, as well as potassium chloride is the one for chromium. The optimal concentration of modifiers has been determined as follows: 0.001 mol per liter for ascorbic acid (when determining lead and aluminium) and 0.2 mol per liter for potassium chloride (when determining chromium). Using obtained results, we have developed electrothermal atomic absorption techniques for determination of aluminium, chromium (III, VI), and lead in natural waters with various salinity. Metrological characteristics of the methodology have been tested on both model solutions and real samples of natural and drinking waters. The accuracy was evaluated by determining the recovery and by standard addition method. It's been proved that the trueness and precision of methodology is sufficient for analysis at the maximum permission level concentration.

KEY WORDS: Atomic absorption spectrometry, trace elements

MATHEMATICAL MODELING OF FOOD QUALITY

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The quality of the food is a set of characteristics that determine its ability to ensure the stability of the composition and useful properties during shelf life. Mathematical model that describes the quality, includes optimization option ($y(t)$ - dependent parameter), which varies with time t , and independent factors characterizing formulation, technological features of production, storage conditions and so on. Second order differential equations can reveal the kinetics of the parameter optimization by chemical, biological, and rheological changes in the product better than any lower-order equations.

Model of meat and meat products quality can be written as an equation:

$$K_1 V \rho \frac{d^2 y}{dt^2} + K_2 \frac{dy}{dt} = \tau, \quad (1)$$

K_1 and K_2 - characteristics of biochemical changes and structural and mechanical properties of the product, τ - the driving force (generalized factorial influence on the product), V - volume, ρ - density.

For the practical application of the model it is necessary to find the coefficients K_1 and K_2 . The sequence of their location next follows. Let's obtain the solution of equation (1) with initial conditions $y(0)$

= 0 => (Cauchy problem).

$$y(t) = \frac{\tau}{K_2^2} (K_1 V \rho e^{\frac{K_2 t}{K_1 V \rho}}) + K_2 t - \rho K_1 V \quad (2)$$

Then we will find the speed with which the parameter optimization changes

$$\frac{dy}{dt} = \frac{\tau}{K_2} (1 - e^{-\frac{K_2 t}{K_1 V \rho}}) \quad (3)$$

Based on the analytical and experimental studies of the preservation product selected term t_1 , we find the value of $y(t_1)$, $\frac{dy(t_1)}{dt}$ and substitute it into the left side of the equations (2) and (3). Solving the system of equations $y=f(t)$ and $v = f_2(\frac{dy}{dt})$, we find the coefficients K_1 and K_2 . Substituting them into (1) a mathematical model of changing the quality of the product obtained which to determine the duration of its storage.

KEY WORDS: mathematical model of the quality, differential equations

FOOD PRODUCTS ASSESSMENT OF QUALITY

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The quality of products means a series of properties that provide human physiological needs for food and flavoring substances that are safe for their health and make it possible to distinguish products one from the other. Modeling complexity of the product means that it is necessary to consider the possibility of storage in various conditions. All foods are made of biomaterials, which will eventually to change their properties, loss of quality. The process of deterioration, spoilage are objective, it cannot be prevented, you can only control and influence it to slow down. For evaluation processes spoilage need to know the regularities of its course. Given that the product loses of quality during storage and is a function of time, the model should be based on the law of kinetic modeling. Processes spoilage classify the three main types: physical, chemical, microbiological. Between them there is a correlation, which in most cases more or less observed in all three types of damage. As a rule, they are linked by the laws of a non-linear (indirect) dependence and influence each other.

Storage practices of many food products (meat, milk, fish) shows that there is a pronounced figure spoilage. For example, cooked sausage inoperable due to the rapid increase in the number of toxic substances $y(t)$ in time t , caused by mold, then the kinetic model can be simplified by writing it in the

$$\frac{d^2}{dt^2} y(t) - a \frac{d}{dt} y(t) = 0$$

form of a differential equation:
(1)

where a - factor characterizing the toxicity of mold.

Technique to obtain the numerical values of the coefficient $a_{(1)}$ is based on the interpolation of experimental data and their analysis. Modeling of the quality and shelf life of food products based on second differential order opens new possibilities for the development of standards for their qualitative assessment of food quality.

Technique to obtain the numerical values of the coefficient $a_{(1)}$ is relatively simple. It is based on the interpolation of experimental data and their analysis. Modeling of the quality and shelf life of food products based on second differential order equations opens new possibilities for the development of standards for their qualitative assessment of food quality.

KEY WORDS: model of forecasting spoilage of food product

DEFINING THE TERM OF FITNESS OF FOOD PRODUCTS

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The world's food producers without exception, are in dire need of a perfect theory of modeling the quality of food and determine their shelf life.

The authors proposed modeling theory of food products quality during their storage. Computations are based on second order differential equations describing the kinetics of accumulation of harmful substances and the changes in the structural and mechanical properties. The model takes into account the initial state of the product - the amount of harmful substances and the rate of their accumulation, the impact on the processes caused by temperature change, humidity, the presence of oxygen, the state of packaging and other factors. Practical use of the model will allow product labeling, will allow to set its expiration date and to create optimal storage conditions, to seek for increasing the shelf life through new formulations and improving production technology, with different composition of components, for example, while changing the recipe, using different preservatives, process equipment of different types. For the case where the product is damage in a short period of time, ie for perishable products, the differential

equation can be written as $m_i \cdot \frac{d^2 y}{dt^2} = a_i \cdot \left(\frac{dy}{dt}\right)^2$, where m_i - the reduced weight of the i -th of

harmful substances, a_i - factor coefficient. In the equation the accumulation of harmful substances is in proportion to the square of the speed, and mostly occurs due to microbial spoilage. Its solution for the

initial conditions $y(0) = y_o$, $\frac{dy}{dt}(0) = V_{oy}$, has the form $y(t) = \frac{m_i \cdot \ln\left(\frac{V_{oy} \cdot t \cdot a_i - m_i}{m_i}\right) - a_i \cdot y_o}{a_i}$.

Differentiating, we find that the rate of accumulation of harmful substances $V(t) = \frac{dy}{dt} = \frac{m_i \cdot V_{oy}}{m_i - V_{oy} \cdot t \cdot a_i}$.

On the basis of the results of experimental studies it is possible to determine the value of $y(t_1)$ and $V(t_1)$ at some time t_1 and to find the coefficients m_i and a_i as a solution of the corresponding system of algebraic equations.

KEY WORDS: defining the term of fitness of food products

THE INFLUENCE OF BACTERIOPHAGE CONTAMINATION ON QUALITY OF DAIRY PRODUCTS

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Defeat of starter cultures by bacteriophages causes serious violations of fermentation process for the production of dairy products and cheeses. The purpose of work was to study the effect of lactococcal phages on technological process of products manufacturing, on microbiological indices and ready products quality, depending on phages contamination level. Analysis of the results showed that almost 60% of examined dairy products, manufactured by plants in Ukraine's different regions, contained lactococcal phages. It was found that phages effect technological process, depending on the degree of phage contamination: low phage titre from 1 to 10¹ pfu/ml - safe; medium phage titre from 10² to 10⁴ pfu/ml – probable danger; and high phage titre from 10⁵ and more pfu/ml - especially dangerous.

The influence of phages on microbiological, hygienic properties and quality of dairy products, depending on the contamination degree, was found. It was shown that in case of phage contamination so called microbiological purity was deteriorated – content of coliforms, sporeforming microorganisms, yeasts and molds is increased. The examined products with phage titre from 10² to 10⁴ pfu/ml did not meet the requirements of valid regulations for these products as for microbiological and sanitary-and-hygienic indices. During the phage titre growth to 10⁵–10⁷ pfu/ml inhibition of lactic acid fermentation was observed, and ready products were characterized by low taste characteristics. Further increase of phages titre to 10⁸–10⁹ pfu/ml was accompanied by fermentation terminating and, as a result, by termination of technological process of dairy product manufacturing.

So, phage contamination creates serious threat to production not only through considerable material losses due to slowdown or suspension of lactic acid process, but the conditions are favourable for extraneous microflora development, resulting in ready products reduced quality and epidemiological safety.

KEY WORDS: bacteriophage, contamination, quality, dairy products.

ACIDOGENIC TRASFORMATION OF FOOD-PROCESSING WASTES FOR BIOPLASTIC PRODUCTION

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Almost all wastes of food-processing plants can be anaerobically transformed to volatile fatty acids (VFA) and hydrogen, which can be used further for the production of bioplastic polyhydroxyalkanoates (PHAs) (Du and Yu, 2002). Fermenting organic compounds could be carbohydrates, liquid and solid lipids, microbial biomass, glucose-, saccharose-, lactose- or starch-containing wastes such as wastes from potato processing and starch manufacturing, molasses from sugar industry, dairy producing factories, fruits and vegetables processing plants, cheese whey, vinegar or acetate-containing waste, valeric acid or valerate-containing wastes, wastes of slaughterhouses or meat-processing plants, and other food-processing wastes. However, vegetable oils and fats will be transformed not too deeply in acidogenic anaerobic bioreactor. Fatty acids and hydrogen for PHAs synthesis can be produced from food-processing wastes or agricultural wastes using anaerobic fermenting bacteria. Initial inoculation of the bioreactor for acidogenic fermentation can be made using sewage sludge of MWWTP, anaerobic sediments, wet soil, or manure. There must be anaerobic conditions in the acidogenic reactor and oxidation/reduction potential should be from -50 mV to - 400 mV. The mass ratio of supplied carbohydrates, producing acids, and proteins, producing alkali, has to be in optimal region close to 3 to maintain near-neutral pH. Acidogenic fermentation of organic food-processing wastes is preferable process than methanogenesis because acidogenesis is significantly faster process than methanogenesis. Methanogenesis requires long time of the waste treatment: hydraulic retention time (HRT) in anaerobic digester is about 10 - 20 days food-processing wastes and about 20 - 40 days for cellulose-containing wastes and manure (O'Flaherty et al., 2010). Biotransformation of the same wastes to VFA and hydrogen, which then be used for the production of bioplastic, can be performed with HRT in anaerobic acidogenic reactor about 3 - 5 days. Acidogenic fermentation of organic wastes for the synthesis of bioplastic should be done on Centralized Anaerobic Digestion (CAD) plants with multiple digesters of about 2000 to 4000 m³ (O'Flaherty et al., 2010).

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KEY WORDS: Acidogenic Fermentation; Food-Processing Wastes; Bioplastic

**SUBSTANTIATION OF THE FEASIBILITY OF USING DRY STARTER CULTURES VIVO
PRODUCTION OF DAIRY PRODUCTS WITH PROBIOTIC PROPERTIES IN PUBLIC CATERING
ESTABLISHMENTS**

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In recent years more and more attention to the development of food products technology with the use of dietary supplements viable microorganisms cultures, above privacy in milk-based products.

The goal was to prove the feasibility of using dry probiotic starter cultures in the production of mass supply. Used bacterial dry yeast VIVO (producent – Institute of Technology of milk and meat, "ALBA-Timm"), containing pure cultures of lactic acid bacteria and bifidobacteria, specially selected of their synergistic properties and antagonistic activity to pathogenic and conditionally pathogenic microflora of the gastrointestinal tract. VIVO sourdough microflora characteristic of normal intestinal biocenosis of the Ukrainian population, and therefore has no contraindications and side effects.

Explored the possibility of the enterprises of public catering restored dairy starters for cooking vegetable hash and fruit salad. Found that the simultaneous use of a probiotic yeast with vegetable raw materials in the hash that improves the properties of the probiotic product in the 1,5 –2,0. Simultaneous use of the finished product with a probiotic raw fruit in the fruit salad worsens probiotic properties of the product in the first days of storage 14 - 25 times. Study the ability of probiotic fermented milk «VIVO» showed that: the number of microorganisms in fermented milk products received more than the minimum rates on the order of 3-4 and is 2-5·10¹¹ CFU/g, penicillin group of antibiotics, chloramphenicol, erythromycin, kanamycin, and no effect on lactic acid bacteria, the lack of growth zones are found, indicators titratable acidity and active final products meet regulatory requirements for a group of dairy products with probiotic properties.

KEY WORDS: foods, probiotic, bacterial dry starter VIVO

VALUE OF GLUTEN - FREE DIET FOR THE TREATMENT OF CELIAC DISEASE WITH CHILDREN

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This article summarizes the current state of celiac disease with children. We describe a survey of children with celiac disease.

Is attentionfocused is the problem of diagnosis and treatment of celiac disease, as well as on the use of modern types of therapy the basis of which gluten-free diet.

Celiac Disease - immunopathological bowel disease with diverse manifestations. Celiac disease is the disease that isa widely spread. For example, in the United States nearly 1% of the population suffer from celiac disease annually . Currently there are no specific and sensitive serological tests, which are suitable for a wide diagnostic research.

The main treatment for celiac disease is a lifelong gluten-free diet, which leads to remission with the majority of individuals.

Diagnosis of celiac disease in Ukraine just begun to gain momentum, so it needs a special attention to a number of food products necessary for the safe treatment of children with celiac disease.

Currently, it is known the only treatment for celiac disease is the diet that does not contain gluten.

Be aware that most oat products that are on sale, usually contain gluten, which is a companion component during processing.

Gluten may occur in many finished products , so people with gluten intolerance need to know their exact composition, which is indicated on the label and labeling that ensures their safety. Current legislation requires to specify every ingredient, whereas in 25% countries of the world it is not obligatory.

World Food Codex Alimentarius Commission in July 1999 approved the document which recommends that labeling should specify all the ingredients, which may cause hypersensitivity, including all cereals containing gluten: wheat, barley, rye and their derivatives.

KEY WORDS: celiac disease, diet, gluten.

APPLICABILITY OF ANAEROBIC FOOD FOR FERMENTATION PROCESSING WASTEWATER TREATMENT IN UKRAINE

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There are about 170 slaughterhouses and 50 plants producing ethanol from molasses in Ukraine. Biotransformation of 1m³ wastewater is able to produce about 10 m³ of methane. One distilling plant using molasses as a raw material produces an average of 500 m³ of wastewater per day, which is more than 5000 m³ of biogas from one enterprise. Sugar beet mills, starch factories, dairies, and cattle farms have the similar possibilities. The quantity of methane produced during the treatment of processing wastewater looks not significant in comparison with the amount of gas required for the economy of Ukraine. However, a feasibility of the use of this energy source quite clear. Meanwhile, it is necessary to make assessment of applicability of anaerobic process to ensure a high quality of wastewater purification.

Concentrated wastewaters contain the high amount of organic substances. Thus, conventional methods of wastewater treatment are not efficient in this case. At high concentrations of organic substances aerobic treatment requires increase in oxygen supply and repeated treatment of wastewater (recirculation), so, the costs of wastewater treatment increases greatly.

The use of anaerobic treatment allows to diminish concentration of organic substances by 60-90 %. The polishing treatment of wastewater can be easily done by aerobic process. At that, the total costs for the treatment of wastewater are diminishing.

Exploitation of wastewater treatment plant consumes a lot of energy. These costs are very substantial and in some cases exceed the cost of energy required for the main technology for the product manufacturing. Partition or complete covering of energy costs of wastewater treatment plant due to the use of produced biogas will be essential to optimize the energy balance of enterprises.

KEY WORDS: methane, microbial biomass, biotransformation, methane fermentation

THE RESEARCH OF METHODS OF THE ANALYSIS OF SUGARS IN THE PRODUCTION OF BEER

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Technology of beer is a complex of biochemical processes, the course of which depends on many factors. To achieve a consistently high quality product it is necessary to control the basic parameters both of raw materials and semi-product at all stages of production. The quantitative and qualitative determination of sugars in the wort is one of the main parameters of the process of the preparation of wort and beer, which that most of all are exposed to the transformation and form the basic organoleptic properties of beer. This is especially true of modern technologies of beer of high density with the use of sugar substitutes malt. Their application can modify the classical correlation of sugars to other carbohydrates and thus affect all the quality indicators of finished drink. Therefore the speed and accuracy of the analyses provides a high level of control of the process, which in modern technology is not always achieved.

Methods for determination of sugars are divided into physical and chemical. As the first so the second ones are some inaccuracies in the study of polycomponent systems, which the beer wort is.

The purpose of the work is the comparison of the main existing methods for the determination of sugars to identify the most accurate and easy-to-use in the brewing industry. Experimentally there are optimal methods for determination of sugars for the use in laboratory and industrial conditions of the brewing industry. The correlated coefficients were determined between the results obtained by different methods for the adequate reflection of the main components of sugar share of wort and beer.

The essential practical conclusion of the research is the methods for determination of sugars have a sufficiently high accuracy in the determination of the maltose concentration in wort. These methods are the most suitable for the control of kinetics and regulation of production processes.

KEY WORDS: fermentable sugars, methods for determination of sugars, express-analysis

A NEW METHOD OF ANALYSIS OF GRANULATED HOPS

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The main brewing indicators of quality of hops are the content of α -acids and moisture. The diffuse reflectance spectra of hops were investigated in order to create a rapid method of assessing the quality of granulated hops with simultaneous determination of key indicators (without the use of chemicals and prolonged dry). Researches have been conducted on the infrared analyzer "Infrapid-61" in the wavelength range 1,33-2,37 microns. For the researches there were used such varieties of granulated hops as Clone 18, Lubliner, Traditional, Tettnanger and Norden Brever 7,51-19,11% of moisture content and α -acids 3,2-16,0%.

On the basis of the conducted investigations it has been established the dependence of reflection coefficient from the degree of dispersion of crushed pellet hops. Optimal degree of it's grinding is 0,294-1,000 mm, which is used in further studies. For the analytical purposes in determining the moisture content of hops there were selected wavelengths of 1.47 and 1.93 microns. The wavelengths 2.27 and 2.36 microns were determined as characteristic for the analysis of α -acids.

The results of measurements of control and experimental samples showed that the new method for determining moisture content and α -acids in hops are sufficiently accurate (absolute deviation relative to the standard methods for moisture content does not exceed 0.4% for α -acids - 0.3%, which within the limits is allowed by the standard). An express method makes it possible to determine the content of these components immediately before entering the wort taking into account the tiniest changes that occur during storage.

KEY WORDS: hops, analysis, moisture, content of α -acids infrared analyzer.

INNOVATIVE WASTEWATER DAIRY

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Wastewater of some food industries due to pollution is related to concentrated. It contains substantial amounts of organic matter that get into them during processing of raw materials.

The construction of wastewater treatment facilities took place on the basis of conventional biological treatment technology used for the disposal of sewage. However, this technology is not suitable for concentrated polluted wastewater purification.

To solve the problem of concentrated wastewater treatment the anaerobic-aerobic treatment technology was proposed.

The main point of it is that the concentration of contaminants initially is sharply reduced by methane fermentation, followed by the purification method of aerobic fermentation in the aeration tanks.

The range of dairy products and technologies of its production involves the formation of some waste at each plant which differs in terms of pollution indicators: chemical oxygen demand (COD) - 1000 ÷ 5000 mg O₂/dm³; biochemical oxygen demand (BOD) - 700 ÷ 3700 mg O₂/dm³; total nitrogen content - 20 ÷ 170 mg/dm³; pH - 4,5 ... 10.4.

Methanogenic fermentation of concentrated wastewater milk processing plant reduced the pollution indicators for SOD of 4500 to 600 mg O₂/dm³; got about 4 dm³ biogas from 1 dm³ wastewater, methane content in biogas is about 75%. The cleaning efficiency is 87%.

At the next stage, the wastewater treatment method of aerobic fermentation in the aeration tanks.

In laboratory conditions, they had to need 12 hours, during which the concentration of contaminants for COD decreased upto 25 mg O₂/dm³ that corresponds to BOD within 12-13 mg O₂/dm³ i.e. purification of wastewater by standards is achieved that allows to discharge wastewater into natural water bodies.

The analysis determined the feasibility of an integrated anaerobic-aerobic wastewater treatment technology that enables energy-valuable biogas. In terms of contamination of treated wastewater is allowed to drop into a natural pond.

KEY WORDS: concentrated wastewater, aerobic fermentation, chemical oxygen demand, culture liquid, aeration tanks

WARNING OF ORIGIN OF FIRE IS ON THE ENTERPRISES OF FOOD INDUSTRY

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Fires are serious problem in many industrial projects. They increase economic, environmental and social costs from them as well as number of victims.

Each year over 6,000,000 fires occurs on Earth including approximately 60 000 - in Ukraine.

Increasing level of fire risk on industrial facilities is caused by significant growth of production power loading, increasing density of transport communications, increased temperature and pressure in process equipment, use of new polymeric materials with enhanced indicators of fire hazard. In modern industries with decreasing of fires likelihood drastic consequence from them, and damaged area increases.

Analysis of fires shows that achieving the maximum allowable value of hazards fire occurs in 5 - 10 minutes after beginning of fire, and the loss of carrying capacity of metal structures - after 10 -15 min. Thus the average start time for effective action of the fire units – is 20 -25 minutes.

The fire danger is strengthened by increasing concentration of in flammable substances and material values, per unit of buildings area.

The main causes of fires and inflammations are:

- Failure of production equipment - 0.3%;
- Emblaze - 1.6%;
- Kids fooling with fire -3.2%;
- Violation of rules for placement and operation of furnaces - 7.3%;
- Violation of arrangement and operation of electric installation - 19.7%;
- Careless handling fire - 59.8%;
- Other reasons - 8.1%.

The most important task of all fire safety systems is insuring protection of people from the hazards of fire which are caused by burning process, and rescue people in case of fire.

The essential task in operation of any object is to provide complete evacuation of all personnel in case of fire during one hour before the critical values of fire hazards shall appear.

KEY WORDS: fire, consequences, evacuation, safety.

ENSURING FIRE SAFETY

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The proposed one approach to assess the amount of useful information in planning emergency response, based on the use of information and computational tasks of mathematical models.

Qualitative and operative work of the management in planning process during emergencies depends on the completeness and usefulness of the information to be used for the purposes of management. Obtaining the necessary information curing information provision must be addressed continuously in the interest of making informed decisions and developing plans, timely and adequate response of management to changes in environment.

Completeness and usefulness of information will be determined as the main task of this phase - definition of solution emergencies, which should fully comply with the conditions of the situation that has arisen, that is located depending on the completeness and usefulness of information collected and processed by the management during its definition.

In some works of scholars by elimination emergencies the study of completeness and usefulness of the information is given enough attention. However, the proposed method does not fully take into account the wider introduction of new automation, which greatly affects the process of obtaining and processing information.

In the article the method of assessing the amount of useful information in planning emergency response is suggested based on the use of information and computational tasks of mathematical models.

There is a the necessity to determine the useful information for the government from total amount. On the other hand, the information may be useful for government, but by volume of it not will determine the optimal solution.

KEY WORDS: Fire, consequences, danger of fire, evacuation.

THE ORGANIZATION OF MEDICAL AND PREVENTIVE NUTRITION IS ONE OF THE WAYS TO PROTECT THE LIVES AND HEALTH OF WORKERS

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Organization of health diet at work will significantly reduce the risk of occupational diseases of workers that work in conditions of high hazard.

Today there is a wide range of functional ingredients . These are vitamins, mineral supplements, dietary fiber, fatty acids etc. One of these ingredients is inulin, which is not absorbed, but is required for normal body functioning. Inulin is found in many plants (chicory, artichoke, dandelion, topinambur). It belongs to a class of dietary fiber with probiotic effect.

The most promising raw material for production of health care products based on inulin can be topinambur. The world has no analogues topinambur for silicon content in tubers. Topinambur contains up to 18 percent of natural inulin - polysaccharide hydrolysis which leads to a harmless for diabetics sugar - fructose.

Today in our country and abroad conducting the researches for developing technologies to produce a wide range of medications, dietary foods and products based on topinambur for organizing healthy eating at work.

Our staff developed a wide range of medical and dietary food treatment from topinambur. It can be for example soluble powder. This product can be used adding it to the diet of employees and using as a substitute for sugar in the bakery products, milk products and soft drinks. In final product maximally preserved bio components derivative raw materials causing its therapeutic and prophylactic properties.

Considering the quality of the developed product through the prism of functionality we can conclude that the high nutritional value of soluble powder of topinambur. Consumption of this product positively affect metabolism in humans body. So we can say about expediency of introduction soluble powder and food products based on it into diet of workers in hazardous conditions.

KEY WORDS: functional ingredients, artichoke, silicon content, inulin, fructose.

DEVELOPMENT OF SMART-PACKING SYSTEM WITH ACTIVE OXYGEN UPTAKE

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The notion of «Smart-package» considers new types of packages, which include the "active" and "intelligent" packaging, as well as functional components for the creation of "smart" packaging design. Introduction of «Smart-packages» using active packaging systems covers all aspects of advanced packaging materials use, and the introduction of mechanical and chemical components extending the shelf life of food products while maintaining their qualitative and quantitative characteristics.

During the shelf life of the product gaseous atmosphere within the package is constantly changing. This is due to the "breathing" packed product and by biochemical changes. Oxygen, which is in the package, allowing to preserve the freshness and natural color of products, preventing botulism, supports the "breath" as well as causes the oxidation of fats and leads to growth of aerobic bacteria.

In recent years greater and wider distribution takes the concept of increasing resistance to food storage by monitoring and adjusting the gas composition in the packaging and the use of active package with self-regulated and actively controlled atmosphere. They are used as oxygen absorbers used substances that

can chemically or enzymatically removed oxygen. In the line with these scientific problems we formulated the line of our research. To fulfill the capacity of oxygen absorber we chose porous packages-sachets which is installed in a sealed plastic packaging. As sorbent we selected oxide of iron. To determine the effective operation of oxygen sinks which are packed in different packaging materials we used gas analyzer brand OpTech-O2 Platinum.

For research material of packet-sachet we selected: EVA, LDPE and Ecolean films (Fig. 1.).

The research helped to select the packing material, determine the size of packages-sachet with oxygen absorber and the optimal number of reactants that enter chemical reaction of iron powder oxidation and provides requirements for oxygen absorption in the food package.

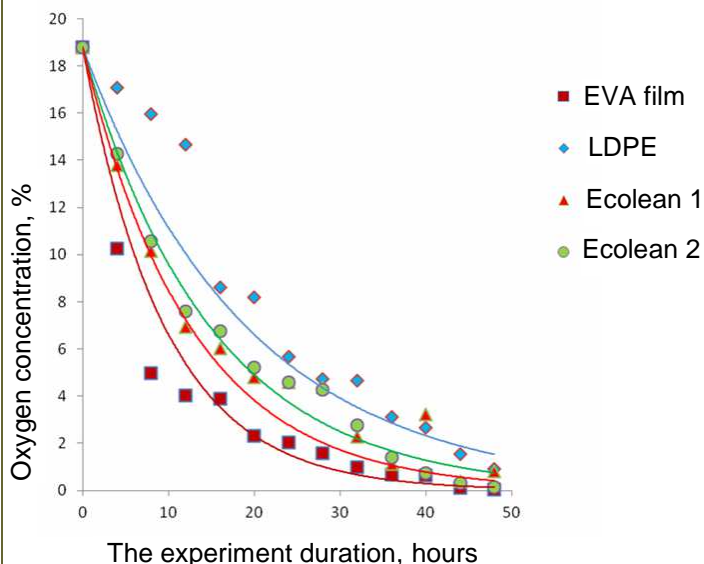


Fig.1. Chart of absorption package-sachet.

KEY WORDS: smart-packaging, consumer packaging, oxygen scavenger, sachets.

PRODUCTION OF BIOCEMENT FROM FOOD- BIOCEMENT FROM FOOD-PROCESSING WASTES

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Globally, 140 billion metric tons of starch and cellulose-containing biomass is generated every year from food-processing industry and agriculture. So, food-processing wastes have attractive potentials for community-level enterprises. Food-processing wastes can be biotransformed to biocement as a much cheaper substitute for cement. The biotechnology of low-cost biocement from starch- or cellulose containing food-processing wastes and limestone mining wastes includes acidogenic fermentation of starch or cellulose-containing wastes using enrichment culture of acidogenic bacteria selected from a mixture of anaerobic soil and sewage sludge. Limestone reacts with free volatile fatty acids keeping the pH at the range between 5.6 and 6.0. The process was performed in the rotating drum bioreactor. All inorganic nutrients, first of all sources of N, P, S, Fe and microelements were supplied as the components of different food-processing wastes. The biotechnology produces solution of calcium acetate and propionate with concentration up to 50 g/L, which is sufficient to perform biocementation of sand ensuring the compressive strength over 5 MPa, depending on the content of bioprecipitated calcium. Bioagent of calcium precipitation were urease-producing bacteria *Bacillus sp.* hydrolyzed urea to increase the pH and to form the calcite crystallization centers. The liquid or dried biocement from food-processing wastes and limestone can be used for such applications as road construction, soil erosion control, and ground improvement.

KEY WORDS: food-processing wastes, biotechnology, urease-producing bacteria, calcite, biocement

PRODUCTION OF SELENIUM-ENRICHED YEASTS FROM FOOD-PROCESSING WASTES

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Selenium is an essential trace nutrient. Its deficiency for human is developing when daily selenium consumption is below than 0.8 µg/kg. The possible way for the enrichment of diet with selenium may be the bakery's products with the yeast cultivated in the medium enriched by selenium. Food waste in Ukraine consists of 38% from all solid municipal wastes. Organic matter can be easily extracted by water from vegetable and fruit processing wastes. The aim of this research was bioconversion of food waste into yeast enriched with selenium. Approximately 65 – 70 % of all total organic carbon, which can be removed from such wastes, was extracted in 24 h. The extracts from vegetable and fruit processing wastes can be used for production of yeast biomass without any nutrient supplements. The yield was comparable with the yield of yeast biomass grown in potato dextrose broth. Biomass concentration of yeast *Saccharomyces cerevisiae* grown at 30°C for 96 h in the sterilized extracts without any nutrient supplements was around 7.5 g/l; content of protein was from 40 % to 45 % of dry biomass. The yeast had normal bakery properties when the selenium concentration in the media was from 2 to 5 µg/ml. Yeast biomass obtained by cultivation in such medium contained 150 µg Se/g of dry biomass. The addition of selenium-enriched yeasts to the dough with weak gluten may improve the quality of bakery products. The wheat roll with weigh 100 g contained up to 52 µg selenium in the form of selenomethionine, which is the best form of selenium for human consumption.

KEY WORDS: food processing wastes, yeasts, selenium

EVALUATION OF THE EFFICIENCY OF MODERN DISINFECTANTS FOR SUGAR PRODUCTION

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Significant contamination of intermediate products of sugar production caused the intensive growth of microorganisms followed by breaking down of sucrose and generation of organic acids, aldehydes, and polysaccharides. So, inhibition of microbial processes is one of the major tasks in the production of sugar. The different antimicrobial agents with mixed-activity are presented at the current market. However, formalin is commonly used as an antiseptic in sugar production in Ukraine. So, selection of alternative antimicrobial agents is a question of the present interest. The microbial agent should have high inhibition efficiency against all groups of microorganisms which are present in intermediate products of sugar manufacturing and be safe to the technology and the environment.

The studies to evaluate the efficiency of application of modern disinfectants at the different stages of sugar production using the raw sugar beet or the yellow-sugar sugarcane were performed.

The effectiveness of disinfectants was determined using the standard microbiological analysis. pH of diffusion juice after treatment and after its incubation at 55 °C for 24 h was also measured. Determination of the content of total acids, lactic acid and nitrate in juices was conducted. Typical microbial contaminants of the sugar production were used as the test cultures. Polyhexamethyleneguanidine, dihlorzotsionurovoy acid and β -hop acid were used as the antimicrobial agents.

It was shown that the majority of the modern antimicrobial agents have high inhibition efficiency even at a very low concentration. So, they can be recommended for application at the different stages of sugar production.

KEY WORDS: antimicrobial agents, sucrose, production of sugar, contamination, obtaining sugar.

DISPOSAL WASTE OF AMINO ACIDS PRODUCTION

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Essential amino acids are necessary for a balanced protein diet. Production of amino acids is accompanied by the formation of ecological problems number, the main of them is the formation of sewage and their disposal. These sewage have high chemical oxygen demand (COD) 18 000 - 30 000 mg O₂ / dm³, so dump their untreated in sewage system, and even more into natural pond is unacceptable. Laboratory studies indicate that it is appropriate to apply the biological anaerobic - aerobic wastewater treatment technology. The main stage of wastewater treatment is thermophilic methane fermentation, which takes place in digesters at 55 °C, where contaminants decompose without oxygen under the influence of microbial anaerobic sludge. Approximately 70% of the organic matter is transformed into biogas (70% methane, 30% carbon dioxide) in methane fermentation, it after cleaning is a valuable energy source and can be used in factory boiler for heat or steam or the implementation of other businesses. Since the methane fermentation formed intermediate substances (volatile fatty acids), must refer to the purification of wastewater in aerotank.

Another useful product of thermophilic methane fermentation is anaerobic activated sludge, it contains essential amino acids, vitamins, phytohormones, nitrogen, phosphorus, potassium and others. Such content valuable substances in the active sludge allows to use it as a plant growth regulator, which is an alternative to chemical fertilizers and improves crop yields.

Thus, the use of anaerobic-aerobic wastewater treatment technology will reduce human impacts on water, to get an alternative source of energy (biogas) and anaerobic activated sludge as a plant growth regulator.

KEY WORDS: anaerobic - aerobic technology, methane fermentation, anaerobic activated sludge, biogas, plant growth regulator

MANAGEMENT STRATEGY OF THE ECONOMIC SYSTEM OF FOOD INDUSTRY ENTERPRISES

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Food industry plays an important role in the development of the country as well as its stable work provides existence of the entire economic system.

The emergence of market relations in the Ukrainian economy dramatically changed the conditions of food enterprises activity. Their financial situation in the past two decades was caused by variability in the economic, technological and social environments. In these conditions the functioning and even survival of food industry companies was getting more difficult.

Today it is obvious that to survive in the market and maintain their competitiveness of food industry, enterprises need to make changes in their business activities in time. Moreover, the need for change has begun to appear so often that its impact on the life cycle of the enterprise is no longer considered as the exception.

Ukrainian export depends on the availability of certificates ISO9000, ISO14000, ISO24000. According to TQM, the implementation process depends on the product specialization. Particular attention should be paid to HACCP system for food industry as the introduction of the system guarantees food safety.

Next fundamentally important questions are: how the company can withstand the environmental changes that arise frequently but irregularly and unexpectedly; which previous means preserve its viability and help to achieve goals. Practice has shown that the existence of the enterprise is more stable if it constantly monitors the main components of the environment, is able to rethink the typical, standard decisions and take unexpected managerial ones at each stage of the life cycle. The task of revising and rethinking the foundations of managing their activities is in the foreground of economic development of food industry.

KEY WORDS: management, economic, food, industry, certificates

LACTIC ACID BACTERIA AND THEIR ROLE IN THE PRODUCTION OF FERMENTED FRUIT

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During enzymatic processing of raw materials, microbiological processes are the result of natural microflora life, although it is more advanced to use special cultures of lactic acid bacteria. There is a large variety of microorganisms on the surface of raw material, so we can observe various processes during its processing, they are lactic, alcoholic, acetic, butyric, formic fermentation and also molding. For obtaining a quality product with aimed taste characteristics, lactic fermentation, which is started with bacteria of Lactobacillaceae family, is mandatory. Therefore, it is important to search for perspective strains of lactobacilli, which would provide typical fermented fruit flavor and taste.

Analysis of domestic pickled and dried fruit microflora showed that it is represented by lactic acid bacteria of genera *Lactobacillus*, *Leuconostoc*, *Pediococcus* and species of *Streptococcus thermophilus*. The majority consists of lactobacilli with homo- and hetero-fermenting lactic fermentation types. Lactic acid and CO₂, formed by them, act as a natural conserving agent, and preserve the form of fermented fruits. Along with the major metabolites, these microorganisms are able to synthesize different taste and aromatic compounds: aldehydes, ketones, non-volatile and volatile carboxylic acids, alcohols and others. Dominance of these lactic acid bacteria in microbial cenosis is the result of strong adaptation to raw material and their ability to synthesize antibiotic substances. It is found out that the genus *Pediococcus* produce bacteriocins.

So, to obtain quality fermented fruits and berries, it is necessary to add pure cultures of lactic acid bacteria starter at the beginning of fermentation. Biochemical potential of these microorganisms is extremely broad and can provide customized features of separate fermented product, its dietary and functional properties.

KEY WORDS: lactic acid bacteria, fermented fruits, lactate

GLUCOSE-FRUCTOSE SYRUPS AS A SUGAR ALTERNATIVE IN CONDENSED MILK PRODUCTION

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Condensed milk is a food product intended for direct consumption, also it used as semi-finished product for filling cakes, pastries, glazed cheeses, ice cream, etc. Traditional condensed milk is produced with sugar. For microbial conserving guarantee it is required to have mass fraction of sugar not less than 43,5%. Experts are proving negative effects of high level sugar consumption: possible cardiovascular disease, atherosclerosis, obesity, tooth decay, etc. This is the reason for a tendency of using low-sugar products for food, growing popularity of products with sweeteners as well. An important alternative to sugar is the glucose-fructose syrups (GFS).

The department of technology of milk and dairy products of the National University of Food Technologies has developed the technology of condensed milk production. The different types of carbohydrate raw materials were used for product manufacturing: GFS-10, GFS-30 and GFS-42. The difference between mass fraction of fructose in the structure. Traditional condensed milk with sugar has been used as control sample. It was calculated necessary quantity of syrup to achieve conserving effect (osmotic pressure must be over 16 MPa) during technology development.

The results of trials reveal that using GFS-30 and GFS-42 allows complete replacement of sugar in the product. Developed product contains for 4...7% less carbohydrates compared with the traditional condensed milk; calorie of condensed milk is reduced.

As a result of trials is proved that 30...35 % GFS added provides conserving effect, the osmotic pressure is 20...21 MPa. It allows the product a long time stored.

Positive impact of syrups using for prevention lactose crystallization in the product is noticed. The average size of the crystals in the control sample was equal to $8,69 \pm 0,025$ micrometer, while samples with GFS-10, GFS-30 and GFS-42 contained $7,80 \pm 0,03$; $6,86 \pm 0,015$; $7,18 \pm 0,02$ respectively.

Determined that using of glucose-fructose syrup allows reducing the duration of thermal processing (cooking) from 150 min to 50...60 min. This is a tool for reducing energy spending.

KEY WORDS: condensed milk, glucose-fructose syrup

KINETICS OF OXIDATION OF FATTY FOODS AS THE MAIN INDICATOR OF THEIR QUALITY

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The quality and safety of food products and raw materials is the main factor determining the health of the nation.

The importance of food available fats, as they are one of the main sources of energy for the human body. Fatty foods are easily oxidized due to the nature of their chemical structure. Oils with high levels oleic acid are much more resistant to oxidation than oils with its usual content. Resistance fats depends on the degree of their unsaturation and content of tocopherols.

In the initial stages of the process of oxidative damage to fatty foods is affected by antioxidants and the rate inhibited process is described by the equation:

$$W = k_{p2} \cdot [RH] (k_7 \cdot f \cdot n \cdot [InH]) \cdot W_i,$$

where k_{p2} - rate constant for chains elongation; $[RH]$ - concentration of substance oxidized; k_7 - rate constant of broken chains; f - factor of inhibition; n - number of active groups in the molecule inhibitor; $[InH]$ - concentration inhibitor; W_i - rate initiation.

This work was conducted by determining the acid and peroxide value in fresh oils and fats, and after one, three and six months of storage.

Determining indicators of oils and fats oxidation allowed to apply Tsepalov's graphical method for calculating kinetic parameters of the oxidation process. According to this method after studying the kinetics of fatty foods oxidation constructed graph values of oxygen uptake from the time of oxidation. For kinetic curves is graphically defined period of induction, the parameters k_{p2} / k_7 corresponding to relation of constants reactions elongation and breaking chains during induction, which allows to compare oxidability hydrocarbons at different rates initiation.

The method is used to calculate the concentration and efficiency of natural inhibitors mixtures and to predict oxidative stability of fatty foods.

KEY WORDS: oils and fats, oxidation, induction time, inhibitors

CATEGORY OF VALUE AND USEFULNESS IN FOOD COMMODITY

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Category of food value is considered to be one of the main problems in commodity science. The idea of nutrition has been studied from the point of view of different disciplines for a long time. The significance of this issue has not only increased, but became very important topic nowadays. As a category of commodity science, nutrition value is the measurement of not only healthy organism, but of social and functional aspects of life as well.

Determination of nutritional value in food commodity closely relates to the fundamental food assessment processes. According to Immanuel Kant, values are not created but discovered by an individual. This is, in fact, the main idea of the existence of the valuable foods. The idea of food value includes nutrition, energetic, biological and cultural values. Not to mention the esthetic value of goods that stimulates the purchases of these foods by 20%. Usage of some types of values shows the complicity of food assessment techniques, connected with determination indicators as well as subjective rates and personal preferences of the customers.

A category of usefulness to assess food indicates the ability to meet one's needs.

On the one side it is important to consider the indicators of nutritional value while assessing the value of food commodity. These value indicators are related to many objective factors, depending on the economy orientation in general, innovations in science and technology and their benefits for a customer as well. On the other side food commodity assessment is a mirror image of world requirements concerning the quality and safety of goods and it provides competitive strength on the market. Finally, truthful, full and detailed information about the product is necessary for food commodity assessment, which determines the constant increase in customers' demand.

KEY WORDS: values, nutrition, energy, consumed, usefulness

RESEARCH OF CHARACTERISTICS OF SAFETY OF POTATO FROM DIFFERENT REGIONS OF UKRAINE

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Nowadays, people from around the world are eager to consume high-quality and safe products. Therefore, one of the promising directions is the use of raw food from the cleanest regions. Thus, the negative impact of various pollutants on the human body is minimized.

The aim of the study was to determine the safety parameters of potatoes from different regions of Ukraine.

Potatoes were selected to investigate the safety parameters selected potatoes, because potatoes are one of the most widely used product throughout Ukraine after bread. Soil samples were selected from different regions of Ukraine and from two different areas of each region to evaluate their contamination.

Key indicators of potatoes by which can be assessed the degree of contamination of soils and their suitability for the use are:

- Toxic metals (cadmium, copper, Lead, zinc, arsenic, mercury);
- Pesticides (organochlorine, hexachloran that represented α - HCH, β - HCH, γ - HCH, aldrin, heptachlor, DDT, DDE, DDD, phosphorus: metaphos);
- Radionuclides (cesium, strontium);
- Nitrates;
- Mycotoxins.

It is known that toxic elements are dangerous to life and health. The level of risk is determined by the concentration and form finding. Currently, there is a regulatory framework that defines the maximum allowable concentration for the contents of some elements in soils.

The natural character of the distribution of toxic elements in the soil is determined by the background concentrations. The existing natural laws are violated and technogenic anomalies that are still poorly explored appear. They need to be studied to determine the extent of danger of soil contamination of the territories and to the zones of influence of individual sources of pollution. It is impossible to work out the effective nature protection measures aimed at protecting the territories from the pollution by toxic elements without solving these important problems.

KEY WORDS: toxic substances, potato, safety of food, ecologically net products, eco-friendly products.

PROBLEMS OF STABILITY INULIN AND OLIOHFRUCTOSE IN DRINKS STORAGE

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The work purpose is stability research inulin and olihofructose depend on size pH, temperature and a storage time of foodstuff in which they were used.

As object of researches used soft drink with the maintenance in solids of 14,0 %. The pH value environments changed, the temperature and endurance time in the drink .

And as the results it has been established that hydrolysis olihofructose degree changes with various intensity in different values of temperature and pH.

Hydrolysis olihofructose occurs slightly in value pH equal or above 4.0 and temperature 85-90°C. It is more important parameter of hydrolysis process, when level pH decreases and the temperature raises. Hydrolysis olihofructose degree increases in a product approximately three times at pH=3.5 and temperature 95°C.

It has been established that at pH=4,0 and above hydrolysis process was accelerated slightly. By the hydrolysis inulin degree research with the temperature 85-90°C in the sour environment. However, hydrolysis inulin increased approximately twice with the level decrease pH to 3,0 and rise to 95°C.

In the conditions of the sour environment and the raised temperatures hydrolysis increase (which have been brought in products with the technological purpose). It leads to partial or full loss of their dietary properties, and, in certain cases, to slight increase in a sweet ready product. Thus, hydrolysis inulin and olihofructose degree depends on level pH and the raised temperatures.

KEY WORDS: olihofructose, inulin, temperature, beverage storage, hydrolysis

ENVIRONMENTAL EXPERTISE OF THE SUGAR INDUSTRY

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The sugar-refinery industry in Ukraine is one of the most important branches of state agriculture. It refers to resource-producing branch, in which the volume of raw materials and auxiliary materials is several times higher than output of finished products.

Sugar refineries are described as companies that have a significant influence on the environment. Thus, the main sources of air pollution is smokestack CHP, department of juice clarification, evaporating stations, vacuum devices, office sugar drying, vent emissions from the premises, loading and unloading of limestone and coal fields of filtration, pulp pit. Generally, factories have 17 stationary sources of emissions, 15 of which emitted pollutants. Potential emissions is ranged from a few to several hundred tons per year.

Sugar refineries are the is a major source of waste and secondary resource materials namely bagasse, molasses, sludge filtration (defecate), beet wastes, ponytails beets, limestone, lime, scrap metal, used batteries, tires, fluorescent lamps.

The big danger to the environment in the areas of sugar beet processing factories are fields of filtration, on which, water category III and settled sludge of the II category arrive.

The nature of the source of filtration fields pollution is characterized as surface permanent man-made pools of industrial effluents. In the process of filtration, fields silt upper layers of filtration cards and reduce their filtration capacity, pollution of underground waters, land water currents, and air environment.

To reduce the influence on the environment, it is appropriate to implement the following measures:

1. Improvement of water purification II category (lighting by installing a hydrocyclone or sumps of continuous action with mechanical removal of sediment).
2. Introduction of anaerobic-aerobic water purification scheme III category.
3. Regeneration filtration for reuse of calcium hydroxide is basically the process.

Thus, the refinery industry need to face many environmental problems and have significant reserves in the use of secondary materials. The implementation of the proposed measures will improve the ecological situation in the areas of sugar refineries.

KEY WORDS: sugar- refinery industry, environmental pollution, influence

TECHNOLOGY BREAD INCREASED BIOLOGICAL VALUE

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In many countries, including Ukraine, there is insufficient provision of public protein food. Protein and aminoacid deficiency on the background of unfavorable environmental conditions adversely affect the health, disability and life expectancy. Lack of protein not only adversely affects the health, growth, development of the body, but also alters the kinetics of metabolism, increasing the absorption of radionuclides in the gastrointestinal tract and prolonging the time of their removal from the body.

Technology of functional bakery products play a critical role in addressing the issue of improving health in Ukraine because bread is one of the most massive food. Available range of bakery products produced in Ukraine is quite wide, however, dietary products, health care, special for different groups produced only 1-2%. To decide whether it constitutes an improvement bakery for prophylactic and therapeutic feeding.

Dairy products are a rich source of protein and are widely used in the world baking. Meanwhile, their use is associated with significant technological complications: worse rheological properties of dough, changing the fermentation activity of yeast, the quality of the finished products is reduced.

The method of simulation and experimentally proved that the optimal dosage of albumin and casein to provide recreational properties is 8% and 12% by weight of flour, respectively. Doing process that provides high quality products made by sharing milk proteins and surfactants and use non-yeast semis. Necessary pH test provided making food acids.

It is shown that albumin and casein facilitate digestion of bread from wheat flour in vitro. Due to the water absorbing capacity of proteins and surfactants interact with starch flour prolonged duration of the preservation of freshness of products during prolonged storage.

Thus, on the basis of these studies improved technology bakery products increased biological value using milk proteins.

KEY WORDS: albumin, casein, bakery, biological value

WATER PHASE OF BUTTER FORTIFIED CARROT POWDER

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The current development of food industry is closely connected with the creation of products that are rich in micronutrients. According to modern conception of healthy food it must be a harmonious combination of traditional food with natural additives. Immunomodulatory and radioprotective properties of carrot are well-known and widely used around the world. Carotenes are often used to improve the treatment of cancer and heart disease. That is why, the new technologies of fortifying butter with carrot powder of cold spray drying was developed. Proposed technological scheme provides the introduction of specially prepared powder suspension of carrots into butter during its homogenization. It was found that the recommended amount of powder in the finished product is within 1,2%.

In previous papers we noted that the butter structure formation is influenced by the additive and its microstructure. So, we analyzed the microstructure of water solution of selected additives. It was established that suspension of carrot powder, produced by cold spray drying contains big and small parts (15-80 micrometers, 1-5 micrometers). Microstructure of recovered particles are similar to those of a fresh vegetable. In water a suspension has fractal structure. Spherical structures and areas of the cellular structures, formed from polyhedra (size edges up to 12 micrometers) have been identified.

The changes that occur in the aqueous phase of enriched butter were studied. According to our results we have developed the mechanism of interaction of plasma with additives particles. It was determined that adding supplements of carrot powder obtained by cold spray drying leads to increasing the quantity of multimolecular bound moisture, slowing confluence of moisture droplets in the finished butter.

KEY WORDS: butter, carrot powder, cold spray drying, technology of fortifying, butter plasma, forms of bond moisture

PROBLEMS OF SAFETY OF FOOD PRODUCTS

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Companies constantly run into obstacles, caused by a global crisis, market competition from the side of companies-importers, price pressure from the side of retailers and endless public organs verifications. Actually, there are three public organs which carry out verifications of enterprises-producers regularly. To give the Ukrainian producers possibility to compete for the new markets of own products to increase the export of food products and their safety, the Ukrainian system of state control of commodities safety must become more productive and effective. Otherwise, it requires a substantial reformation.

The reform of the present in Ukraine system of state control of domestic products, regardless the selected direction, requires from the state officers, brought over to their development, understanding and clear vision of strategy. The developers must also define, what maximal level of users defence can be attained and what advantages will be scored as a result of reform.

Summarizing front-rank practice of leading countries and situation in Ukraine, it is possible to do the following conclusions.

1. The only supervisory organ is the most effective method of leading through transparent, successive verifications of food products safety and users defence.
2. The central register of market operators is promotes the transparency of the system. The central register provides the basis for the data maintenance, acknowledged at international level. All the proper supervisors have an access to the reports, as a result of particular companies verifications. It allows to avoid duplication of efforts and prevents the superfluous burden of enterprises.
3. Certificates which are given by the bodies of state power must meet the requirements of WTO and practices acknowledged at international level.

The selection of standards of the imported and national products must be executed in accordance with the rules and has certain features. To such features, for example, obvious inconsistencies in documentation.

KEY WORDS: developers, products

MONITORING OF NITRITES IN SAUSAGE PRODUCTS

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The study of environment pollution, caused by human activities, is one of the main scientific challenges that modern science is facing. Environmental safety control of food items among others is one of the most important tasks of analytical chemistry, considering that more than 70% of toxic substances enter human body with the food.

It is known that in order to improve the quality of food manufacturers use different supplements. So far as not all of them are safe for human health, control over their content is an important task of analytical chemistry.

For example, nitrite and nitrate of potassium or sodium are used as additives in the salting of meat and meat products to maintain the red colour.

In the U.S. and some European countries, for example, in 1958, it was decided not to use substances with carcinogenic impact as food additives. However, this decree is not implemented in any state. There are recommendations on the use of nitrites and nitrates together with ascorbic acid in smoked meat products, as it prevents the formation of nitrosamines, and inhibits the development of *Cl. Botulinum*.

Excess of TLV (threshold limit value) nitrite ions can cause severe poisoning. Therefore, we conducted a study of samples of different varieties of cooked sausages and meat produced by Kremenchug meat plant and Zhitomir Company "M'yaso Polissya" ("Polissya's meat"). These companies' products are widely represented in Kiev trade network.

Determination of nitrites was performed by Griss method in compliance with approved in Ukraine National State Standard (ГОСТ) 29299, using the calibration curve method. Selected results are shown in the table.

Table.

Results of the determination of nitrite ions in cooked sausages

| № | Sausage sample name, grade, producer | The content of nitrite ions, mkg/kg |
|----|---|-------------------------------------|
| 1. | «Molochnaya», h/g, Kremenchug meat plant | 180 ± 4 |
| 2. | «Doctorskaya», h/g, Kremenchug meat plant | 90 ± 3 |
| 3. | «Myasnaya», extra, Kremenchug meat plant | 330 ± 4 |
| 4. | «Doctorskaya», h/g, "M'yaso Polissya" | 50 ± 2 |
| 5. | «Fermerskaya», h/g, "M'yaso Polissya" | 90 ± 3 |

TLV = 30 mg/kg, h/g – highest grade.

KEY WORDS: nitrites, sausage products

MONITORING FOR NITRATES IN VEGETABLES AND POTABLE WATER

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It is of common knowledge that most NO_3^- ions are derived from vegetable products, largely grown in private farms and not subjected to systemic monitoring. Potable water becomes another source, especially if water supply is decentralized. This survey purports to estimate the nitrite and nitrate content in vegetable products and potable water in different regions of Ukraine. Potatoes, carrots, red beets, and other vegetables were sampled, grown on indoor and outdoor beds, as well as potable water from private housing areas and urban utilities. Besides, nitrates were monitored in non-permanent consumption vegetables: Napa cabbages, Yalta sweet onions, squashes (autumn harvest), tomatoes and paprika (produced in Turkey), etc., as well as in pre-cooked frozen suilluses and bay boletes. Nitrate content in vegetables was detected by potentiometric method, using an ion selective NO_3^- electrode. Nitrates in potable water were detected by photometry using salicylic acid. The method is based on inter-reaction between nitrate ions and salicylic acid, producing mixtures of 3- and 5-anilotic acid which, in alkaline media, render yellow coloring. Light absorption was measured using photoelectric colorimeter with $\lambda = 490 \text{ nm}$, in a cuvette with $l = 2 \text{ cm}$.

Significant differences in nitrate content were found in different parts of Napa cabbages. In tender central leaves NO_3^- ion concentrations fall within the range of 500 to 700 mg/kg, in green parts of outer leaves, 800 to 900 mg/kg, and in whitened parts of outer leaves, 2000 to 2200 mg/kg. Black winter radish (with jackets, NO_3^- at 5000 mg/kg, without it, 3500 mg/kg) proved to be a top performer for nitrates among the sampled vegetables. Nitrates in potatoes increased pro rata to the sizes. Red paprika, Yalta onions, and kiwi contained virtually no nitrates at all. Quite significant quantities of nitrates (200 to 300 mg/kg) were detected in mushrooms, even after boiling.

The gathered data enabled us to draw the following conclusions:

1. Nitrate content in vegetables is subject to wide variance, which can be explained by growing conditions and inherent strain specifics.
2. Potable water from decentralized sources sometimes fails to meet the health standards and specifications.
3. The samples of black winter radishes, Napa cabbages, and squash (autumn harvest) displayed extremely high nitrate concentrations, 1000 to 5000 mg/kg.

KEY WORDS: nitrates, vegetables, water, photometry, nitrate content

TECHNOLOGY OF EMULSION SAUCES USING ZUCCHINI POWDER

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Sauces of emulsion type, including dressing became common in peoples diet are represented by polycomponent systems. They are composed by water, oil, emulsifiers, stabilizers and structure agent and also by taste and nutritional supplements that provide different taste, flavor, shape and nutritional value.

One of the possible ways of optimizing lipid balance and appropriate quality dressing is the use of dried plant material. This technological approach allows variation in fat ingredient, reducing it in recipes by making structure-natural. Based on the obtained powder with zucchini dispersion 35...40 microns, which is the source of anionic polysaccharides (pectin) and therefore plays role in dressing dispersed environment.

Application of the technology of producing of powder with zucchini besides allowing naturalness, allows to avoid seasonal vegetable consumption, simplify transactions with mechanical culinary processing, shorten the process of cooking and culinary products and expand their range, reduce the area of warehouses and production facilities for the storage of vegetables. This is a promising issue, especially for exactly for the restaurants, including the bistro type.

The study of organoleptic quality dressing found advantages in design with the addition of 15% powder from squash to the mass formula mixture. Rheological characteristics of new sauces with vegetable raw materials are defined. It is shown that due to the high moisture retaining ability and lipid absorbing powder from cabbage polydispersion structure, which is the dressing, the viscosity of the new product exceeds that of the control sample at the same mass fraction of solids. Emulsion stability is established while adding powder from cabbage. Chemical composition of the dressing with vegetable powder, which resulted in reduction of calories and increase of nutritional value, is calculated.

Thus, the technological process of emulsion type sauces production involving plant material - powder from zucchini, is proposed.

KEY WORDS: zucchini powder, emulsion sauces, organoleptic quality, rheological characteristics

PROGRESS IN RESEARCH OF FOOD TECHNOLOGIES BASED ON DRIED FOOD MATERIALS

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The key point of food and restaurant industry enterprises is the introduction of resource-saving and competitive technologies. Today, companies like bistro are growing in popularity because of the convenience for population to receive services and relatively low cost of culinary products. However, the nutritional value and naturalness of food products in these companies does not always meet the balanced nutritional standards, and these criteria come to the fore for the modern consumer.

To solve these issues is possible by using dried food products in technological process. Dried foods are used in diets of special contingent: Geologists, sportsmen, military and other categories. A special role of these products is paid making state reserves of food. They can be used in restaurant, institution, including fast food chain enterprises (bistro).

Therefore, the concept of work is to develop functional and technological properties of raw dried food, which is the basis for improving technology, expanding the range of foods that can adapt technologies for various conditions (restaurant management, bistros, military-industrial complexes).

In the course of implementing the concept following functional and technological properties of food products, which are derived by method of drying the mixed supplying the heat were: organoleptic properties, given dispersion, water absorbing, water-retaining, lipid absorbing, emulsifying capacity and aggregate stability as well as quality and safety.

Based on the multi-dimensional complex investigations, technology of meals and food products involving the technological flux dried foods were improved.

The proposed innovative approach improves nutritional and biological value of food consumption to avoid seasonal vegetables, simplify operations with mechanical cooking meat and vegetable raw materials, reduce the process of cooking and culinary products and expand their range, to reduce the area of warehouses and production facilities.

KEY WORDS: dried food materials, functional and technological properties, food technologies

COMMODITY CHARACTERISTICS OF MODERN EXTRUSIVE POTATO PRODUCTS

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Nowadays rapid development of extrusion in food industry made it possible to create new compositions for baby food and dietary nutrition to meet the needs of different population groups, to get products with curative, preventive and stimulating properties for various groups of population and population segment.

In the USA such foods as breakfasts are produced by high extrusion method and then marketed in the amount of more than \$ 2 billions a year and production volume increases by about 3% every year. In Ukraine such foods are produced at the enterprises of Dnipropetrovsk, Kyiv, Kharkiv, Luhansk, Odessa and other towns. It should be noted that the range of this group of food products is quite limited on the Ukrainian market and does not always meet the needs of consumers.

The method of potato noodles production is patented, which lies in extruding a mixture of dried fresh potatoes at the temperature of 75-140 oC. The output (noodles) are of 2-5 mm thick.

The technology of potato snacks is developed, which includes extruding the input (by hot or cold method), drying it to 10% moisture content and frying in hot oil at the temperature of 180 - 200 ° C for a few seconds.

Experiments of cooking potato crackers with fish grits added to extrusion mixture were conducted in the Far East Commercial Institute (Russia). Output is determined to have increase protein by 2 times, minerals by 3.5 times. The amino acid composition of the output food is completely balanced.

New potato foods are produced by such technology: water and also carob bean gum are added to dried potatoes in the form of pellets or powder and then homogeneous, wet, bound dough is extruded. Then extrudate is dried to 7%final moisture content.

KEY WORDS: extrusion, extruder, potato products, extrusion foods, snacks

APPLICATION OF DIRECTED BIOCATALYSIS TO ENHANCE THE CONVERSION EFFICIENCY OF BERRY RAW MATERIAL PROCESSING

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A complex of scientific and practical tasks aimed at the development of intensive technologies of berry raw material processing providing exhaustive extraction of valuable berry components into the juice fraction and the production of berry juice concentrates of increased food value is fulfilled in the research. The technology is based on the application of glucanase and pectinase enzyme preparations composition during the juice production stage. A scientific and methodological approach to the evaluation of berry raw material enzymatic pretreatment in juice production based on a thorough analysis of the chemical composition and antioxidant properties of the juice thus produced in comparison with the juice manufactured without enzymatic treatment has been worked out. The role of enzymatic hydrolysis of nonstarch polysaccharides of berry raw material as factor promoting destruction of berry cell structures and cell walls components and as a consequence effective extraction of physiologically active berry ingredients (vitamin C, tocopherols, carotenoids, catechins, flavons, flavonols and flavanonols, anthocyanins, proanthocyanidins) as well as natural antioxidants, colouring matter and preservatives into the juice fraction has been theoretically substantiated and experimentally verified. Production technologies for a new assortment of improved nutritive value foods on the basis of berry juice concentrates in their formula have been developed, approbated in industrial conditions and introduced into production.

KEY WORDS: enzymatic hydrolysis, conversion efficiency, berry raw material processing

COMPARATIVE STUDIES ON BIOCIDAL ACTIVITY OF NANO-SILVER AND PEROXYACETIC ACID AGAINST GROWTH OF FOOD SPOILAGE YEASTS PREVALENT IN JUICE INDUSTRY

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The maintenance of high hygienic standards during the various steps of juice production is essential to prevent the contamination of fruit juices by spoilage yeasts. The main objective of our work was to develop effective technologies on applying of disinfection agents against food spoilage yeasts in juice industry based on assessment of their inhibition activity. Efficiency of used disinfectant has been tested in juice processing by transporting swabs. For calculation of recovered yeast cells from food contact surfaces Plate Count Agar with Tween 80 and Lecithin (used for sanitary examination of surfaces) has been used. For testing disinfectant activity in laboratory surface, suspension and well diffusion methods have been applied. In this study yeast species (*Saccharomyces cerevisiae*, *Rhodotorula rubra*) isolated from juice processing factory have been used. Among tested yeast strains *R. rubra* showed higher resistance against used disinfectants than *S. cerevisiae*. In the end of 30 minutes of contact time with disinfection agent and interfering substance 4.3log reduction of *R. rubra* was observed (Surface Test (EN 13697:2001)). In case of *S. cerevisiae*, more than 6log reduction was occurred. Present study shows that influence of implemented disinfectants on growth of *R. rubra* had unstable and temporary effect. Dynamics of inhibition of yeasts cells obtained from surface test were confirmed by testing of disinfectants in fruit juice processing. Among tested disinfectants peroxyacetic acid possessed good inhibition activity against both species of yeasts in comparison with nano-silver.

KEY WORDS: nano-Silver, biocidal activity, *Saccharomyces cerevisiae*, peroxyacetic acid

APPLICATION OF THE MIXOLAB AS A TOOL FOR THE EXPANSION OF FLOUR ASSORTMENT

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The flour, as a product of the grain processing, is a raw material for the baking, pasta, confectionery, pastry industries. According to the Ukrainian standards only 3 grades of the flour are obtained at the mill while as the different quality indexes of the flour for the various products are required. At the modern mills with the expanded flow diagram it is possible to obtain about 20-30 flour streams which were analyzed for the protein content, ash content, whiteness, quantity and quality of gluten, Falling Number, the index of sedimentation, water-absorbing capacity. The physical properties of dough at the Mixolab and Alveograph techniques, laboratory bakery and pastry tests of the flour streams also were conducted. One of the goals of these studies was the justification of the new innovative Mixolab device as a tool for the production flour for the different end-use purposes. Was established that the all flour streams have a different graphic Mixolab profile including 6 quality indexes even on the systems belonging to the one group of quality and especially on the systems of the different stages of the technological process. Index 1 primarily depends on the stage of the technological process and the modes of the system which the flour stream was obtained. The protein content, quantity and quality of the gluten impact on 2nd and 3rd Mixolab indexes and finally the 4,5 and 6 indexes are a result of the starch content, starch granules damage, Falling Number of the flour. Thus each flour stream has a different set of indexes and is suitable for producing of various products. For example, the maximum value of index 2 tend to flour streams from B3f, D2 and C1 system. This flour is good for baking purposes. In the opposite of that the flour from S2, C3, C5, B1 system has low value of this index, and better is suitable for producing of cookies and crackers. The flour from B1 also has a low water-absorbing capacity due to the low starch granule damage which makes it a valuable raw material for sugar cookies.

KEY WORDS: wheat flour, Mixolab, quality, end-use application

ANTIOXIDANT ACTIVITY OF *MACROLEPIOTA PROCERA* WILD MUSHROOM SUBMITTED TO DIFFERENT PROCESSING TECHNOLOGIES

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Mushrooms are very perishable food products and tend to lose quality immediately after harvest. Drying is the most common method for preserving mushrooms, freezing is becoming increasingly popular and food irradiation has also been suggested by many researchers as a good conservation technique in order to maintain and increase the food shelf life. In the present work, the effects of different processing technologies (freezing, drying and gamma irradiation) on antioxidant activity of the wild mushroom *Macrolepiota procera* were evaluated. Fruiting bodies were obtained in Trás-os-Montes, in the Northeast of Portugal, in November 2011. The irradiation was performed in experimental equipment with four ⁶⁰Co sources at 0.6 kGy. The samples were submitted to different processing technologies: freezing (at -20 °C in a freezer), drying (at 30 °C in an oven) and gamma irradiation in fresh samples. Antioxidant activity was determined in the methanolic extracts by *in vitro* assays measuring DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity, reducing power, inhibition of β-carotene bleaching and inhibition of lipid peroxidation using thiobarbituric acid reactive substances (TBARS) assay. Total phenolics were also determined by the Folin-Ciocalteu assay. Dried samples gave the highest DPPH scavenging activity (50% at 2.7 mg/mL), β-carotene bleaching inhibition (50% at 1.10 mg/mL) and the highest phenolic content (19.2 mg GAE/g methanolic extract). Frozen and irradiated samples presented the highest reducing power (0.5 absorbance at 1.27 mg/mL) and TBARS formation inhibition (50% at 0.78 mg/mL), respectively. The applied processing technologies affected favourably the antioxidant potential of *M. procera* extracts, particularly dryness for DPPH scavenging activity and β-carotene bleaching inhibition, freezing for reducing power and irradiation for TBARS formation inhibition.

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KEY WORDS: wild mushroom; *Macrolepiota procera*; Processed samples; Antioxidant activity

THE INFLUENCE OF DRYING CONDITIONS ON THE EFFECTIVE MOISTURE DIFFUSIVITY AND ENERGY OF ACTIVATION DURING THE HOT AIR DRYING OF RED BEETROOT

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The main goals of the present work are the influence of drying characteristics on red beetroot, effective moisture diffusivity determination and the activation energy. The drying characteristics of red beetroot were investigated theoretically and experimentally by convection drying at different air temperatures, ranging 50 – 80°C and relative humidity 30.6 – 53.8%. Red beetroot samples were dried from moisture content of 88.84±0.35% until 9.88±0.5%. The results have shown that, increasing the drying air temperature causes shorter drying times from 510 min to 240 min. Moisture transfer from red beetroot samples was described by applying the Fick's diffusion model. The effective diffusivity coefficient of moisture transfer varied from 1.471x10⁻⁸ to 1.19x10⁻⁷m²/s over the temperature range. The temperature dependence of the diffusivity coefficients was described by Arrhenius type relationship and was found to be 26.18 kJ/mol.

The research aimed to establish the kinetics of the drying process of red beetroot, in order to investigate the optimal drying parameters for this vegetable.

KEY WORDS: convection; red beetroot; moisture diffusivity; activation energy

Poster Presentations

Section **NOVEL SYSTEMS FOR FOOD CHAIN**

ECO-LABELING OF TRADITIONAL FOODS IN ROMANIA

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Proliferation of environmental statements created for eco-labeling standards need require consideration of all relevant aspects of the life cycle of a product and the design of these statements. Environmental declarations may be made by traditional foods producers, they must perform correctly this declarations to avoid negative effects on the market, such as trade barriers or unfair competition that may arise from environmental statements that are unsafe or misleading. Eco-labeling and eco-labeling is a form of positive statements that identify a product or service that is less harmful to the environment than other similar products or services. Eco-labels can provide a variety of information, as ecological, for example, those related to consumer health and products' impact on the atmosphere and other environmental factors about packing and other technical aspects. Labels enable consumers to compare products / services of the same type but most important to express their preference when buying a product or a service chosen. Eco-labeling aims is to establish a voluntary eco-label for products with minimal impact on human health and the environment throughout the product life cycle. From the point of view of the Romanian legislation, the organic label is defined by Government Decision no. 189/2002 as "a symbol and / or a short descriptive text on the product, packaging, a brochure or other document accompanying the product information and provide information about at least one and at most three types of environmental impact". The eco-label awarding national authority is the Romanian Ministry of Agriculture, Waters and Environmental Protection (MAAPM). International experience has shown that eco-labeling performed adequately in conjunction with verification procedures but certification is an incentive to increase the volume of recycled products or products based on the achievement of sustainable development This paper aims at collecting data on the importance, necessity and appropriateness of traditional eco-labeled products from manufacturers in Romania.

KEY WORDS: Eco-label, traditional foods, environmental statements

MICROBIOLOGICAL SAFETY OF FOOD PRODUCTS, DERIVED BY LOW-TEMPERATURE HEAT TREATMENT

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Well-known low-temperature technology of thermal food processing, pre-vacuum-packed in plastic bags, which allows to preserve their food and biological value, increase yield and shelf life of the finished product, which is especially important in the nutrition organization in special (field) conditions. When cooking using various combinations of vegetable and animal raw materials to ensure a balanced composition of the finished product on the fats, proteins, carbohydrates, macro- and micronutrients.

The aim of the study was to evaluate the microbiological safety indicators of fish (carp), cereals (rice), vegetables (onions, carrots) during storage at different temperatures.

Culinary raw material pre packed in plastic bags and subjected to heat treatment at temperatures $T = 333$ and 363 K, the moisture content of $W = 100\%$ and the duration of $\tau = 10-25$ min.

In the products, during storage, was studied its change in organoleptic properties (texture, taste, smell, color), the number of aerobic and facultative anaerobic microorganisms, *Escherichia coli*, *Staphylococcus aureus*, *Clostridium perfringens* and *Listeria monocytogenes*.

It was established experimentally, that for the processed products at these temperatures, the time to reach critical amount of aerobic and facultative anaerobic microorganisms, dangerous for the consumers health (for carp - 1×10^5 colony-forming units (CFU / g), rice - 5×10^4 CFU / g, for the onion - 5×10^4 CFU / g, for carrot - 5×10^5 CFU / g), that is:

- at a temperature of $T = 276 \pm 0,1$ K: carp - 12 and 14 days, rice - 15 and 17 days, for the onion - 14 and 16 days and for carrots - 13 and 15 days;

- at a temperature of $T = 298 \pm 0,1$ K: carp - 6 and 7 days, for the rice - 7 and 8 days, for the onion - 7 and 8 days, for carrot - 6 and 8 days.

In control samples, the heat treatment was in the traditional way (boiling in water), the period of achieving the critical amount of aerobic and facultative anaerobic microorganisms, dangerous for the consumers health, was 24 and 48 hours at storage temperatures of $T = 298 \pm 0,1$ and $T = 276 \pm 0,1$ K, respectively.

During the studying periods of storage in the experimental samples were not detected: *Escherichia coli*, *Staphylococcus aureus*, *Clostridium perfringens* and *Listeria monocytogenes*.

Thus, we have shown that food products, treated with these modes, that preserve food and biological value of the raw material, can be stored without special cooling 6 - 8 days and are suitable for the catering field (tourism, expeditions, etc.).

KEY WORDS: Microbiological safety, vacuum packaging, low temperature, heat treatment

PARTICULARITIES OF DAIRY PRODUCT LABELING

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When purchasing dairy products we have to make sure to check the label. It is a very important element of the promotion but also the most fast and easy support for consumer information. There is also a romanian applicable legislation regarding the labelling of foodstuffs which contain general regulations, such as OG no. 21/1992 – Consumer Protection, and Law no. 296/2004 – Consumer Code. These reglementations are completed by another rule, such as HG no. 106/2002, a normative which presents the main principle of foodstuff labeling. The Consumer Code is an excellent guide which specify „that the purpose of the labeling is to provide to the consumer the necessary information, information which should be sufficient, verifiable and easy to compare, so as to enable them to choose the product that meets their requirements in terms of needs and their financial possibilities, as well as to know the potential risks that could be subjected to”. As regards the labelling of dairy products, these should be labeled as products of the region, produced by origin, very similar to what happens with the labelling of wines. Farmers consider that this decision on the labelling of dairy products will be beneficial to the promotion and use of dairy products. The work is aimed at gathering data about the importance, necessity and desirability of labelling of dairy products including traditional dairy products.

KEY WORDS: Labeling, promotion, recovery, traditional dairy products

LABELING OF WINES IN ROMANIA PRODUCED BY SPECIAL TECHNOLOGY OF MANUFACTURING

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In winemaking, clarification and stabilization are the processes by which insoluble matter suspended in the wine is removed before bottling. The clarification has a big influence in the production of a wine whose taste, color, bouquet, and clarity must be near perfect. Technological schemes are conditional stabilization phase composition and evolutionary for main wines and their predisposition to certain defects. Knowing the cause, conditions of occurrence and manifestation of disorder determines how choosing appropriate treatments that will ensure the stability of the wine. Clarifying wine using various substances causing sedimentation (submission) impurities on the bottom of the tank. Substances for clarification and stabilization are used for liquid food products, especially wine and beer. Clarification is done usually with adhesives, which is the addition of substances called glues, following coagulation and flocculation of particles suspended. Adhesive substances was making with a positive charge also helps to neutralize the negative electric charge of colloids, which thus may be involved in the process of sedimentation. Coagulation can occur under the influence of tannins (gelatin, egg albumin) or under the influence of acidity and alcohol (casein, isinglass). Given that there are people allergic to some substances such as egg albumin, casein and lysozyme (substances used in clarification, stabilization and cleaning wine), European Food Safety Authority (EFSA) imposed on all wine producers which use these substances to indicate the presence of these substances in wine on bottle label. New wine labeling rules laid down in Regulation 579/2012 EC, apply wines produced wholly or partly from grapes from the harvest of 2012 and the years ahead and labeled after 30 June 2012. This paper aims at collecting data on the importance, necessity and opportunity of labeling wines produced with special technology to wine producers in Romania. Also show how some wine producers in Romania applying special technologies can be align the new rules could lead of new marketing opportunities.

KEY WORDS: Winemaking, clarification, allergic, stabilization, labeling

RESEARCH OF WAYS TO HARMONIZE THE LAWS OF UKRAINE ON FOOD LABELING WITH EUROPEAN LEGISLATION

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The purpose of this paper is to collect and analyze information on the legislative, legal and institutional frameworks of food labeling in Ukraine. Labeling is the fundamental basis for conformity assessment of food as an object of international trade and have informational, motivational and identifying features.

The first step in the process of food labeling harmonization rules was the adoption of technical regulations in Ukraine on food labeling rules (№ 487 of 28.10.2010), which was based on the requirements of both the Laws of Ukraine ("On the safety and quality of food", "On consumer protection", "About Baby Food ") and European directives (Directive 2000/13/EC of the European Parliament on the number approximation of the laws of Member States on the labeling, decoration and advertising of foodstuffs, Commission Directive № 2008/5/ES in matters providing the required information on the special properties of products, Directive 90/496/EEC, as amended by Directives 2003/120/EC and 2008/100/EC of the data application on the food product value, of Directive 1924/2006 on the rules of labeling).

Requirements outlined in the regulations are the basis of identification of the food products samples and their properties, as well as the information base for analysis of compliance with the labeling requirements of domestic and imported goods.

As a result of the collection and systematization of information on food packaging, data were obtained on availability, information content, completeness of reporting and compliance with the rules of data application provided by the Technical Regulations № 487 (as amended in accordance with the order of the Ministry of Economic Development and Trade of Ukraine of 28.05.2012 g . № 639) and individual EU Directives. Special attention is paid to the study of information on the properties of the added functional products and products developed using modern technologies.

Conducted research will be used in the technical regulation of the food market, or uniting of standard technical requirements for labeling, or reducing the risk of introducing unnecessary rules or requirements in the country that, in the end, is aimed at ensuring the quality and safety of food products, which will guarantee the protection of consumer rights, Ukraine's implementation of the WTO Agreement on technical barriers to trade.

The study was performed as part of the European project «NUTritional LABeling Study in Black Sea Region Countries» (NUTRILAB) of the Seventh Framework Programme for Research and Technological Development FP7-PEOPLE-2012-IRSES, n° 318946.

KEY WORDS: technical regulations, national law, harmonization, food products, labeling

BEER PELLETT DRYING IN AN AEROVIBRATION-AGITATED LAYER

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Waste of the brewing attract attention as a source of raw materials with a high nutritional feck and biological activity, used for feeding livestock and poultry. A brewery average power goes to waste each year about 40,000 tons of spent grains, and effective methods of preservation of these products do not exist, except for drying.

Drying spent grains to the final moisture content of 10% ensures a long shelf life, making it a cost-effective production and transport over long distances. The solid residue can be used for a whole range of valuable products, because it contains in its composition of about 8% lipid, 26% protein, 58% carbohydrates, and minerals, vitamins and other biologically active substances. Currently there are no effective and science-based methods for drying spent grains, which determines the relevance of the work. The paper offers a mathematical model of the drying process of brewer's spent grains layer, the dehydration process of separate grain of brewer's spent grains in a fluidized state by using computer-based simulation methods, allowing to take into account such important factors as the real grain shape and heterogeneity of the capillary-porous structure of the grain due to the crust presence. In the case of a two-layer grain at small values of Biot criterion ($Bi \rightarrow 0$), the process of moisture content leveling in the grain is much more intensively due to moisture removal from the surface.

The modeling shows that for the brewer's spent grains layer with the thickness of 0.03 m and more a constant rate drying period is absent, and a falling drying rate period immediately comes. During the falling drying rate period the moisture content changes exponentially with the course of time.

The kinetics of grains drying in sludge blanket was experimentally investigated and the curves were obtained: the changes in moisture content and temperature of the brewer's spent grains in the drying process by varying the temperature of the drying agent; the changes in moisture content and temperature of the brewer's spent grains in the drying process by varying the load (layer height); the changes in moisture content and temperature of the brewer's spent grains in the drying process by varying the speed of the drying agent; the changes of moisture content and temperature of the brewer's spent grains in the drying process by varying the parameters of vibration sieve; by varying the drying rate of the brewer's spent grains.

The generalized curve of brewer's spent grains drying at different process conditions is obtained. The constancy of the product of rate and drying time $N\tau$ is shown, which simplifies the calculations of the moisture content changes. Empirical dependences of duration and the drying rate are found. The relative coefficient of energy consumption, the proportionality coefficient on productivity and layer height, the conditional energy consumption rate that allows choosing reasonably rational modes of the drying process of the brewer's spent grains are offered.

KEY WORDS: beer pellet, drying, aerovibration-agitated layer

THE PROCESS OF OUTPUT OF FOAMED MIXTURES ON THE BASIS OF RAW FISH

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Fish and fish products play an important role in the human diet. At present the average consumption of fish products in Ukraine does not exceed 12 kg per capita annually unlike the physiologically specified annual amount of fish products consumption of 20.1 kg per capita. It is possible to improve the current situation on the account of expanding the range of produced fish items by fishing industry enterprises with applying the innovative methods for processing of raw materials.

The crucial task is to develop the technique of processing fish raw materials into foamed mixtures at temperatures not more than 55°C, this enabling to preserve thermolabile vitamins available in fish raw materials.

The authors have developed the new method of raw fish processing into foamed mixtures (patent of Ukraine for useful model No. 65473) and design of experimental installation for fish raw materials foaming (patent of Ukraine for useful model No. 76438), which made possible to carry out experimental research in order to specify rational parameters for the process.

The extrusion process was taken as a basis in developing a new technique to produce foamed mixtures. The principal difference of this technique was reduction of operational temperature and pressure in processing that enabled to preserve 90% labile to temperature vitamins of the basic raw materials.

This technique was proposed for the output of a new food product «Fish crunch» – snack made of minced meat of a round goby with the increased content of vitamins. Technical specifications for the product were determined by the standard of the enterprise (Kerch State Maritime Technological University) SOU 15.2-34571906-002:2013. In order to specify rational parameters providing minimum expenses of time and energy sources in the snack production, the planning of the experiment type 2³ was undertaken. For the first time the empirical dependence of the process duration was obtained (t, min.):

$$t=1,564 \cdot P-2,068 \cdot t+0,2135 \cdot \rho-12,520 \quad (1)$$

where P – the pressure of the raw fish processing, kPa; t – the temperature of the raw fish processing, °C;

ρ – the density of raw fish stuffing while processing, kg/m³.

By means of convex optimization the rational parameters of the process were calculated, viz. pressure P = 10 kPa, temperature t = 55°C, density of raw fish stuffing ρ = 1100 kg/m³.

The further research will be aimed at developing the design of the device of continuous operation for the process of foaming and drying of raw fish and projecting the workshop for raw fish processing into foamed mixtures in order to implement at fish processing plants.

KEY WORDS: processing, raw fish, rational parameters

USE OF HIGH PRESSURE TO COOK PASTA FROM FLAVORING HERBS

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The purpose of the paper is the merchandizing assessment for quality of pasta from flavoring herbs, processed by high pressure (HP), being maximally approached to fresh greens due to organoleptic properties and food value. The researches determined the rational period for harvesting of dill and parsley: on the field – since June until August, in hothouses – since January until February, at which the plants are maximally enriched with vitamin and mineral compositions, solids, sugars, volatile oils and cellulose.

The parameters for production process at the stage of experiment planning in order to optimize the modes of high pressure technology are: pressure – 200-600 MPa, processing temperature: from 10 to 40°C; duration of high pressure action: from 4×60^1 s up to 12×60^1 .

During researches we found out the mechanism for action of processing parameters on microflora of pasta from flavoring herbs, studied the qualitative composition of final microflora and its change during storage, and determined the modes technologies, at which the maximum effect from inactivation of microflora is achieved.

During optimization of production process we defined the following parameters for high pressure technology (pressure, temperature, processing duration: 500 MPa, 25°C, $4-8 \times 60^1$ s.

While assessing physical chemical characteristics of pasta from flavoring herbs in comparison with reference samples we determined the insignificant change in content of whole protein, amount of components for volatile oil, mass fraction of solids. The results from determination for content of main vitamins testified to their maximum keeping quality. Thus, the content of vitamin C in pasta from flavoring herbs, processed by high pressure, is by 74% higher than in other samples and the amount of β -carotene has not been changed. The studies of quantitative and qualitative composition of volatile oils showed that the amount of components for volatile oils has been increased in pasta from flavoring herbs at processing by HP. Using chromatograph "Tsvet 110" and processing chromatograms on software system "Khromprotessor 5" we found out the following hydrocarbons: α - terpinene, sabinene, β -phellandrene, myrcene; oxygen-containing components: methyl benzene and two unidentified components. The researches on changes in content of coloring agents and their quantitative content were held through preparation of alcoholic extracts with further measurement of optical density on spectrophotometer SPECORD® S 300 UV VIS. While processing the pasta from flavoring herbs by HP, the content of chlorophyll has not virtually been changed in comparison with fresh greens of dill and parsley.

The complex assessment of organoleptic characteristics allowed defining that the highest index was inherent to the product, made with application of high pressure technology: pasta from flavoring herbs – 95.2 scores.

The expected social economical effect was UAH 63.9 ths., the payback period – 2.7 years. The patent of Ukraine was received and ToR, as well as Technical Instructions were developed for pasta from flavoring herbs, processed by high pressure.

KEY WORDS: high pressure, pasta from flavoring herbs

PROCESSING OF BUTTER BY HIGH CYCLICAL PRESSURES IN ORDER TO STABILIZE ITS QUALITY DURING STORAGE

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In order to stabilize the quality, ensuring microbiological sterility and high consumer properties of butter (B) in the process of long-term storage, there was proposed the technology which includes its processing of high cyclic pressure (HCP). To determine the parameters of rational processing (maximum pressure P_{max} , the rate of increase $u_{n\uparrow}$ and reducing the pressure $u_{n\downarrow}$, the number of pulses n) there was carried out a set research.

It was established that treatment of B by HCP reduces water activity. Water activity of B after HCP treatment is reduced to the threshold of pathogenic microorganism's life. At a relatively low intensity of HCP exposure to B inactivation rate of microorganisms is described by a linear dependence, but with increasing intensity of HCP exposure to B linear relationship turns into two-phase model.

HCP Processing of B leads to positive changes (compared with control) chemical numbers. The rate of acid number increase in the samples of B treated by HCP is significantly lower. HCP Processing reduces hydrolysis and oxidation in the products, as evidenced by reduced values of peroxide value, iodine value, saponification value increase, the amount of soluble (Reichert-Meissl number) and insoluble (Polenske number) volatile fatty acids is reduced in water; increases its thermal stability. To estimate the dispersion of the major components of B (fat globules, air bubbles, moisture particles) there were used characteristics of the area, perimeter, Feret diameter, roundness, elongation and compactness. HCP Processing of B leads to change of its dispersion: breaking the fat globules, increasing of its number, decreasing of its average area and increasing of its compactness rate. The average area of the moisture particles was decreased, which leads to reducing the speed of oxidation processes and the development of pathogenic organisms in the B. There were also reduced the number and the average diameter of air bubbles.

With increasing values of the process parameters there occurs decrease of the penetration coefficient, cutting work and increased stress limit cut. There were obtained dependences of changes in density and relative volume of B, bulk modulus and the compressibility of the process parameters.

To construct the optimization model there was used the method of Lagrange multipliers. By solving the system of Lagrange equations there was obtained the area of optimal treatment conditions:

$$P_{max} = 320-340 \text{ MPa}; n = 2-3; u_{n\uparrow} = 7-10 \text{ MPa/s}; u_{n\downarrow} = 15-25 \text{ MPa/s}.$$

KEY WORDS: butter, high cyclic pressure, physical and chemical properties, quality stabilizing, shelf-life

HIGH PRESSURE IN THE TECHNOLOGY OF MILK AND SOFT CHEESE

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This work is devoted to scientific developments in the use of innovative technology of high-pressure in the production of milk and soft cheese. The scientific laboratory of high pressure in DonNUET has made a complex of scientific research work in high pressure effects on safety, nutritive and biological value of milk and milk products, the increasing of their shelf life, the expansion of assortment by creating new dairy products with improved consumer properties. The objects of research are: milk, processed with HP, soft cheese, produced with the use of HP. Control samples are raw cow's milk, heat-treated (pasteurized), soft cheese, produced by traditional technology in accordance with DSTU 4395:2005. HP processing parameters on the stage of research are the following: the pressure from 300 to 600 MPa, the processing time: from 10x60s to 30x60s, milk cure temperature 40-45°C; cheese process temperature of the product at the moment of completing its self pressing: 18±2°C. Experimental samples of cheese were made from unpasteurized standardized milk with fat content 2.4%.

With the help of research the mechanism of pressure and duration of treatment on the micro flora of milk and soft cheese has been found. Processing parameters have been selected at which the maximum inactivating effect of micro flora of milk and soft cheese is achieved.

In the process of experimental studies the optimal processing parameters have been established and proved: for milk – the pressure of 300-330 MPa, the temperature is 40-45°C, the duration of exposure 30*60¹s; for cheese – the pressure 450-580 MPa, the temperature is 18°C and the duration of exposure – 20-30*60¹c.

In assessing physical-chemical characteristics of milk and cheese in comparison with control samples it was established that the total content of protein, fat, lactose and mass fraction of solid substances varies slightly. The content of essential vitamins in milk and soft cheese is a sign of the maximum preservation. In milk treated with high pressure fat soluble vitamins are stored in 4-6 times more and water soluble in 2-3 times more than in pasteurized milk. In the soft cheese vitamins content is stored in 1,5-2 times more than in those produced by traditional technology. According to the evaluating marks of sensor characteristics the products produced by the technology of high pressure received the highest scores: milk has got 98,6 points, soft cheese has got 96,8. Decline in consumer properties of control samples during storage was significantly faster than in the samples treated with high pressure, which is the result of enzymatic activity and the development of surviving micro organisms. The presented analytical summary of high pressure effects on the quality of milk and soft cheese proves the prospects in implementation of this technology in the dairy industry with the aim of producing products with high biological value of durability.

KEY WORDS: high-pressure, milk, soft cheese

SCIENTIFIC AND TECHNICAL BASES ENERGY SAVING OF DOMESTIC ABSORPTION REFRIGERATION DEVICES

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Dissertation is devoted to the energy saving absorption refrigeration appliances scientific and technical development creation bases. Creation directions of such refrigeration devices are grounded. It is shown that: composition of rare gas does not influence on cycle efficiency. Energy saving constructions are developed: vaporizer; liquid heat exchanger; absorber; generator knots with thermal isolation as filling up granules from high-porous cellular material; refrigerator with a drawing channel. The two stages method of heat admission is developed with on 10..15 % reduced by an energy consumption. The new going near the choice of thermal isolation chambers thickness and new absorption refrigerators constructing principle is offered on the base of heat pipes and thermosyphon. Expedience of squeezed copper high-porous material application is shown as a filler in the area of thermal connection and thermal isolation casing on all of deflegmator lifting area height. The mathematical model of the refrigerators unstationary temperature fields is developed with heat pipes, allowing to conduct the choice of heat pipes amount. Forcing power efficiency of the tricked into thermal loading is shown in the absorption freezers starting period and management method with permanent admission of the thermal loading and temperature control on the deflegmator output. It is set that absorption refrigerators can be used in all of refrigeration storage temperatures range – from minus 18 °C to plus 12 °C and to become universal refrigeration appliance, and their minimum energy consumption is arrived at the three-position control mode. Perspective direction of energy saving in a domestic technique is development of devices, combining the food products refrigeration storage and thermal treatment functions. It is shown, what additional thermal chamber setting brings to energy consumption growth and does not worsen operating descriptions of cooling chambers. It is shown that the offered refrigerators models exceed the best analogues on ecological descriptions.

KEY WORDS: absorption refrigeration devices, energy saving

SYNTHESIS OF OBSERVERS FOR ELECTROMECHANICAL SYSTEM

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The article examines the model of dual-mass electromechanical system (EMS) observer. For the control system of rotation frequency EMS we used the measured number of the drive motor revolutions ω_1 and the calculated value of motor torque M_M . The observer of condition, which must reproduce the twisting angle of shaft $\Delta\vartheta$ and the rotation frequency of the load ω_H , is synthesized as the disturbance observer. The disturbance observer for the initial system can be presented in the form of the complete degree

observer with four variables of the condition $\tilde{X} = \left[\tilde{\omega}_1 \quad \Delta\tilde{\vartheta} \quad \tilde{\omega}_2 \quad \tilde{M}_H \right]^T$ and the measured value of the

motor rotation frequency ω_M in the output of the control object and also in the form of the reduced observer. The input values are the determined varieties of the moment set point and the moment of load M_H , occurring at the synthesis of the complete EMS observer. To estimate of the values Luenberger

observer is used, and can be described by the equation $\dot{\hat{x}} = (A - LCT)\hat{x} + Bu + Ly$.

The immeasurable moment of load is reproduced based on assumption about the constancy of the function change of the load moment in the individual sections $\frac{d\tilde{M}_H}{dt} = 0$. The observer describes the

control object in the form of $\frac{d}{dt} \tilde{X} = \tilde{A} \cdot \tilde{X} + \tilde{B} \cdot \tilde{u}$.

The agreement of observer calculation model with the results of the real control object measurements is conducted using the feedback vector $L = [l_{\omega_1} \quad l_{\Delta\vartheta} \quad l_{\omega_H} \quad l_{M_H}]^T$, which is formed by setting the

position of matrix eigenvalues $\left(\tilde{A} - L \cdot \tilde{C}^T \right)$.

The procedure of reduction degree for the reduced EMS observer occurs as a result of rejecting the observation of the measured motor rotation frequency ω_1 .

KEY WORDS: observer, electromechanical system, dual-mass.

USE OF GENETIC ALGORITHMS FO ELECTROMECHANICAL SYSTEM

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The principle of genetic algorithms (GA) is based on the fact that for the specific mathematical criterion of quality evaluation the value of parameters is changed with the help of the evolutionary mechanisms, so that the quality of functional would reach its minimum. GA are working simultaneously with a certain number of potential solutions that are denoted as individuals, and consequently form the population. Such mechanisms as multiplication, mutation and selection are applied to the individuals.

The simplified mathematical model of the control object (the main drive of rolling stand) takes into account the mechanical system in the form of dual-mass model, the control system of the drive motor, and also the transport delay and nonlinearity in the form of clearance. The vector of the identified parameters θ is represented in the form

$$\theta^T = [T_M \quad k_j \quad T_E \quad T_A \quad T_T \quad \Delta\vartheta].$$

The optimization of the individuals' parameters is carried out with the help of the mathematical algorithms: recombination, mutation and selection. For each vector of the parameter θ , that is calculated with the help of the genetic algorithm during the optimization, the functional of quality is calculated. The optimization will be finished after the calculation of the specified number of iterations. The standards of mutation, recombination and selection should be tailored to the number of population. The method of the parameters identification for the simplified dual-mass mathematical model of the technological object, that is based on the genetic algorithms, allows to identify EMS mechanical parameters in the composition of technological installation, with the sufficient accuracy for practical purposes. The essential shortening of the parameters optimization time, which are identified using the genetic algorithms, can be achieved by the initial determination of the parameters with the help of traditional methods, such as least squares, the regression analysis and others.

KEY WORDS: genetic algorithms, mutation, selection, electromechanical system

ANALYSIS OF THE ENERGY EFFICIENCY OF HEAT EXCHANGERS OF SUGAR INDUSTRY

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Heat exchangers of heat exchanging engineering system of sugar industry are a part of general energy supply allocation of an enterprise as the major secondary heat and electrical energy user, which makes it difficult to analyze and optimize these apparatus. That consequently requires systematic approach with the usage of applicable methods.

Nowadays such major characteristics as "area of thermoexchange surface" and "coefficient of efficiency" are traditionally used in sugar industry. That is not enough, as while comparing constructionally different heat exchangers it makes no sense to compare relation between area of thermoexchanging surface and its characteristics. The usage of exergy method of thermodynamic analysis (which is widely used while analyzing technical systems – work generators) contradicts the fundamental principles of methodology of optimization of thermoexchanging processes and systems.

According to non-cycle entropy method technique, integrated thermodynamic analysis assumes the determination of measure of irreversibility of processes, that occurs in heat exchangers, the sources of which are heat exchanging at the finite variance of temperatures, the dissipation of mechanic energy of heat transfer medium currents and heat exchanging with the environment.

Suggested technique of thermodynamic analysis assumes scientifically proved systematic approach to comparative analysis and different construction, that, obviously, is suitable to do with the help of entropy coefficient of efficiency, as well as for defining their thermodynamic efficiency in margins of sugar plant. The last can be achieved with the help of using entropy coefficient of thermodynamic perfection and allows to analyze different heat exchanging systems for defining the level of their influence on general energetic efficiency of sugar plant.

KEY WORDS: food, thermodynamics, heat exchange, process, entropy, exergy

DETERMINATION OF THE MAXIMUM STEAM DEMAND DURING THE CYCLE BOILING MASSECUITE IN BATCH VACUUM PANS A-CRYSTALLIZATION

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The vacuum pan has maximal steam demand E_{max} at the starting moment (Fig. 1).

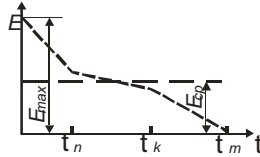


Fig.1. Graph of steam demand during the cycle of A-crystallization

The period's time τ_n , τ_k and total time of A-crystallization τ_m are depended on the quality of syrup, the heating surface, the temperature drop.

The dry substance of thick juice and the total quantity vapors in the evaporation station are variable data because vacuum pan has a discontinuous work. From the heat balance at the beginning of the cycle A-

crystallization in simplified form the value E_{max} can be written as follows $E_{max} = \frac{KF\Delta t}{r}$, (1)

where K - heat transfer coefficient, Δt - the temperature difference between the heating steam and vapor, r - specific heat of vaporization, F - heating surface of vacuum pan.

Main factor which influences to the value E_{max} is F , other factors K , Δt , r have less influence.

From the material balance of the cycle A-crystallization vacuum pan, the total quantity of vapors is

$$\sum W_{va} = \sum G_{ij} + \sum G_{mix} + \sum G_{ws} - M_m \quad (2)$$

M_m - mass of liquid (syrup, massecuite) which is boiled, $\sum W_{va}$ - the total quantity of vapors which evaporated during cycle of A-crystallization, $\sum G_{ij}$ - the total quantity of thick juice, $\sum G_{ws}$ - the total quantity of wash syrup, $\sum G_{mix}$ - mix of B-sugar, C-sugar and thin juice.

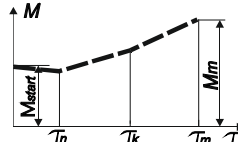


Fig.2. Graph change in the volume of solution in the apparatus during the cycle of A-crystallization

You can find the value of E_{max} , if know the graph change in the volume of solution in the apparatus during the cycle of A-crystallization (Fig. 2), the mass of liquid in a vacuum pan at the starting moment, equation 5. You must find k_1, k_2, k_3 (angular coefficients for specific periods) and use known values τ_n, τ_k, τ_m that performed equality 2.

KEY WORDS: crystallization, vacuum pan, steam demand, vapor

STUDY OF HEAT EXCHANGE IN THE ENTHALPY EXCHANGER WITH DIRECT CONTACT OF PHASES

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Heat- and mass- exchangers with direct contact of phases are widely used in food industry, especially in sugar, wine, and ethanol productions.

The use of these units is connected with utilization of (1) heat energy of secondary energy resources, (2) energy of discharge gas-vapor mixture from technological equipment, (3) heat produced during its regeneration, air-conditioning, and vet cleaning of gases from mechanical pollutants.

However, currently wide application of direct contact units is limited by different reasons. One of them is lack of scientifically-based methods of their thermo-hydraulic and design calculations.

An extended analyses and experimental research of the heat transfer during the water steam condensation out of the steam gas mixture on the cylindrical jet of uncompressed liquid has been performed. A mathematical model describing heat transfer in the jets of liquid at turbulent flow regime has been developed. The model is based upon the principle of "intermittent turbulence". The results of a direct experimentation of heat transfer and hydrodynamic patterns of uncompressed liquid jets flowing of the cylindrical hole into the stem volume were used as the locking correlations of the model thus developed. The experiments were carried out within a wide range of mass flow rates characteristic for the working parameters of heat and mass transfer units of food production. As a result of experimental data processing, a set of empirical correlations has been obtained.

The correlations allow for the calculations and determinations of local thermo-hydraulic characteristics of water steam condensation on the cylindrical liquid jets.

The adequacy and reliability of these correlations has been proven by the statistic analysis methods.

The results of the project may be used at the designing and optimization of phase direct contact heat transfer units.

KEY WORDS: water steam condensation, cylindrical jet, heat transfer

SOME THERMODYNAMIC CHARACTERISTICS OF BEET PULP

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Sugar industry of Ukraine has a long-standing tradition for sugar production and export due to favorable soil, climatic and economic conditions. Along with a primary market of sugar there is a market of its by-products such as molasses, sugar beet pulp, sugar liquor, etc.

According to the results of sugar refining season in 2012/2013, 17.08 million tons of sugar beet roots were processed by the sugar refinery in Ukraine. Taking into account that the yield of raw sugar beet pulp from weight of the treated beet roots consists 85% (totally 14.5 million tons of product was produced), it is clear that the treatment of raw sugar beet pulp is a significant problem.

Nowadays, the main way for sugar beet pulp using is its use in feeding of farm animals. The use of sugar beet pulp for pectin production is considered as a promising direction for its utilization. There is a lot of new technologies and technological decisions for production of pectin-containing substances from sugar beet pulp. However, lack of technological step "raw – dry" of the certain quality is one of the major obstacles for application of these technologies. The soft temperature mode for the thermal treatment of sugar beet pulp with application of heat transfer agent purified from products of fuel burning should be applied.

With the aim of determination the optimal regime for drying of sugar beet pulp at a low temperature, studies of effective thermophysical characteristics for different kinds of sugar beet pulp in temperature range from 60°C to 100°C were performed. The results of study allow to control the process of drying more effectively for the materials with different moisture content. The generalized graph of sugar beet pulp drying was obtained as a result of studies of drying kinetics, as well as a value of complex N_{\square} , which gives the possibility to draw the graphs for drying for any other regime. Air with the movement rate in the range from 1 to 4,5 m/s was chosen as a drying agent for the temperatures from 60 to 120°C. Under the study of total heat-mass-transfer of sugar beet pulp, the database was created. It took into account four changeable parameters. Empiric relationship between volume coefficient and heat interchange of drying were developed as a result of analysis of dynamics of total heat-mass-transfer.

KEY WORDS: beet pulp, generalized characteristics, drying

THE FACTORS OF BUILDINGS ENERGY EFFICIENCY BUILDINGS

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A problem of exhausting of power resources is the basis of development in planning energy saving buildings . So, now scientific and creative research is needed in this industry, that's why it is necessary to pay attention to not only structurally-technical decisions for food industry buildings. Energy consumption of building is considerably influenced by volume of-plan decisions. For example, building with a wide corps consume 15-18% energy, than buildings with a usuall corps. Criterion of quality of a by volume of-plan decision can serve the calculation index of building compactness. First this index was introduced into setting of norms in GFR in 1984. It is find as a relation of the general area of external protective constructions of S_{ext} and value of volume that is heated V_{heat} :

$$k = \text{of } S_{ext} / V_{heat}$$

The main factor of building energy efficiency is ability to prevent losses of heat through the roof, walls, windows and underground surfaces. due to the use of effective heat-insulation materials and taking new structural decisions. The value of heat losses through external protections is determined by resistance of transfer heat construction. Actual thermal protection of external covers 15-20% less than norm. Reasons are lack of uniformity constructions, low quality building and its bad exploitation. This lead to unexpected heat losses, unsatisfactory microclimate and decline of the building service life. In planning and building of energy effective building, it is necessary also to take into account its future placing. It is necessary, that building windows looked to the south side. It will allow the sun to heat building during the day, and thermal-insulation will be able to keep heat. Perspective is also using double-layer protection constructions with bearing and heat-insulation layers.

KEY WORDS: energy saving buildings, heat losses, building, roof, walls

USE OF CAVITATION EFFECTS TO HANDLE LIQUIDS

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Problem of reduction of energy costs for a technological effect in the finished production remains important. In particular it deals with cavitation devices that use liquid medium for processing in food industry. Effective influence of cavitation is found in the medium field of cavitation bubbles formed in the fluid flow due to pressure reduction on the value of fluid saturation vapor pressure at the appropriate temperature. The mechanism of hydromechanical impact on the medium, which is processed, depends on the size and number of cavitation bubbles, which, while slattered, create some cavitation effect.

The source of bubbles in cavitation device layer is vapor mixture forming on the outside of the cavity. Due to fluctuation of tail cavity along the flow direction and in radial direction, there appears crumbling of cavity on vapor bubbles.

The number of cavitation bubbles generated per unit of time from an elementary volume of vapor mixture boundary layer from the cavity and, consequently, their diameter will depend on the speed of the liquid and vapor mixture in the boundary layer, which determines the thickness of this layer.

Cavitation bubbles created at the time of their collapse give homogenization and dispersion of food medium.

Simultaneously as a result of collapse of bubbles energy elimination takes place with the bubbles boundary layer and occurrence of reaction connected with chemical transformation of substances in liquid food medium is initiated. Calculation of cavitation bubbles size during the research in terms of sugar production is based on this model. Maximum technological effect is at the stage of cavitation, which corresponds to the maximum energy, eliminated during the collapse of cavitation bubbles, calculated by the corresponding equation. This confirms the adequacy of mathematical model and the fact that it can be used to calculate the structures of hydrodynamic cavitation devices for processing liquid mediums.

KEY WORDS: cavitation effect, cavitation bubbles, energy

MATHEMATICAL DESCRIPTION OF THE PROCESS OF COUNTERFLOW TRANSPORTATION OF A SOLID PHASE IN CONTINUOUS VIBROEXTRACTION

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The counterflow separation of phases in continuous vibroextraction was investigated on a continuous vibroextractor model.

It was established that counterflow transportation is provided due to the difference between the hydraulic resistances to intersection of flows of an inhomogeneous system, namely, a mixture of the solid and the liquid phase, which take place in transporting elements, and due to the sedimentation effect on the filtering surface of elements.

In the analysis of hydrodynamic and hydromechanical effects of a filtering element in downward movement of a plate, it should be noted that, on the one hand, a flow of a two-phase medium with the corresponding ratio of mass (volume) consumption of both phases enters into the nozzle of the filtering element and, on the other hand, because of the additional difference between the heads of the media before and after filtering partition of this element, local separation of phases, namely, the filtering process, occurs: the solid phase remains on the internal surface of the filtering surface of the filtering element and forms a layer of a deposit with the corresponding characteristics, and the liquid phase passes (is filtered) through the formed deposit and then through the filtering surface of the element into the under-plate working space.

The obtained mathematical descriptions of the hydrodynamics of vibrotransportation of the solid phase in the working under-plate and above-plate volumes of the apparatus enable us to determine the velocities (specific capacities) of the two-phase flow in the transporting elements and the rates of separation of the solid phase on the filtering elements of individual working plates with certain design characteristics, e.g., plates with rigid, leaf, and flap branch tubes. The simultaneous solution of the obtained equations makes it possible to develop a mathematical model of the capacity of vibroextractors in the case of continuous movement of the solid phase in the working volume of the apparatus.

KEY WORDS: model, mathematical description, vibrotransportation, vibroextractor

IVESTIGATION OF THE EXTRACTION OF FLAVOID COMPOUNDS FROM HIGH MOUNTAIN HERBAGE

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At the present time, traditional manufacturing methods of extraction of desired components are limited by the emergence of the screening effect in extractors, which leads to a decrease in the active surface of interacting phases.

One of the methods of continuous renewal of the surface of interaction of phases is the method of using low-frequency mechanical vibrations. For this reason, in cooperation with the Transcarpathian Institute of Agroindustrial Production (Ukraine), the Department of Processes and Apparatuses of Food Production of the National University of Food Technologies performed an investigation of the extraction process of flavonoid compounds from giant hyssop and hyssop in a periodic vibratory extractor, which uses the principle of formation of intensive turbulent flows.

The vibration parameters of the vibromixing device changed from 3 to 9 Hz at a fixed amplitude, time of the process, and water duty. The boiling point of the mixture was maintained at ~90°C (under atmospheric pressure) and in the range 45–60°C (under rarefaction) by a temperature control system.

It was established that the largest content of flavonoid compounds, high degree of transparency, and high degree of astringency of the extract are attained at a boiling point of 50–60°C (under rarefaction) and 85°C (under atmospheric pressure) for a time of the process of 40 min at a frequency of vibration of the vibrodevice of 9 Hz. The system reaches an equilibrium state in a shorter time in the case of a smaller particle size of the raw materials and a smaller water duty. With rise in the aforementioned parameters, the time of the extraction process increases. The results of the investigations were generalized by an equation that enables us to predict the change in the current concentration of the desired component in the volume of the apparatus.

KEY WORDS: antioxidants, pulsing flows, periodic vibroextraction

CHARACTERISTIC FEATURES OF TREATMENT OF VEGETABLE HOP RAW VALUE OF BITTERNESS IN THE COMPOSITION MATERIALS IN VIBROEXTRACTION

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The efficiency of vibroextraction apparatus for processing of plant raw materials and their waste is due to the realization of intensive hydrodynamic regimes by turbulent pulsing flows generated by the elements of vibromixing devices. This activation of the interface leads to an abrupt increase in the motive force and a decrease in the external diffusion resistance. For this reason, internal mass transfer remains the limiting state of the process.

In this connection, the use of electrohydraulic methods of treatment of plant raw materials deserves attention. The essence of this method consists in the intensification of a shock wave in liquid by a formed pulse high-voltage electric discharge and in the intensification of the cavitation effect.

The treatment of the investigated objects was performed in a discharge chamber of special design. In performance of investigations, the discharge voltage was set by regulating the gap between the tori of the air discharger and the frequency of discharges.

The technological assessment of using the combined method of intensification of the external and internal mass transfer was performed on a continuous vibroextractor model.

The dependence of accumulation of common dry substances of hop in the extractant (water with a temperature of 40°C) on the parameters of electric-spark discharges and amplitude–frequency characteristics of the vibroextractor and dependences of the amount of bitterness on the analogous parameters of electric-spark discharges.

The analysis of the results shows the largest dynamics of accumulation of dry substances in treatment of the water suspension of hop cones by the first discharge with a voltage of 30 kV. The proposed method of intensification of vibroextraction will make it possible to obtain a complex preparation containing not only water-soluble bitter substances but also the whole set of substances that usually pass to beer wort in its hopping by hop cones, but with a larger yield.

KEY WORDS: vibroextraction, spark processing, hop raw material

SCIENTIFIC JUSTIFICATION OF THE VIBROEXTRACTION PROCESS AND ITS USE IN THE AGROINDUSTRIAL COMPLEX

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The rational use of plant raw materials and their deep processing can be realized in vibroextraction equipment. It was established that continuous and periodic vibroextractors provide intensive interface mass transfer in the extraction process of valuable components with substantial grinding of plant raw materials and their waste.

The continuous vibroextraction process is based on the new principle of counterflow separation of phases by using vibrotransporters of special design, which do not cause compaction of a layer of a raw material and provide its porosity independently of the particle size.

Turbulent pulsing jets generated by the transporting elements of vibrating attachments form optimal hydrodynamic conditions for intensive micromixing and, as a consequence, conditions for the renewal of a large interface in cross-sections of a two-phase flow in the whole working volume of the apparatus, which causes continuous intensive counterflow mass exchange.

The developed designs of periodic extractors contain vibrosystems with a container whose surface is permeable for extractants, which provides two-side filtration of suspension in the working volume of the apparatus and formation of turbulent jets, that provide continuous renewal of the liquid phase–solid phase contact surface, homogeneous energy dissipation in the whole working volume of the apparatus, and enables one to perform the process in the regime of intermediate squeezing due to regulating the amplitude and vibration frequency of the system within certain intervals.

To reduce loss of extractive substances in plant raw materials and the extraction time, preliminary treatment of raw materials by electric-spark discharges and high-frequency mechanical and ultrasonic waves can be used.

The developments can be introduced into processing industries to provide wasteless and deep processing of plant raw materials of rhizome, herbaceous, fruit, berry, and vegetable origin, as well as their wastes.

KEY WORDS: vibroextraction, plant raw materials, turbulent pulsing jets, interface

SELECTION OF FERMENTER WITH OPTIMAL CHARACTERISTICS FOR BATCH PROCESS OF MICROBIAL SYNTHESIS

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Optimization of the design and the technological parameters of fermenter are essential for the development of a new biotechnological production. However, current methods for fermenter selection are based on the parameters which give possibility to ensure good technical-economic indicators, but not maximum result. So, exciting methods for calculation and predictive modeling of the technological parameters of fermentation are not perfect until now.

The global technical-economic criteria of optimization can be used for the selection of the most effective fermenter for bath process of microbial synthesis. The algorithm for this criteria calculation was developed using software MathCAD. This calculated optimization criteria considers the physiological properties of cultivated microorganism, composition of nutrient medium and the cost of each component, energy consumption for mixing and aeration, capital costs for purchase and installation of fermenter, as well as for its amortization.

Comparative studies of different types of fermenters from created database allow to choose the most effective fermenter with the optimal characteristics and to minimize expenses for realization of fermentation process.

KEY WORDS: optimization, technological parameters, fermenter, batch process, microbial synthesis

PROBLEMS AND RESEARCH RESULTS OF COOLING PROCESSES OF BAKERY PRODUCTS BY VACUUM EVAPORATIVE WAY

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The processes of cooling and heating are studied for centuries and unfair to assume that they were studied thoroughly and completely. Sources of heat and methods of supply are diverse and within the time of the process sometimes are simply disparately as convective surface heating method and heating by high frequency and microwave. And for the removal of heat (cooling) we thoroughly considered only the superficial way. The surround way of cooling is fast, a few tens or hundreds of times, was considered utopian. Recently, attempts were made to use for the surround cooling vacuum-evaporative cooling, which has proved itself in cooling fruits and vegetables, although in their case it is used as a faster way to surface cooling. This method of cooling requires placing products in a vacuum chamber with a residual pressure corresponding to the temperature of water vapor close +2 °C. At the same time intensively moisture product evaporates and thus cools it. Evaporation rate and the corresponding cooling rate determined by system performance vacuuming.

Traditional methods of cooling foodstuffs by convective flow of cold air can not always be used for the intermediate cooling foodstuffs. This is due to restrictions by the temperature of cooling medium, which, being low enough, should remain positive and avoid freezing of the product. Because of the small temperature changes ($T_{\text{prod}} - T_{\text{chamber}}$) the duration of the process grows (especially in its final stages) become significant shrinkage and uneven distribution of moisture by volume cooled object. All this leads to further deterioration of storing and deviations from standards of product quality in appearance, the acidity, microflora, etc.

An alternative to this method is vacuum-evaporative cooling, in which the wet-cooled product itself is controlled by the temperature of the coolant. Only one basic requirement is presented to the product with proper cooling vacuum-evaporators way - it is big enough porosity that allows couples formed inside the capillary-porous body freely leave it and removed together with is evacuated air.

Vacuum evaporative cooling is carried out by selection of heat from the product by evaporative of moisture from it. Evaporation of moisture is caused by decreasing pressure (creating vacuum). Due to the rather uniform distribution of the free moisture in the products as cooling goes throughout the volume cooled product. A positive feature of vacuum-evaporative cooling is the ease of controlling the speed of the process. When vacuum-evaporative cooling ice crystals do not damage the structure of porous products due to positive temperatures for the entire period of cooling.

KEY WORDS: bakery products, cooling, vacuum-evaporative cooling

AIR DISTRIBUTION RESEARCH IN CELLS FLUCTUATIONAL FEEDING THE MIXTURE IN SMOKED SAUSAGES PROCESSING

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One of the necessary conditions for the maintenance of the quality and weight loss reduction of meat products, including raw smoked sausages, with heat treatment of air, aero-steam and smoke-steam environments - is a uniform distribution of temperature and humidity and velocity fields of the environment, which transmits heat in the working volume of the cameras. Uniformity of distribution of the environment, which transmits heat, depends on the method and design of air distribution system.

System of pulsating air division consists of fan supply air airgoing, two air distribution channels, mechanism, switch supply air or smoke-steam environment in discharge channels, dampers and outlet of the channel.

For the study of air distribution system we measured speed and temperature of air in smoke-steam environment of the supply and in the most characteristic points of the working zone of thermal cameras. The speed of air and smoke-steam environment movement is measured by thermoanemometr with digital data.

The system under consideration (air division) allows to reduce air exchange ratio and the specific air load, and, accordingly, electric power consumption on the distribution of air and smoke-steam environment in the working volume of the chamber, as well as energy consumption in its handling of the unit for conditioning (directly in the air conditioner or smoke generator). Processing the product of an aircraft or smoke-steam environment in the heat chamber on a "top - to the mountain" allows to obtain uniform distribution of the fields of motion and, as a consequence, the temperature and humidity fields. On the basis of the conclusions about the system of pulsating air division, it is possible to recommend the introduction of the thermal chamber and other devices for thermal processing of meat products.

KEY WORDS: Pulsation, heating stage, air conditioning

STUDY OF FINAL PROOFERS METHOD OF COMPUTER SIMULATION

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In the baking industry the process of the final proofing of the dough is important for obtaining high-quality products. The main problem that should be solved in the new proffers and modernization of the existing problems is ensure uniform temperature and humidity of the air in the whole volume of the proofer. The main way of searching solutions to the proposed problems is to use computer simulation of aero- hydrodynamic processes in the proffers equipment. It gives the ability to visualize the flow of air, caused by natural and forced convection, measure the speed of the temperature and flow in order, to detect the stagnant areas.

The object of research had chosen a typical final proofer horizontal design, which is widely spread in bread baking. While modeling process, area with significant differences in climatic parameters was discovered. For elimination of detected deficiencies it was suggested to change the direction and intensity of air convection inside the proofer. With this purpose, additional metal screens were established, and additional pairs are served in the separate areas of the proofer.

Computer simulation allowed to perform the quick check of the proposed technical solutions. Search for rational structural, kinematic and rheological parameters in this case is carried out without significant consumption of materials, time and finance. Checking of several proposed options will let you choose the optimal solution of tasks on creation of uniform conditions of carrying out the proofing process.

KEY WORDS: baking industry, proofing, computer simulation, convection

TECHNOLOGICAL ADVANTAGES OF USING CYCLIC DISTILLATION PROCESS IN THE PRODUCTION OF ETHANOL FOOD GRADE

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One of the main factors that provide high quality of ethanol food grade is distillation columns. Nowadays manufacturers have strict conditions on the quantitative and organoleptic indicators of alcohol quality. At the same time, market conditions dictate the reduction of specific energy costs per unit of output. This problem can be solved only by constantly improving technology of removing impurities by increasing the efficiency of mass transfer. Application of cyclic modes is one of the methods to increase the efficiency of interaction phases in distillation column, which essentially boils down to a circular motion phases in the contact zone. Mass transfer occurs on a tray in the absence of fluid flow. This allows you to achieve hydrodynamic regime that is close to the ideal displacement as in a liquid, and a pair in real conditions. Especially significant difference is observed between standard and cyclic processes at high reflux. This scheme of contact phase makes it possible to get number of structural and technological advantages: reduce the number of trays in the column 2 in 2.5 times; reduce square of trays in 1.5 – 2 times; reduce steam consumption is 1.5 – 2, 5 times; increase the load on the liquid 1.5 – 2 times; improve quality and increase the additional output of ethanol.

Let's demonstrate the benefits of the transfer distillation column in cyclic mode on the example of the column final purification and column of impurities concentration.

The Column of the final purification of ethanol, operating in the hydroselection mode reduces the content of methanol in 1.3 – 2 times, reduces the aldehydes content of 0.2 mg / liter; increases oxidation ethanol per 1 ... 2 min; improves organoleptic properties of ethanol. This specific steam consumption in the cyclic mode is 0.3 – 0.4 kg / liter (for bubble column in standard mode is 0.6 – 0.8 kg / liter).

The Column of impurities concentration performs the function of additional hydroselection column for the purification of contaminated flows. Release of additional ethanol for 3 – 4% is possible due to the higher concentration of impurities main character (esters and aldehydes), namely 0.6 – 0.7% of plant capacity and specific consumption of steam 0.07 – 0.08 kg / liter (for bubble column in standard mode is 0.3 – 0.4 kg / liter).

Distillation column in a cyclic mode allows to reduce capital costs for the construction of new and reconstruction of existing ethanol plant, while reducing the cost and improving the quality of the final product.

KEY WORDS: cyclic distillation process, ethanol plant, column concentration of impurities, column of final purification, ethanol food grade.

INTENSIFICATION OF THE PROCESSES AND IMPROVEMENT OF EQUIPMENT FOR YEAST DOUGH MIXING AND EXTRUDING

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On the basis of the research of mixing and extruding processes of the gas-filled dough we propose the design of mixing-fermentation-forming unit, which allows to combine the processes of continuous intensive dough mixing, aerated dough pieces fermentation and formation directly to the baking plate.

There are screw tools installed in the mixing zone, a design of which foresees the provision of three-phase dough mixing, namely: mixing of the components is done with the spiral tool, mixing occurs with the minimal use of energy due to the use of screw with the large pitch and at the stage of dough plastification – the intensive mechanical processing by the screw tools with variable pitch. The use of the screw with the decreasing pitch at the final stage of mixing provides the necessary pressure for feeding into the fermentation chamber. There is a technological screen with the variable cross-section installed at the exit of mixing chamber, which provides additional dough processing, promotes the formation of the whole gluten dough structure and stay in the mixing chamber during the time needed for intensive mixing process.

The unit operates as follows: the raw material is fed into the intake funnel of the mixing chamber, where three stages of dough mixing are performed and dough is fed, then to the fermentation chamber through the screen. Carbon dioxide is accumulated in the dough mass during the fermentation in the amount necessary for the aeration of the dough pieces during the extrusion through the moulding matrix directly to the baking plate in a kind of continuous twines or individual pieces in mass production.

The advantages of the proposed design are the combination of manufacturing operations of intensive mixing, fermentation, forming and aeration in a single unit of continuous operation that provides the reduction of PFD and PID (process flow diagram and piping and instrumentation diagram), working area, operation costs savings and allows to form yeast-fermented dough products without further processing directly on the baking plate.

KEY WORDS: mixing-fermentation-forming unit, gas-filled dough, screw tools

THE IMPACT OF CONSTRUCTIVE FEATURES OF HYDROCYCLONES APPARATUS ON PROCESS LIGHTING BEER WORT

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Suspended solids hot hopped wort, representing mainly proteins, are transferred from the dissolved form insoluble and bitter hop products. They are quite large, the size of them is 30 - 80mkm [1]. Number of suspended solids hot wort is 6000 - 8000 mg/l after pumping hot wort, and it should be reduced after their removal to 100 mg/l [1]. But the aim is the complete removal of suspended solids hot wort.

Inadequate removal of suspended solids due to a number of technological parameters of process and product quality indicators, such as: improper maintenance of beer mash filtration and making hops, contains no or insufficient amount of tannins, poor quality malt and non-optimal composition of its flour. But much due to the quality reporting process wort is also affected and imperfection of equipment is used for lighting.

Practical research and monitoring of hydrocyclone apparatus allowed to determine that its optimal performance depends not only on the quality indicators of hot wort, but also on the speed of its filling, vessel geometry and design parameters and the location of pipes for wort supply and production.

Research of the process of beer illumination was conducted on the models of hydroclone vehicle in the program Flow Vision, intended for the design of three-dimensional flows of liquid and gas in technical and natural objects, and also visualization of these flows by the methods of computer graphics.

As a result of research influence of such factors as speed of wort serve was set in a vehicle, form of vehicle bottom on speed and quality of besieging of albuminous sediment particles in a hydroclone vehicle.

Undertaken studies allowed us to insure the fact that the optimal construction of hydroclone vehicle is a construction that combines a conical or flat bottom and is poorly concave in itself, and that optimal speed of wort serve in a vehicle presents is 3,5 m/s. With the use of such vehicle construction the process of besieging will be accelerated, and a dish of albuminous sediment will be more integral, that will positively influence the process of beer wort illumination, and thus the quality of the prepared product.

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KEY WORDS:

INFORMATIONAL RESEARCH TECHNOLOGIES OF LEAVENED DOUGH EXTRUSION

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For the technological equipment elements design is expediently to use not only physical modeling, but information practice of design (IPD) as well. The main feature of IPD is the opportunity to consider the food production technological processes as the multicomponential system of interconnected subjects of inquiry: dough, technological equipment elements, mechanical loading means etc.

The mathematical imitation modelling of the leavened dough extrusion can serve as the basis of the IPD of the technological equipment elements. The leavened dough is considered as a complex heterogeneous, colloidal disperse system with the elasto-visco-plastic solid phase properties.

The proposed algorithms are allows to consider:

- the gas phase behavior during extrusion (CO₂ conversion from gaseous state in the dissolved and conversely);
- the dough rheological properties changes under the influence of external load;
- friction forces presence;
- dough motion in the complex configurations container.

The computer realisation of proposed algorithms leads to the relevant special digital subsystems creation. Their subsequent compilation with the basic working units and system libraries allowed the development of a modernized problem-oriented version of a digital model PLAST-EXTR-002 .

Within the framework of IPD the developed digital models using has allowed to perform a complex design calculation by consideration leavened dough extrusion.

The results of physical and numerical experiments comparison confirms the adequacy of created mathematical model.

KEY WORDS: mathematic modelling, extrusion, dough, gas phase, disperse system

THE GRANULATION EQUIPMENT INFORMATION PRACTICE OF DESIGN

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Thesis deals with the: - granulation of particulate mass (sunflower and buckwheat husk, straw, bran, wood chips, etc.); - development of information practice of design (IPD) of the processing dispersed materials equipment using extrusion; - engineering in the design of the site in pellet pressing technology of biomass for the fuel pellets production.

The granulation typical scheme with the pressing roller inside ring matrix is observed.

The mathematical imitation modelling of the biomass pressing processes can serve as the basis of the IPD of pellet production equipment.

IPD has the type: "mathematical model - intellectual expert system - design automation system" and considers the technological processes as multicomponential system of interconnected subjects of inquiry: particulate biomass, roller and matrix constructions, thermo- mechanical loading means etc. IPD is based on carrying out of the computing experiments which realize the analytical, algorithm and digital models.

Analytical model is based on:

- disperse materials mechanics main sections;
- mathematics - statistical analysis of numerical experiments results;
- the optimum constructive-technological equipment parameters distribution problem formulation.

Algorithm model contains:

- method of nonequilibrium deformation of disperse materials boundary problem solving;
- procedures of reological processes calculation;
- disperse materials pressing kinematics procedures;
- the regression equation method;
- Levenberg
- Marquardt algorithm.

The program system PLAST- OPT- 002 ensuring the high level automatic condition of numerical experiments is working out upon these algorithms (*digital model*).

Within the framework of IPD the developed digital models using has allowed to perform a complex design calculation of different bio mass components granulation.

KEY WORDS: mathematic modelling, biomass, pellet, designing, intellectual expert system, optimisation

THE HYDRODYNAMIC CAVITATION IN FOOD INDUSTRY, SEWAGE AND NATURAL WATER TREATMENT

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The problem of using various physical effects of hydrodynamic cavitation in particular and at development of non-traditional solutions for perfecting of process in food, chemical and other industries, and also in ecology is very important. Effective constructions of cavitation devices (Hydrodynamic Cavitation Apparatus – HCA) had been created and tested in laboratory and in working conditions. Processes in the HCA are based on using hydrodynamic cavitation and connected with physical and mechanical effects, arising at a collapse of cavitation bubbles. At the collapse of each small bubble pressure pulses reaching 10^3 MPa are initiated. Such high shock wave pulses with the volume of concentration of bubbles in the operating HCA zone being high make the specific power fed to the unit of volume equal to $10^4 \dots 10^5$ kW/m³.

Application of the HCA ensures qualitatively new technological effects. The authors found that the application of HCA to enhance the quality of emulsions for salting meat, and 20 ... 25% of their stability, improve the environmental performance of pectin products and simplify their production process flow, greatly shorten the cooking sugar syrups for the confectionery industry and reduce the energy of the process. The use of HCA for oxygenating water in fish farms increases its concentration to 6.0 g / L in the winter.

In cavitation treatment with simultaneous water ozonization the loss of ozone reduces considerably and ozone consumption approximates to theoretical value. This method can be used for sewage treatment aimed at removing of residual petroleum products and other cancerogens, as well as for tertiary treatment of sewage pre-purified biochemically, in the process of which water desodoration and clarification take place. Cavitation technology is 6...9 times more effective than barbotation treatment and 2...3 times more effective than ejection treatment and allows to reach purification effect of up to 97...99%.

KEY WORDS: Cavitation, food industry, water treatment

BEER-WORT CLARIFICATION IN THE COMBINED WORT APPARATUS

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To obtain high-quality beer an important value has clarification of hopped wort, removal of sediment from it. This operation is proposed to be carried out in the combined wort brewing apparatus, which additionally performs the function of separation hops and hot protein sediment. This process is done via the frame mixing device through a gradual slowing its rotation rate.

The particles characteristics, wort temperature, hydrodynamic conditions over a layer of sediment, the particles and apparatus bottom interaction affect the separation quality. Experimental researches have allowed to define the most expedient mixing device design, its placement in the apparatus and also bottom form of apparatus.

The results of known problem solved by U.T. Bedevadt about the rotation of liquid above an immovable bottom were used. Taking into account an active force of frontal action on a particle, particle friction force on the bottom and the law of Archimedes the ratio for the beginning of the movement particle velocity at the bottom (inhibition in the reversed process) and speed laying can be determined. Getting in the apparatus zone where the speed less than the laying speed, particle touches the bottom and settles on it. The radius of sediment formation area depends on the coefficient of capture, densities of particles and medium, angular velocity and functions that characterize the velocity distribution in the boundary layer.

Data obtained from a mathematical model when mixer speed is lower than 15 rev/min are confirmed quite by the experimental results. In particular when $n = 10$ rev/min to the bottom begin to settle all sizes particles. Throughout the apparatus bottom surface settle the largest particles granulated hops (size 2.8 - 8 mm). For particles of different sizes and shapes laying speed ranges from 0.65 to 0.08 m/s. The developed model is adequate to the real sedimentation process, deviation obtained theoretically and experimental data is 7.15%.

KEY WORDS: Wort, mixing device, sediment

THE MATHEMATICAL MODEL DESIGN OF HEAT-MASS TRANSFER IN BACKING PRODUCTION

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One of the main problems of the moist material heat processes is connected with the heat-mass transfer equation system solving. The mathematical imitation modeling of these processes can serve as the basis of the information practice of design (IPD) of backing production equipment. The correct made boundary condition gives it's possible to define the temperature and moisture distributions at any moment.

IPD has the type: "mathematical model - intellectual expert system - design automation system" and considers the technological processes as multicomponential system of interconnected subjects of inquiry: dough, constructive-technological parameter of the backing furnace elements, thermo - mechanical regimes etc. IPD is based on carrying out of the numerical experiments which are realized by the analytical, algorithm and digital models.

For the *analytical model* construction of mechanical behavior of the food medium we are guided by a principle of its conditional division on three groups: 1 - solid particles; 2 - water in various kinds and conditions; 3 - gaseous inclusions. An analytical part of mathematical model is based on connected system of differential heat-mass transfer equations. The dough samples are considered as the moisture contented disperse system with the given geometrical parameters.

The *algorithm model* is based on use of the net-point methods of the decision of the formulated boundary problems. There have been elaborated methods for put problem decision with use of finite element method on spatial parameters and finite difference method on time argument. The calculation algorithms are designed by consideration: - moisture changing by the scheme "waters - pairs" using $T \geq 1000C^0$ condition; - solid phase transformation by the scheme "dough - soft - crust" using the moisture changing condition in each separate finite element.

The program system HMT-002 ensuring the high level automatic condition of numerical experiments is working out upon these algorithms (*digital model*).

Within the framework of IPD the developed digital models using has allowed to perform a complex design calculation of heat-mass transfer during bread baking processes.

KEY WORDS: mathematic modelling, heat-mass transfer, backing production

IMPROVEMENT OF THE EQUIPMENT FOR SULPHITATION OF PRODUCTS OF SUGAR MANUFACTURE

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For the effective work of a sugar-refinery the great attention is paid to the improving the operation of each equipment unit, in particular stations of sulphitation that ensures good operation of the diffusive device. Persistence of pH indexes for sulphitation water and the low sulphur expenditure for process define the perfection of this equipment operation.

At refineries, jet sulphitator for sulphitation of water, juice and syrup are used, but they have some deficiencies:

- presence of the ineffective equipment (sublimator) for compartment of sulphur steams;
- staining of tubes for assignment of sulphitation gas.

As to the first deficiency, the solution of this problem is the installation of the equipment (cyclonic afterburner) with additional rendering of air, which executes two functions: an afterburner of sulphur steams and simultaneous scrubbing action of sulphitation gas from dust.

As to staining of tubes that means that the declare capacity factor of SO_2 in 99,8 % is not confirmed; and consequently, the construction of a jet sulphitator is imperfect.

This imperfection can be changed by:

1. Installing a spray jet instead of a ring plate or changing of an operating principle of the ejection device: from ejection of sulphitation gas by compact stream to ejection of gas by stream.
2. Further in the chamber of blending there occurs relative stabilization of flows driving and to complete carrying the process with high SO_2 capacity factor it is are necessary to augment the sizes of the device.

For speeding the processes of mass transfer in the cylindrical blending chamber it is are offered to execute inside the guiding device in the form of screw cutting it. It leads to the fact that the part of a fluid that leaked on an internal wall of the chamber mixes up in the form, breaks with acute crimps of cutting screw and interacts with drops of fluid that shades slide along a shaft of the cylindrical blending chamber. At impacts of fluid drops the intensive renewal of a surface occurs and the process of mass transfer accelerates.

KEY WORDS: sulphitation, mass transfer, afterburner, ejection

MODERNISING OF THE COLUMNED DIFFUSIVE DEVICE

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In sugar-refinery industry, the columned pullers, which consist of a diffusive column and cossette mixer, are widely used to derive of diffusive juice.

The diffusive column consists of a vertical cylindrical case with hollow pipe shaft plac in it a not from the outside of which lobes are tighten. Lobes and counterlobes create a lifting mechanism for a swaft that comes from below the columned device through the distributive gear that turns together with pipe shaft over a strainer surface. From above the sugarfree beet swaft moves through the special unloading device.

The fluid for sucrose extraction comes from upper part of columned puller and is collected from below through a strainer surface.

Deficiency of such diffusive device is that despite big metal consumption of the device considerable part of is doesn't participate in diffusive process (approximately 1/3 volumes of the device is occupied by the hollow shaft). Besides as a result of operation of a body loading force, there is considerable pressure on the upper leg of hollow pipe shaft that reduces operation time of the upper basic node, and consequently the reliability of device maintenance.

In the fundamentals of our work is the problem of increasing specific duty of the device, making operations more reliable and lowering specific metal consumption at the expense of using internal space of pipe shaft with firmware transport system at which puller becomes double-thread.

The upgraded columned diffusive device consists of a vertical cylindrical case with counterlobes and mobile pipe shaft plac inside it and attached lobes. Outside it from above there is a cylindrical case for unloading and below the device for bagasse.

It is agreed to put fix vertical strut with the counterlobes attach to it in side pipe shaft, and place pipe shaft lobes outside it for transportation of juice chips mixtures in the heel of pipe shaft that is connected by ports with the distributive gear of juice chips mixtures plac.

As a result of using the offer engineering decision, the capacity of a puller increases greatly (to one third) at the same sizes of apparatus and increasing reliability of device operation owing to the reduction of the load to the upper basic node.

KEY WORDS: diffusive device, puller, pipe shaft, lobe

A NEW FORM OF BEET COSSETTES – THE WAY TO GET AND BENEFITS

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The capacity and stability of beet sugar plant's functioning depends mostly on the work of diffuse device which is sensible to the beet cossettes' quality. We get cossettes from beet slicers reducing suger beets by diffuser knives. That's why knives' form, type and derived cossettes play an important role in sugur production.

We offer a new way to get cossettes of triangle slicer, which is more beneficial than other forms. This type of cossettes is obtained in the following way: knives' of keningsfeld type under the angle with a top of 60° are set in the first row of double-row knife chassis. Knives with flat cutting edge, are set in the second row.

The process of beets cutting occurs in the following way: cossettes of triangle form and ribbed surface in the beet's body are obtained after the first row of knives, the next row of knives cuts off this ribbing in triangle cossettes, alining the beet's surface.

The application of such types of knives and described above composition of roots' mixture during cutting by no means influence the beets cossettes' quality.

Beet's cossettes benefits of triangle diametrical cut comparing with diamond-shape are following: bigger maximum moment of resistance against bend, bigger surface of diffusion and lesser minimum distance of diffusion. It is evident, that saccharose will be obtained faster from triangle cossettes.

So, principal benefits of the offered way of obtaining cossettes are:

- the augmentation of strength to the bend and diffusion , reducing of the minimum way of diffusion;
- the roots' replacement during the process of triangle cossettes' obtaining by no means influence its quality;
- offered composition includes an application of 50% of flat knives, which are simple in producing and the service and have a law price;
- the capacity augmentation of beet slicer in 10%;
- the angle with a top of 60 and offered way of triangle cossettes' obtaining can be used in all types of beet slicers.

KEY WORDS: beet cossettes, beet cutting knives, diffusion, cutting

IMPROVEMENT OF A VACUUM PAN FOR CRYSTALLIZATION OF SUGAR SOLUTIONS

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For efficient work of sugar factories great value acquires perfection of operation of each unit of equipment, and, in particular vacuum pans for crystallisation of sugar solutions. However the drawback of such vacuum pans is that process of boiling massecuite occupies a long time as a result of rather high viscosity of massecuite, low speed of solution circulation in the water tubes of the heating chamber.

We received the task in to intensify of boiling massecuite at the expense of raising of circulation rate of sugar solution in the heating chamber of a vacuum pan.

The vacuum pan for crystallisation of sugar solutions contains the vertical cylindrical case, the build-in pendant tubular heating chamber with the central circulation pipe and the mechanical circulator in the form of a paddle stirrer situated in the bottom of a circulation pipe, the elbow for delivering solution in to a vacuum pan and the elbow for output of the finished product.

For raising of circulation rate of sugar solution in a vacuum pan it is suggested on shaft of the circulator on the height of the circulation pipe to place a screw.

Installation of the screw will lead to pumping of the sugar solution on the lobe of the circulator that will improve operation of the basic blade circulator moving of the solute to the vacuum pan which will lead to reduction in time of boiling massecuite.

When delivering fresh sugar solution to boiling mass of massecuite conditions of agitation, because of pains of higher speed of circulating solution will also improve. Concentration of sucrose in massecuite and fresh solution will flatten much quicker that is a condition of receiving of massecuite of high quality (equal crystals of saccharum will be received).

Thus, making padding screw for forcing sugar solution on the blade of circulator provides decrease in time of boiling massecuite and will improve the quality of crystals.

KEY WORDS: vacuum pan, screw, massecuite

PROCESSING OF MUNICIPAL SOLID WASTE WITH RECEIVING OF BIOGAS

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In communities throughout the world, the public is becoming increasingly aware of the waste disposal problem. While existing landfills are reaching capacity, new ones are becoming hard to find, harder to license, and next to impossible to get accepted by the local residents.

Increasing environmental protection laws require expensive preparation and precautions against unguarded leachate and biogas emissions.

We discuss the Biotechnological Process, which avoids the above cited problems at the source. Actually the natural process which takes place in a landfill site, is transferred into closed buildings and tanks. Controlled temperature and other process conditions accelerate the biological fermentation from years to less than 15 days, thus considerably reducing the required area of several hectares in a landfill site, and any kind of emission of whatever kind can be avoided.

This process, reduces volume of waste and is capable to cover its operational costs by producing Bio-Gas (methane gas) and biological compost, which can be sold commercially.

The main products gained from the Biotechnological Process are:

- a) Bio-Gas is an inflammable gas, which contains about 65 - 75 % of pure methane, which is the main constituent of natural gas. The calorific value of Bio-Gas reaches approximately 6.5 kWh/m³, equivalent to 5600 kcal/m³. This gas will be used for electricity generation in a decentralised power plant.
- b) Compost gained from Biotechnological Process (by anaerobic fermentation) is a valuable soil improving material for all types of agriculture or recultivation.

The basic advantage of the Biotechnological Process is that it can treat such a great variety of household or industrial refuse.

KEY WORDS: bio-gas, waste, recycling, compost

ORGANIC BIOMASS – ALTERNATIVE ENERGY SOURCE

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The necessity to reduce the cost of energy is one of the most pressing issues and problems facing humanity today. Ukraine is an agricultural country, so the organic biomass in the future can be a powerful, inexhaustible source of energy for its needs. The main types of organic materials, which have the country, are: sunflower husks, buckwheat, corn, wood chips, low-grade coal screenings and more.

A group of researchers the Department of Theoretical Mechanics and resource saving technologies of the National University of Food Technologies considers that today the issue problem getting alternative energy is inextricably linked with the development of technologies which are based on the using as an energy source the organic biomass and organic waste from food production. We think that promising technology in this direction is the technology for obtaining synthesis gas by thermal conversion of organic materials.

In general gasifier is the equipment for thermal processing of solid organic materials in combustible gases that implement during shortage of blowing agent (air, oxygen, water vapor, etc.). Combustion of solid fuel in the reactor of gasifier is carried out in a volume of vertical layer is characterized by raw feeding blowing agent, which is insufficient for complete combustion. Gases is formed in gas generator contain complete fuel combustion products (carbon dioxide, water) and products of their recovery, incomplete combustion (carbon monoxide, hydrogen, methane, carbon, etc.). The process that occurs in the gas generator called the gasification of organic materials.

A group of researchers of the National University of Food Technologies in Kyiv in cooperation with experts of LLC "Luhanshyproshaht" in Lugansk and "Dyzelbudivnym Plant of Kirov" Tokmak, did the work on the elaboration of highly complex gas generation that decides such tasks: continuous provision of electricity and heat for industrial projects; supply houses or private buildings, obtaining raw materials for the synthesis of chemicals, recycling organic waste, improving the environmental situation in different regions and so on.

KEY WORDS: organic biomass, gasifier, synthesis gas

PRECONDITIONS OF THE MATERIAL CHOICE AND INERT BODIES SHAPES FOR DRYING OF LIQUID FOODSTUFF

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The analysis of scientific and technical information concerning realization of drying ways for receiving friable foodstuff showed that the perspective there is a way of drying in a boiling layer of inert bodies by spraying of a liquid product on its surface.

The wide nomenclature of products which are dried up in such apparatus, causes a large number of researches in the industry therefore development of the effective way of liquid products drying on the surface of inert bodies in the pseudo-liquefied or vibro of pseudo-liquefied layer is a quite perspective task. When developing it, an important task is material choice of inert bodies, their form and the geometrical dimension.

The researches of drying process of foodstuff on inert bodies surface which have a form of cubes, a sphere from glass, metal, Teflon, aluminum and composites from them are brought by many authors. The important factor here is the dimension of these bodies. So P. G. Romankov says that at increasing of the inert bodies dimensions to 6... 12 mm, a product which is dried up, generally consists of parts in the dimension about 300 microns and looks like "flakes" or grains. The performance of the dryer increases significantly, but the heat-carrier speed also increases, which requires additional energy.

Another authors point to expediency and efficiency of liquid drying and crystal of the forming solutions in the pseudo-liquefied layer of binary inert bodies which consist of the mix of Teflon and aluminum parts.

However, there is not enough information about the impact of size and material of inert solids on heat and mass transfer in drying foodstuff.

So, the important direction of researches is justification of the dimension choice, form and material of inert bodies for drying of liquid and pasty foodstuff on their surface.

KEY WORDS: inert bodies, drying, material, shape, foodstuff

MODERNIZATION OF DRYING PLANT FOR MILK

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Cow's milk is very important in a balanced diet because it is useful at any age. But milk is a product that cannot be stored for an extended period.

Therefore, the use of fresh milk is only possible in the areas of its immediate production. Besides getting the milk is regional, that does not allow the delivery of fresh milk for consumers living in areas with undeveloped dairy cattle, or working in extreme conditions (scientific expeditions, remote constructions). Because of the seasonality of production a year supply of fresh milk is complicated in large cities and industrial centers. The foundation of the state food reserves and export of fresh milk is also impossible. So, to meet the listed requirements in the milk, some part of it must be dried and delivered in this way to the consumer.

For better digestibility of dry milk we have to ensure its high solubility. For this purpose it is proposed the improvement of disc spray dryer A1-ORC design, which is used in many domestic enterprises by installing the second stage of drying and air treatment systems of drying tower. Drying of milk in a two-stage drying plant is in two phases. The first stage of drying is a relatively short time at 180-200°C and the product is dried to 6-8% of moisture. The second stage of drying to the desired moisture content is in the machine, which is outside the drying tower at low temperature – about 100-120°C in a final drying section, and – 15-20°C in the cooling section. The dried product is obtained in the form of agglomerated particles having a high solubility.

So, the modernization of the dryer A1-ORC provides the production of dry dairy products with high quality and less final temperature, which can improve the competitiveness of the dairy industry and reduce the negative impact on the environment.

KEY WORDS: drying plant, milk powder, solubility

RESEARCH OF HYDRODYNAMICS PROCESS IN THE VACUUM APPARATUS WHEN CRYSTALLIZATION MASSECUITE WITH THE PURPOSE OF THEIR INTENSIFICATION

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The research in the area of mass crystallization of sucrose are traditional for the National University of Food Technologies, where fundamental researches on heat and mass exchange when boiling sugar massecuite, sugar crystallization kinetics and fluid dynamics in the vacuum apparatus are carried out. The objective of our work is theoretical and experimental study of the recycling process in obtaining sugar massecuite and research of constructive factors on the process.

The purpose of research is to determine the influence of the introduction of water vapor from the outside in sugar solution and massecuite to the process of intensification of mass crystallization.

We have studied the bubble flow steam and massecuite mixtures typical for industrial vacuum apparatus. We used a method of hydrodynamic intensification of massecuite boiling by injecting steam into each tube apparatus. Injected steam flow was maintained in the optimal range for each stage of boiling. It was first used to simulate the movement of massecuite in vacuum apparatus using software system FlowVision. This complex is designed to simulate three-dimensional flows of liquid and gas in the technical and natural objects, as well as the visualization of these flows by computer graphics.

In our case, we consider the problem of modeling of turbulent flow between two media with properties which differ by many times. Massecuite is given to the main entrance canal and steam is supplied from the auxiliary input in the center of the tube.

In this task a model of an incompressible fluid was chosen. In the calculations Navier–Stokes equations are solved for turbulent transfer functions and equations of convectediffusive transport.

On the basis of studies of heat exchange process and hydrodynamics in a vacuum apparatus an upgrading unit batch in proposed. It is equipped with a device for amplification of hydrodynamic circulation in order to intensify the process.

KEY WORDS: massecuite, steam, intensity

**COMPILING COMPREHENSIVE ANALYSIS AND METHODOLOGY OF PACKAGING EQUIPMENT
BASED ON SIMULATION**

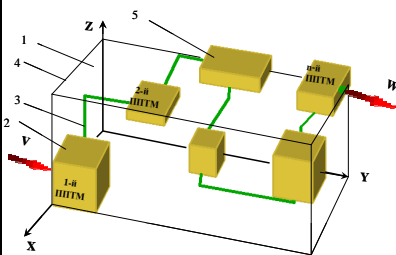
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Actual problems of modern packaging engineering, namely complex automation of technological process, the introduction of flexible technologies, the ability to quickly change the equipment for manufacturing high-quality products of different shape and size, ensure high performance, reduced energy and material costs, configurations of the universal packaging lines, are "all inclusive" for the same manufacturer. The development is based on the analysis and synthesis of existing designs of machines and lines for packaging equipment selection, the advantages and disadvantages of individual functional modules. The main factor of technological systems is to increase the utilization of space at all hierarchical levels in the design:

$$K_p = \frac{V_k}{V_{op}} \quad V_k - \text{the amount of space, which is the technological equipment (processing element);}$$



Where K_p - utilization of space p – level; V_{op} - the total volume of space, which limits the functional unit. The principle of the weighing-and-packing equipment based on the movement of material flows hyperlinked two-stream packing material and flow. If the projected complex technological systems with n-streaming space modules, you need to compose their space in the production area (fig. 1). Areas of spatial construction equipment are related to the total volume of the space production workshop. It should be noted that the areas are placed according to the increasing rate of spatial streams density in technological modules production. A formalized three-dimensional

spatial production area is shown on

Figure 1. Formalized 3-d spatial production section: 1-technological system; 2-play-spatial technological module; 3-the relationship between technological modules; 4-line production area; 5-limit streaming spatial processing module.

The modularity of spatial technological systems streaming makes it possible to implement the main principles of automated productions: flexibility, continuity, high technical and economic indicators.

KEY WORDS: packaging equipment, construction equipment, internal transportation system, structure, functional modules

ENGINEERING OF PET PREFORMS HEATING EQUIPMENT

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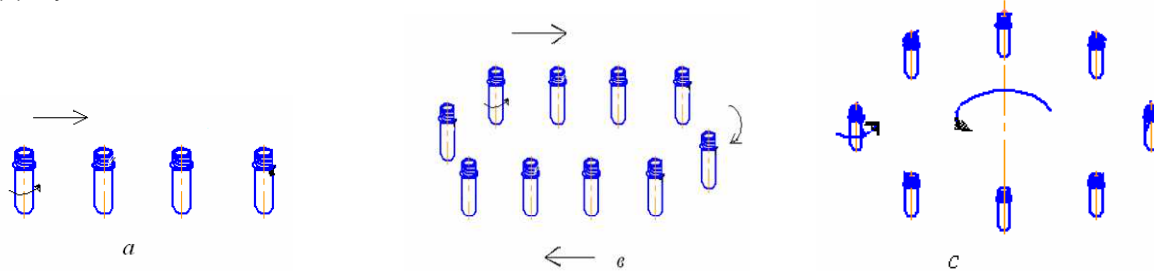
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PET bottles are widely used for packing of different food and non-food liquids and their usage in Ukraine is growing rapidly in recent years.

The classical technological process of PET bottle production consists of two main stages: preform heating and further blowing to the necessary form and volume. The quality and equability of heating has an extreme impact on the quality of received bottles.

Heating of the preforms could be done in different ways e.g. – thermal, infrared radiation, contact, convective and others. Equipment for preforms heating could have linear (a), linear-return (b) and radial (c) layouts.



The quantity of heat transferred depends from following conditions:

- quantity of heat increases in fourth degree depending from the temperature of heating element

Intensity of heat flow:

$$q = G \times M \times (T_1^4 - T_2^4),$$

where:

G – Stefan-Boltzmann constant; M – coefficient of radiation; T_1 and T_2 - temperatures of heating and heated surfaces correspondingly

- quantity of heat transferred is as higher as the distance between the heating element and preform is smaller
- quantity of heat transferred to the preform depends on the equality of radiation
- radiation surface of the heating element should have a high coefficient of radiation
- quantity of heat depends on the coefficient of reflection

Loading and unloading of PET preforms could be done manually or automatically. Rotational motion around its axis could be applied to the PET preform to achieve equable heating. Significant increase of installed equipment capacity without the change of footprint could be reached by multilevel placement.

As the result of research work several applications for patents of Ukraine were submitted for inventions which increase capacity of equipment and quality of heating of PET preforms.

KEY WORDS: PET preform, heating, equipment layout

USAGE ANALYSIS OF POLYMER FILMS IN PACKAGING

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An integral part of modern production is the need for packaging materials. Nowadays one of the most advanced developments used for packaging is the usage of plastic materials.

Acetate and cellophane were the first to be used in packaging industry. With the invention of polyethylene, polypropylene, polyvinyl chloride and other polymeric materials, product packaging problem has been completely eliminated. The consequence of monolayer films modifications was the emergence of single-axial and biaxial polyolefin and PET films. Orientated polypropylene films (single- axial and biaxial orientated) and films with coating for thermal welding have been widely distributed. The invention of stretch film created an opportunity to perform batch and transport packaging for securing a finished product on pallets, by rotation, manual or automatic wrapping (stacking).

Over the past 3-5 years range of polymer thin films has expanded dramatically. The usage of metallized polymer films have been increased, which successfully compete in the market with composite materials based on aluminum foil, perforated film, contributing to the preservation of the food freshness, and others. Development of film packaging created the so-called group of flexible packaging materials with annual growth of 5-7% and a corresponding variety of packaging equipment, special machines, such as palletizers for bulk packaging, the possibility of streaming production, etc. The most common type of flexible packaging is a mono-film with high pressure polyethylene, which occupies about 75% of the total consumption of thermoplastic films in the package. However, the diversity of their types species, a fairly large range of polymers used for their manufacture, the relatively short lifetime duration of their usage and terms of the decomposition create ecological problems for the environment and require more careful understanding of their role in society. A study of the accumulation of polymeric materials used in Ukraine and the characteristics of the recycling processes logistics under current conditions was provided, trends and ways of the recycling of the designated group of materials were examined.

KEY WORDS: packaging materials, orientated films, metallized polymer, biaxial orientated.

SYNTHESIS OF STRUCTURE OF HIGH-EFFICIENCY HYDROCLEANING DEVICES ON THE BASIS OF MORPHOLOGICAL ANALYSIS

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A number of factors of constructive, technological, exploitation and economic character influence the process of new machinery production. These factors define the need of system analysis and synthesis of technical objects (TO) in machine-building. However, hitherto high hopes for use of computer engineering in the construction process have not been completely justified. In the theory of decision making three stages of optimization in the process of new TO construction have been considered. At the first stage the choice of technical idea or system principle is made. The second stage is a search of rational structure; and the third one is identifying the best parameter value for the structure. Technical and economic indices of TO systems planned at the third stage of optimization can be increased by 10-15% and in some cases by 30%. During the first and the second stages indices increase by 30-35%, and sometimes even higher. We can obtain more efficient TO construction at the first stage of optimization. Currently computer design system covers the third stage of optimization where one can get relatively small effect.

Structural synthesis is paid such an attention that does not correspond to its subject matter and importance in general cycle of TO construction. That's why the problem of development of scientifically confirmed methods of structural TO synthesis at the early construction stages is essential. It is especially concerned with diversified range of hydrocleaning devices. The tasks of parametric optimization at the second and third stages are formalized and well investigated. While the tasks of the first stage are difficult to formalize, and there are only a few methods for their solving.

The difficulty is that mistake in the choice of technical decision of hydrocleaning devices can not be corrected in the future.

The use of morphological approach can be efficient in structural synthesis. It consists in construction of morphological table, its filling in by possible alternative variants and choice of a great deal of combinations of the best decision.

Method of morphological analysis has high level of catholicity that makes it possible to perform new construction synthesis in conditions of different criteria taking into consideration of TO properties that do not have quantitative concept, e. g., some ergonomic indices.

KEY WORDS: HYDROCLEANING DEVICES MORPHOLOGICAL ANALYSIS

OPTIMAL CONTROL OF THE VACUUM BATCH APPARATUS OF SITUATIONAL APPROACH

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Topic is devoted to the development of optimal control of massecuite vacuum apparatus based on kinetic optimization and situational management, and building of automation control systems by that object. Mathematical models were developed and their adequacy was held by experimental data taken from the refineries. The analysis of technological variables was made, the main results were verified by simulation modeling. The research shows expediency of situational management as the best solution for the operation of vacuum batch apparatus.

UML (Unified Modeling Language) is used to build a logical model of periodic processes in massecuite vacuum apparatus.

However, computer modeling is carried out in the following sequence: 1) description of the system in terms of UML; 2) implementation of the model system using Simulink subsystem of Matlab package or a similar software and 3) analysis of the results of computer simulations.

Proposed diagrams give an idea of such a complex process as massecuite boiling, in order to see communication between the machine and the controller and inside the apparatus. On the basis of these diagrams the program of massecuite vacuum apparatus for the controller has been developed.

We propose a situational approach for control of massecuite vacuum apparatus, which is based on logic scheme, which includes: a diagnosis of the situation and how to achieve the goal, identifying the factors which influence the decision and assessment of alternatives, development of tactics of the solution tactics.

There are recommendations given in selecting the criteria of massecuite vacuum apparatus control which would make maximize the finished product, depending on the time limits or selection of criteria, which minimize the process, depending on the restrictions on the yield. Optimal control algorithms for each situation were developed separately of the kinetic parameters.

Functioning structure for the implementation of optimal control algorithm's and the automatic control system of vacuum apparatus was designed. When using such an approach the yield increased in average by 8%, and the boiling time decreased in average by 12%.

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Key words: massecuite vacuum apparatus batch, technological complex, optimum conditions, mathematical modeling

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ONE APPROACH TO DECISION MAKING IN CORPORATE SYSTEMS

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Characteristic feature of the enterprise systems is the presence of priority in deciding between different subsystems that are part of the corporate system in accordance with their responsibilities range. Also subsystem of one level share the same priorities in choosing solutions in relation to each other and each subsystem, except subsystems of the first level, solves two problems: a problem of self-performance through its functional activity and task coordination of subordinated subsystems of lower level with their local optimality criteria.

Connection of subsystems of lower level to higher level ones is established by sending the generalized information about the status of these subsystems. Connection of upper level subsystems with subordinated lower level subsystems is established by means of administrative actions, which come from the top-level subsystems.

Models of coordination problems in each of the subsystems, except for subsystems of the first level, are constructed according to the summary information about the behavior of the entire set of subordinated to them lower level subsystems.

Solving problems of self-governance in each of the subsystems generates parameters of tasks of coordination. Also lower level subsystem between the two neighboring phases of coordination problem solving in subsystem of upper level that controls these subsystems have the right to take independent decisions based on management actions derived from the top level.

Each subsystem is effected by local external and internal disturbances that are associated with the change of the generalized information from lower levels.

In describing the corporate system the following parameters are taken into account:

- Restrictions that describe "external structure" of the corporate system.

$$B_i \leq \sum_{j=1}^J a_{i,j} x_j \leq D_i, \quad (1)$$

where $i, i=1, \dots, I$, - limitation indexes (1);

- Restrictions that describe the "internal structure" of the corporate system.

$$\gamma_r \leq (\alpha_r, A(x - y^{(r)})) / (\beta_r, A(x - y^{(r)})) \leq \overline{\gamma_r}, \quad (2)$$

where $r=1, \dots, R$, - index of type limit (2);

- Restrictions which are imposed on the specific characteristics of the corporate system

$$A_j \in Q_j, \quad (3)$$

where $j=1, \dots, J$ - index of components of the vector of variables x , A_j , $j = 1, \dots, J$, column vector of transmissivity matrix A , $A = (a_{i,j})_{i,j=1}^{I,J}$;

- constraints that describe the technological limitations on the range of the variables of the system.

$$x \in Q \quad (4)$$

KEY WORDS: enterprise systems, corporate system, restriction, connection, level.

CONTROL OF THE SYSTEM OF THE PERIODIC ACTION WITH THE USE OF PROGRAMMER

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There are two main methods of sterilization. The first one involves previous packaging of the product followed by sterilization. Sterilization of products in containers can be carried out in periodic and continuous action apparatus. The first type includes different types of autoclaves. The second method, assumes that the product is initially sterilized in a stream, and then packaged into a container in aseptic conditions.

The main element of the dynamic subsystem of automatic control system of periodic action apparatus is a programmer that develops the program and therefore a function of transition from initial to final state of the object.

Programmer is a device that provides a transition variable from the initial state x_0 at T_0 in the final state x_n at T_n . Program describes the change of variable in predetermined law.

As the object of periodic action chosen autoclave, in which the current program of sterilization of canned cucumbers and salty paste. In implementing the single ACS is used PI-regulator, so the system will have astaticism of the first order. As orders of statyzm and astaticyumu level are equal, it will be an established static error. For its removal we use combined ACS program, where an additional connection leads to increased order of astaticyumu.

The worst results were obtained in single ACS program without logical devices. Introduction to logic devices allowed using PI-controller with optimal settings for each of the areas. It gave better optimality criterion, but he was quite significant, since a static error is not eliminated.

We used a combined program ACS, which allowed eliminating static error. Application logic devices enabled better reproduce the program and gave the lowest criterion of optimality.

KEY WORDS: sterilization, autoclave, programmer, logic devices.

SYNTHESIS OF THE OPTIMAL CONTROL SYSTEM FOR EVAPORATING STATION OF SUGAR PRODUCTION IN INTERVAL UNCERTAINTY CONDITIONS

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The usage of optimal control methods for technological objects shows that the multidimensional systems that are synthesized by the quadratic quality criterion, sometimes lose not only optimality, but also stability. This is caused by sensitivity of the mathematical model parameters of the object, which are uncertain. That is why while designing such methods it is appropriate to check stability of the synthesized system in a given class of technological object uncertainty, that leads to using of robust stability methods.

Evaporating station operates in uncertain conditions caused by objective uncertainty, environmental uncertainty and person uncertainty who makes decisions. The first is proved by wrongly chosen object operation criterion. We show that the most complete operation criteria is integral quadratic criterion and matrix weights determine the influence of each component on the criterion. The uncertainty of the evaporating station operation caused by changeable coefficients of heat- and weith- exchange processes, such as increasing thermal resistance incrustation that depends on the syrup properties, design characteristics and operating time of the device; irregular perturbations associated with syrup properties changing; irregular perturbations associated with the accumulation of unfused gases; uncontrollable perturbations, the magnitude and nature of which are difficult to predict. Also uncertainty appears while composing mathematical model and simplifying introduction assumptions. All these uncertainties can be described mathematically in interval form.

This paper includes the mathematical model of evaporating station subsystem, which describes changes in concentration and levels behind shells in time. Based on the linear-quadratic Gaussian regulator algorithm the multivariate linear regulator and local P-regulators are synthesized, and it is shown that the qualitative characteristics of the system with optimal control are better than local ones.

Optimal stationary stochastic system is investigated on robust stability of the system in a given class of interval uncertainty. Hence, there was found the common Lyapunov function and the following condition was checked:

$$A^T(q^v)P + PA(q^v) + GQG^T < 0, P > 0, q^v \in V,$$

where P - the total Lyapunov function, $V(x) = x^T P x$, $P > 0$; $A(q^v)$ - epical matrixes of the interval family of closed system; G, Q - mathematical model matrix of the object, standing near random disturbances and their covariance matrix. Checking of this condition gave a positive result, ie, the evaporating station optimal subsystem that is synthesized by linear-quadratic Gaussian law with interval uncertainty is robust stable.

KEY WORDS: optimal control system, Lyapunov function, robust stabilisation

USE OF MODERN THEORY METHODS FOR MANAGEMENT OF TECHNOLOGICAL BEER PRODUCTION COMPLEX

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The process equipment should meet the requirements of the consumer on the technical and economic performances. The equipment technological level is defined by relative performance of its quality which is grounded on comparison of indexes of technical perfection by corresponding indexes of analogues.

At equipment maintenance profitability and safety indexes are important. Economic indexes - the equipment price, level of expenditures for maintenance service and repair. Safety indexes - level of a possible traumatism at service, presence of harmful factors: vibration, noise, high or low temperature and another which influence health of the worker.

The complex index of technological level Q of the equipment is calculated behind the formula:

$$Q = k_1\varphi_1 + k_2\varphi_2 + \dots + k_i\varphi_i,$$

Where φ_i - an index i -properties of the equipment according to functionality, operation ability, universality, safety of maintenance, etc; k_i - the weighing factor.

Weighing factors of indexes answer conditions:

$$k_1+k_2+\dots+k_3=1$$

As a matter of convenience the analysis of complex indexes of a technological level of the process equipment spend its rationing under condition of $0 < Q \leq 1$.

The new method of an estimation of competition and equipment technological level is offered. The profile analysis is put in the fundamentals. At first the area of a profile (polygon) of the is conditional-ideal equipment on indexes is defined: functional exactitude P_1 , profitability in maintenance P_2 , an index of level of safety P_3 , automation P_4 , patent-legal protection P_5 , an index of expenditures on maintenance P_6 .

For the conditional-ideal equipment each of indexes of separate function P_i is taken as a unit. For analogue they will be less units, and the polygon area will be smaller.

Comparing the areas of profiles (polygons) which it is accepted for a complex index of technological level Q of the equipment, we evaluate level of competition and an equipment technological level.

The offered method allows to select the most qualitative equipment, to evaluate change of its quality during maintenance, to consider a deterioration and to establish duration of maintenance between flowing and capital repairs.

KEY WORDS: process equipment, quality, technological level

MULTIDIMENSIONAL AND DATA MINING TASKS IN FOOD BUSINESSES PLANNING

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Information systems used on multiproduct food manufacturing of Ukraine, accumulate large amounts of economic information about the business activities of the company. Due to standardization and harmonization of accounts reporting, databases of many food companies have a similar structure. We can therefore say that a set of production planning tasks which can be solved on the set of data collected during the business is, to some extent, typical. Modern information technologies provide sufficient funds for the formation of management decisions based on analysis of the accumulated information. The problem arises in a defined set of planning tasks solved by information resource of the companies.

The source of historical information is a developed three-level data warehouse (DW). On the set of DW data OLAP-cubes are built to solve the planning tasks, monitoring and analysis of production costs. The use of Data Mining provides more subtle and informal analysis of costs and search of ways to reduce them in a competitive environment. As a result, the information technology of the product range adjustment is created by highlighting characteristics of the product having high demand. Based on the results predicted values of production are generated, as well as and suggestions on new products characteristics are made.

KEY WORDS: OLAP, Data Mining, planning, food company

OPTIMIZATION OF CALCULATION OF THE CRUDE JUICE SATURATOR

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The main task of purifying crude juice by lime and kiln gas is to eliminate various non-sugar components to the maximum and to obtain deposits with high sedimentation and filtration rates. Technological patterns of cold and heat treatment of hot crude juice that became the most prevalent in industrial practice, include predefecation as well as combined cold or mild hot primary defecation. Thus, high quality of intermediate products is achieved due to the presence of cold (warm) stage of primary defecation, which leads to the increase of lime solubility under temperature decrease of sugar containing solution, accompanied by the dissolution reaction of reducing substances towards the formation of little colored substances. The latter being well absorbed in the process of I saturation, where the intense decomposition of chromophoric systems and dye molecules with a simultaneous decrease of colouration takes place, while heating of cold crude juice, as a result of reduction of lime solubility, is accompanied by the formation of a supersaturated sugar lime liquid, which under further saturation undergoes the gel phase, possessing high absorption properties.

Promising ways of refining crude juice both in terms of the maximum effect for purifying and forming good filtration sedimentation properties of deposit are referred to the separation schemes of bulk coagulates from non-sugar components prior to primary defecation. An improved treatment is based on the exclusion of deposit dissolution in the process of primary defecation and improved efficiency of I saturation on the pure deposit of calcium carbonate.

At sugar plants it is recommended to put into a widespread practice the scheme of crude juice defecation with progressive pre-defecation, combined primary defecation, defecation before the second saturation phase with recirculation of condensed suspension of II saturation along with the part of unfiltered juice of the I saturation for pre-defecation.

The Chair of Informatics (NUFT, Kiev) has done work on optimization of calculation process for the equipment intended for the absorption of carbon dioxide with the aim to neutralize calcium hydroxide when purifying crude juice in sugar production.

For this purpose there was developed a mathematical model to calculate the process of carbonation. The first saturation involving calcium carbonate completes the formation of deposit with the required for its isolation sedimentation and filtration properties.

KEY WORDS: Optimization, calculation, crude juice saturator

USE OF UNIFAC (DORTMUND) MODIFIED METHOD FOR MODELING THE PHASE EQUILIBRIUM OF VAPOR-LIQUID SYSTEMS "ETHANOL-WATER-IMPURITY"

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When calculating and modeling processes in the column of alcohol and epuration typical installation of a typical distiller information on the phase equilibrium of vapor-liquid systems of the "ethanol-water-impurity." Is required in case of low impurity concentration phase equilibrium calculations are made by "ethanol-water" system and the concentration of impurities is calculated by the K rectification coefficient. The rectification of a group of impurities in their infinite dilution can be found in reference books or, for example, in the database of the University of Dortmund (Germany). However, the data for some impurities are absent or are not in reality. In such cases, the only solution may be to use analytical calculations.

Current approaches to modeling of the vapor-liquid equilibria are based on the calculation of fugitive components in the vapor and liquid which must be equal in equilibrium. In our view the most appropriate methods for the calculation of the active component in the liquid phase, are group contribution methods. This approach makes it possible to adjust the weighting of mathematical expressions in a view of the activity coefficient from experimental data of phase equilibrium. Among these methods there is the UNIFAC method, which was developed, modified and revised at the University of Dortmund. Using modified method of UNIFAC (Dortmund) more accurately than the original method the activity coefficient for infinitely dilute solutions is calculated.

Using modified method of UNIFAC (Dortmund), we calculated the temperature and the concentration of ethanol in the vapor for the systems "ethanol-water-impurity", rectification coefficients of several impurities accompanying ethyl alcohol, the concentration of ethanol in the liquid at atmospheric pressure. The calculated data for the phase equilibrium ethyl alcohol is almost equal to the experimental ones. Modeling of almost all impurities give good results except acetaldehyde and amines. The calculation of the rectification coefficients for acetaldehyde is very important because it is defining impurity in the design and control of epuration columns.

Use of modified UNIFAC method has practical interest both in the design of rectification columns, and in their operation and automation control. We have created a structure, algorithms and software for automation control system for epuration process with reference model. An integral part of this model is analyzed method.

KEY WORDS: UNIFAC, equilibrium vapor-liquid

HUMAN-MACHINES TECHNOLOGIES OF ACCEPTANCE OF COLLECTIVE DECISIONS

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The known method of increasing the drying process intensity is a pre-heating of the material. The effectiveness of this technology is based on the acceptance that the increase in the average material temperature before drying increases the coefficient of internal moisture diffusion, which determines the overall process duration.

However, in practice, there are no recommendations on the selection of the modes for preheating of the drying material which analyze energy consumption. Obviously, the preliminary increase in temperature of the material, on one hand, reduces the duration of the subsequent drying process, but on the other hand, requires a lot of the overall energy cost to the whole process.

This paper presents the theoretical and experimental studies to determine the rational modes for pre-heating edible raw materials in order to reduce overall energy costs for the drying process.

To estimate the energy efficiency new index is proposed: the ratio of dryer performance by moisture evaporation to drying process energy costs ratio.

It is shown that there exists an optimal duration of the preliminary material pre-heating process at which the total energy consumption for the drying process with pre-heating is minimal.

Based on the example of grape pomace drying in heat Mass Transfer module with conductive heat supply it is shown that dryer energy efficiency increases 25 ... 45% when pre-heating duration is optimal

KEY WORDS: production plan, collective decision, system optimization, methods, models

DEVELOPMENT OF RECIPES BY MATHEMATICAL MODELING

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Modern software of 3 – D modeling of thermal and hydrodynamic processes becomes the most powerful and sophisticated instrument which enables a profound research into the local characteristics. These methods are extremely valuable when studying such complex processes as combustion; insofar a set of governing equations has to include the hydrodynamic conservation equations of momentum, mass of components diffusion, chemical reactions, convective and radioactive heat transfer.

It should be mentioned that direct experimentation into the combustion process appears to be cost prohibited, since only heating of reactors needs a significant amount of organic fuel to be burnt.

Therefore, a commercial software ANSYS (Fluent, CFX) has been utilized for 3 – D modeling and validation of models.

A set of geometric objects of the VGP – 100 B (a pilot experimental combustion stand of the Coal Energy Technology Institute of the National Academy of Sciences of Ukraine) were developed and modeled.

The process of natural gas combustion has been modeled including the processes of flue – gases turbulent flow, component reactions of combustion, heat transfer including radiation in the semitransparent irradiating combustion products.

The validation has been carried out by comparison the data calculated within the developed model to those measured in the direct experiments. A close correspondence of data thus obtained proves the accuracy and validity of the model.

KEY WORDS: Analytical information management, analytical control, effective control algorithms.

DEVELOPING MODELS OF QUALITY FOOD PRODUCTS

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Key business processes of food production, aims to achieve the strategic goals of the company - high quality end product. Therefore, restructuring of management, which allows the company to coordinate the interaction of all departments, and will be aimed at achieving the strategic goals will be most effective in the current economic situation in Ukraine.

Quality management involves identifying future product defects at all stages and the stages of its life cycle. The earlier due to defects, the easier they will be eliminated, the cheaper is the process of elimination. Improvement Program, if it is designed correctly, most would lower production costs than to increase them.

When developing the model to perform basic work:

1. Delimitation process. This should identify internal and external suppliers and customers of the process. External suppliers serving process planning department, which on the basis of market research formulates the problem to develop a new product or upgrading what is already available. Consumer advocates implementation process jam products. In addition, at each stage, identify the supplier and the consumer.

2. Modeling process. First it creates a model «as is», in such that reflects the current process. With the help of this model is checked as follows:

- Each stage ends with a transformation of material flow or development documents;

- Both material and information flows (document) must be unidirectional, ie there should be no return to the previous stages.

Creation of «to be», which will take into account all the peculiarities of the functioning of the enterprise and will be used to improve the quality assurance process

Develop model will:

- Reduce the number of rejections;

- Prevent the occurrence of claims and consumer complaints;

- Restructure management;

- To increase the role of senior management in ensuring sales;

- Involve staff responsible for product quality, etc.

KEY WORDS: process, quality, modeling, food products

AUTOMATION OF QUASI ARBITRARY QUERIES OF USER TO THE THEMATIC DATABASE

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From the perspective of the user data-processing system, which is the basis of decision support in enterprise management of the food industry, a direct information source used for the analysis is the database "showcase" level ("Case" DataBase). [1] Depending on the complexity of making a query to the CDB by the user, there are various types of queries - "push" (PS), "parametric" (PMC), "arbitrary" (AR). Works [1,2] substantiate the practical utility and offer technology of request called "quasi arbitrary" requests (QAR), they are placed like an intermediate position between PMC and the AR in terms of functionality (the different ways of the required data sets) on the one hand, and on-line access to the data from the other one. The QAR technology allows formulating and implementing on-line-requests in terms that are familiar to the user without specifically trained staff.

In order to evaluate the performance of QAR, based on the GOMS methodology [3] a comparative analysis of the labour input for creating custom queries which are arranged using the development system that implements this technology, was carried out. Under "labour input" we mean the time spent by the user for the on-line-activities associated with the formation of a request to the CDB and preparation to formulate a request. The requests of varying degrees of complexity, made for a specific CDB were considered. Categories of queries (PAC) were determined according to the numbers of frames selected (virtual tables) F, and attributes A, and parameters P ranging from PAC-1 (F = 1, A = 2, P = 1) to the PAC-5 (F = 5, A = 10, P = 5). AR evaluation of the implementation of labor input was performed from "below", i.e. "office" time consuming was not considered. The estimated values of labour input interface resulted in : for PS - 2.7, for PMC - 7.1-23.1, for the QAR - 13.8-49.8, for AR - 790-2600. As a result, given the functionality of specific requests reviewed, the QAR use significantly reduces the aggregate time for the formation of multitude of potential requests under acceptable increase in on-line QAR labour input.

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KEY WORDS: user interface, database query

INVESTIGATION OF FIRE-EXPLOSION PRODUCTION PROCESSES OF ALCOHOL WITH MECHANOTRONIC MANAGEMENT IN DISTILLATION COLUMN SUBSYSTEM BASED ON PNEUMOELECTRICITY

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The aim of the study is to determine the feasibility of using mechatronic elements in order to improve rectification process, improve mass transfer between the liquid and vapor, increase the efficiency of plates by means of fluid retention control. This allows to achieve phase equilibrium.

The university staff has developed the design of the main column for ethanol fraction distillation. It operates in a cyclic mode of fluid motion in column plates with a continuous supply of the heating steam and by using hydrosorption which was introduced into production. During the process of mass transfer and fluid vapor, distillation of the main fraction is divided into two products: concentrate of the main fraction, in which impurity alcohol is moving and water-alcohol mixture without volatile impurities, which is sent to the wastewater column. The inclusion of columns into rectification process increases the selection of the main fraction of the condenser purification column to 8.10%. It allows to "unload" purification column by turning the supply of alcohol-chase capacitor from wastewater column separator of carbon dioxide and ethanol inclusive purification with additional column, get a "clean" evaporate and pure rectified ethyl alcohol [1].

Fire explosion pneumatic devices play an important role in the mechanization of production. Recently, they are effectively used to solve automation tasks. To control the process of rectification mass transfer devices are additionally equipped by pneumatic machine managed by going through valve, which provides possibility to save time and space. Each column has two pneumatic cylinders. The last are tied with moving rods, which are fixed in such a way that some of them are on odd plates and others on even. Pneumatic machines lead traction in movement up or down in the set time intervals.

Conclusions. The results of exploratory studies have proved the feasibility of introducing mechatronic elements with discrete pneumatics in order to improve processes of rectification by improving technology of by-products and intermediates distillation. It happens in cycles using controlled delay and overflow of fluid by a given algorithm, and providing fire unexplosive process of rectified alcohol.

KEY WORDS: mechatronic elements, rectification process, column

DEVELOPMENT AND RESEARCH OF THE LEVEL CONTROL AUTOMATIC SYSTEM FOR THE NORMALIZATION OF CREAM IN CONTAINERS USING ULTRASONIC TRANSDUCERS ON SPATIAL BEATING

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The subject of research is the development of ultrasonic transducers on spatial beats and creation of automatic system of normalization of cream in a container on its base. Production and storage of normalized cream should be provided with acceptable error not exceeding $\pm 0,06\%$. To normalize the cream in the container, their fat content may be ensured by a highly accurate level gauge. This paper presents the results of development of ultrasonic method on spatial beats. The method is based on the use of two standing waves in the space measurement of phenomena superposition. When implementing the method, the level controlled substance surface is voiced simultaneously in a continuous mode with two close in frequency F_1 and F_2 ultrasonic vibrations. These fluctuations form a spatial beating between the substance surface and area of "radiation - acceptance" of ultrasonic transducers block. The initial distance H_{BHX} between the latter is defined by the formula:

$$H_{VUH} = \frac{L}{m}, \quad (1)$$

where $L = \frac{2\pi}{|K_1 - K_2|}$ the length of the period of spatial beats; K_1, K_2 - wave number; $m \leq \frac{L}{H_0}$ - a integer positive number that multiple of quantity H_{VUH} ; $H_0 = \frac{D_B + 2(D_{II} + \delta)}{4tg\alpha}$ - the minimum possible distance

between the tested surface and the plane of "radiation - acceptance"; D_B, D_{II} - diameters of the radiating and the receiving transducers; δ - the distance of acoustic decoupling between the latter. At a distance slightly greater than H_{VUH} , that is to the side $H = \frac{L}{(m-1)}$, the frequency of the output signal

receiver corresponds only to one value F_1 or F_2 and not varies in the range

$$\frac{L}{m} < H < \frac{L}{(m-1)} \quad (2)$$

At a distance, slightly less to the side $H = \frac{L}{(m+1)}$ when the frequency of signal receiver corresponds to the frequency F_2 or F_1 within the range

$$\frac{L}{(m+1)} < H < \frac{L}{m} \quad (3)$$

With the change of distance H_{VUH} , by moving the ultrasonic transducers block the distance value H_{VUH} again is updated, that is the distance H_{VUH} is maintained unchanged.

KEY WORDS: spatial beats, ultrasonic transducers

DEVELOPMENT OF PROGRAMMER FOR TIME PROGRAMS WITH NONLINEAR STATIONS

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Sterilization is a process of thermal processing of products, packaged and sealed in airtight containers at a temperature above 100 ° C, resulting in inactivation of enzymes and destruction of microorganisms.

Programmer is a device that provides a transition from the initial state variable x_0 at t_0 in the final state

x_x at t_x .

The simplest form of the systems of the programmatic control (SPC) is simple system. Programming device, in turn, can consist of blocks of task of the program on areas and logical device which provides a transition from one area to other.

If the system of the programmatic control is thumbs-under in relation to the basic regulative size of x then such system has considerably less exactness as compared to reserved, at first, recreates the program of change of $y(\tau)$, but not $x(\tau)$, and secondly, does not compensate influence of of the perturbation on the output size.

During realization of the simpler systems of the programmatic control with the help of typical laws of control the choice of the last will determined the type of the program. For the programs which consist of linear areas, it is possible to apply simple SPC with PI -regulator. With nonlinear lanocs such system must at least have the astatism of the second order. At difficulties, arising up during realization indicated systems with the help of typical laws of control, it is possible to use combined systems of the programmatic adjusting with additional connection on the set action.

KEY WORDS: Programmer, time programs with nonlinear stations, regulator, SAR

DEVELOPMENT AND STUDY OF AUTOMATIC CONTROL SYSTEMS DOSING SUGAR WITH USING MAGNETOELASTIC TRANSDUCERS

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In the dosing system of bulk materials on conveyor scales or conveyors performed differential methods of measurement. The essence of the method is that on the measuring tool is enters and measured only the difference between the measured mass and mass that reproduced measure. The method used in such cases because the measured mass X can be given by:

$$X = X_0 \pm \Delta X$$

where X_0 - value that is nominal of the measured mass, ΔX - possible deviation of the measured masses from of the value that is nominal, and usually is within 10% of X_0 , as well as simply and accurately implemented subtraction measured mass X and the value that is nominal X_0 .

Subtraction performed on the levers, what is on scales platform, and the value of X_0 is given appropriate weights. As the primary measuring transducer in the device used magnetoelastic converters for which uses effect change magnetic resistance ferromagnetic centers under the influence of the measured weight. The principle activity of magnetoelastic transducers based on the change in magnetic permeability m of ferromagnetic bodies, depending on the stress mechanical, what is caused by exposure on ferromagnetic body mechanical forces P .

In general magnetoelastic converters effect has

nonlinear nature, dependent from value of the tension applied field H . However, selecting appropriate modes can be obtained linear plots: $m = f(s)$ or $m = f(R)$. Simultaneous changes in magnetic permeability and changes linear dimensions of cores, which is caused by mechanical stress can be used to measure pressure, efforts, moments deformation. The relative sensitivity of magnetoelastic materials can be characterized coefficient tensosensitivity.

$$K_T = \frac{\frac{\Delta\mu}{\mu}}{\frac{\Delta l}{l}} = \frac{\varepsilon_\mu}{\varepsilon_l}$$

After analysis principle work of magnetoelastic sensors can distinguish their main advantages - simple design, low cost, ability to measure big effort.

KEY WORDS: Magnetoelastic transducer, measured mass

DEVELOPMENT OF CASCADE-AUTONOMOUS SYSTEM OF AUTOMATIC CONTROL

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Automation has always been one of the main components of the acceleration of scientific and technological progress in agricultural complex. The intensive use of microprocessors, personal computers and computer networks allows to introduce computer technology in automation and create computer-integrated control systems, which is the main focus of automation at the present stage.

There are four classes of cascade systems: the cascade-bound (CCSAC), cascade-autonomous (CASAC), cascade-unbound (CUSAC) and cascade-differential (CDSAC). Their common feature is the presence of two circuits of regulation, which are placed one in another: the internal and external. In the first three cascading of system is realized by means of two regulators: main RM and auxiliary RA. The difference between them is in use of the output RM: in CCSAC it changes the task of RA, in CUSAC acts directly on the object, in CASAC it is two-channelled and one channel through compensator modifies task of RA, and another channel acts directly on the object. In CASAC and CUSAC have a defect, which is associated with response to external perturbations not only external, but also internal circuit is eliminated. At the same time, only CCSAC and CASAC let us implement a system with a single RM and several RA, that stabilize modes of machines that work simultaneously.

The drawbacks of CASAC are the complexity of their calculation and adjustment, the high costs of creating an CASAC with lots of cross-channels, if we have n cross-channels we need $n(n-1)$ compensators.

This paper focuses on the study of the most common cascade-autonomous systems.

The aim of the study is to know if such a system will provide quality and ease of control process, process stability, centralized management of the entire branch using one point of control.

KEY WORDS: : Automation, cascade systems, process control, process stability

MANAGEMENT OF THE UNLOADING MILK LINE IN THE CONDITIONS OF PACKAGING WITH THE VARIABLE NUMBER OF PACKING MACHINES

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In this paper we consider possible approaches to solve two interrelated tasks: providing the necessary costs of whole milk product unloading line and stabilization of its temperature. Functional diagram of the proposed control subsystem unloading line has a look like in Figure 1.

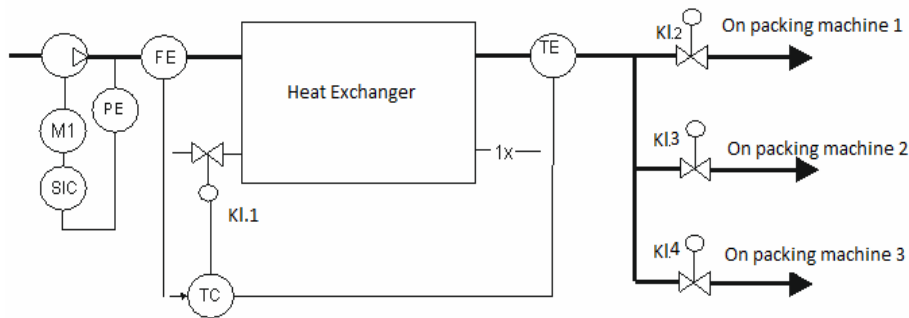


Fig. 1 Functional diagram of the control subsystem unloading line.

Control object can be introduced with such elements (Fig. 1): a pipeline with the unloading motor M1 pump on it; plate heat exchanger for cooling the product; valves on the outlet pipe (kl.2-kl.4) driven by consumers (Packaging machines). Pipeline from one side connected to the finished product tank, and on the other - with packing machines through kl.2-kl.4. So the expenditure of product in the pipeline is determined by the parameters of the pipeline, the height of the liquid column in the tank, the type of product, the number of revolutions and the pump parameters, and also by valves state (kl.2-kl.4). Valves are guided by local Packaging machines management systems for filling dosing tanks. Depending on the type and productivity, Packaging machines, valves can operate at different intervals.

Stabilizing the temperature at the outlet of heat exchanger is usually made if there is deviation of the controlled value. For smaller inertia circuit we can use cascade control where slave controller provides fast system response to changing cooling water in the exiting of heat exchanger, and the leader - the temperature stabilization of the product. This structure can not provide the necessary quality control at constant changing of product costs. Therefore it is proposed to use combined regulator with compensation fixed perturbation - the cost of the product. At this step several variants of this circuit (TC): cascade control (temperature stabilization – costs correlation), the regulator of the compensator, an adaptive tracking controller.

KEY WORDS: *Office of line packaging milk*

SUBSYSTEM OF TECHNOLOGICAL MONITORING FOR MANAGEMENT DIFFUSIVE DIVISION

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Technological complexes of food productions, including diffusive division of a refinery are the difficult objects of management. That is why, for increasing efficiency of management system by difficult technological complexes of food production it is necessary to conduct the operative analysis of information that is obtained in the process of management system functioning. Such functions are given to the subsystem of the technological monitoring, which conducts operation processing of entrance and initial information, carries out forecast of the development of management object.

Efficiency of management by difficult technological complexes can considerably be increased due to the technological monitoring. Application of the technological monitoring gives new possibilities for management quality due to the continuous "supervision" of the most substantial properties in reality and on the basis of acceptance of flexible strategy of management decisions.

Monitoring includes such basic activities :

1. Observing the factors which influence technological process.
2. Assessment of the actual technological process.
3. Forecast of the technological process state and assessment of this state.

The aim of work is to increase efficiency of saccharine production creating CAS system of the technological monitoring of diffusive division.

The task of analysis in the subsystem of the technological monitoring within the framework of a master's degree research envisages classification of situations. For this purpose we suggest to use the Kohonen's maps.

As a teaching set we take rows of variables of diffusion process. On the basis of these data we study a model that shows intercommunication of technological parameters of diffusion processes and their influence on technological process.

Application of Kohonen's maps gives an opportunity of operation classification of situations and formation of situational and significant zones in scenario management of diffusive division.

KEY WORDS: Technological monitoring, diffusive division, continuous supervision, the Kohonen's maps

USING PREDICTIVE SEARCH FOR THE OPTIMAL VALUES IN PROCESS CONTROL FOOD

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The purpose of this work is to find the optimal values of key parameters of brewery brewhouse, namely temperature of mash vats and brewing unit; residence time in mash vats, filtration apparatus, and brewing unit.

To solve the problems of finding the optimal values are used algorithms based on gradient and sorting methods. These optimization algorithms are also used when required processing large amount of data with minimal time to compute.

You can not always use traditional methods to find optimal values. Therefore, combining sorting and gradient methods, we can get the solution, the accuracy of which will increase with the increase of calculation time. Simple genetic algorithm randomly generates an initial population structures. Work genetic algorithm represents an iterative process that continues until you execute a given number of generations, or any other criterion of stopping. Choosing an appropriate time calculation, we get one of the best decisions that you can get in this time.

The feasibility of using genetic algorithms in finding the optimal values of the variables confirmed the speed of work and the fact that they simulate the natural evolution in the space of parameters that are optimized.

KEY WORDS: optimal values, genetic algorithm, optimization algorithms

**MECHATRONIC SYSTEM CONTROL OF CAVITATION MILK PRODUCTION WITH USING
ULTRASONIC HOMOGENIZER**

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The production automation is one of the main components of the acceleration of scientific and technological progress of food industry. An important stage in the development of dairy products is a mechanical effect on the starting materials that is of homogenization. It does not only prevent fat settling, but also helps to ensure a high-quality dairy products with improved consistence and flavor.

Milk homogenization is usually carried out in a valve and rotary homogenizer, devices for ultrasonic and electrohydraulic homogenization, hydrodynamic ultrasonic devices, etc. Traditional methods of homogenization lead to the destruction of fat globules and modifying their structure, reducing the stability of proteins and casein content in plasma. In the 1960s another type of homogenizer was offered, based on the principle - ultrasonic vibrations.

Ultrasonic homogenization is based on cavitation and it's very effective for breaking soft and hard particles. The sound waves expand through liquids that are processed by ultrasound to cause the cycle of alternately high and low pressure cycle. Tiny vacuum bubbles are forming during the period of low pressure. When the bubbles reach a certain size, bubbles are rapidly destroyed under the high pressure. During internal explosion a very high pressure and high speed liquid jet is locally created.

The ultrasonic homogenization usage has the following distinctive features:

- design can be very simple and reliable, (without moving parts and high pressure) necessary vibrations generated by piezo elements;
- frequency effect on the flow is so strong and frequent so that the fat globules are smashed to the value of 1,05-1,64 micrometer;

Conclusion. The introduction of the ultrasound technology provides the following benefits:

- 1) sterilization of milk is observed as a significant positive effect after ultrasonic processing of milk;
- 2) breaking of milk fat globules to smaller sizes increases the nutritional value of milk;
- 3) manufactured milk by homogenizer after defrosting fully retains its nutrients and flavor.

KEY WORDS: Homogenization, Cavitation, milk, ultrasonic, homogenizer

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| Poster Presentations |
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| Section NATURAL BIOACTIVE COMPOUNDS, FUNCTIONAL AND TRADITIONAL FOOD PRODUCTS |
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| PHENOLIC PROFILE OF WILD FRUITS OF <i>ROSA CANINA</i> SL. FROM NORTHEAST PORTUGAL |
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Plant polyphenols are a wide group of secondary metabolites and are a common component of our diet. Flavonoids represent the most common and widely distributed group of plant phenolics, and can be further broken into classes including flavones, flavonols, flavanones, flavanols, anthocyanins and isoflavonoids. Different classes of bioactive constituents are present in *Rosa canina*, including phenolic compounds. *Rosa canina* fruits can be eaten raw as snacks and possess prophylactic and therapeutic activities against a wide range of ailments, including the inflammatory disorders arthritis, rheumatism, gout, colds and gastrointestinal disorders, which might be related with their phenolic composition. This study aimed to characterize the phenolic compounds present in the above mentioned wild fruits. The analysis of phenolic compounds was carried out by reversed-phase HPLC-DAD and the major phenolic compounds were identified by ESI-MS, in order to establish the specific phenolic profile. *Rosa canina* presented different classes of flavonoids. Flavones, flavonols and dihydroflavonols represented 5.50 mg/100 g dry weight, among which taxifolin, a dihydroflavonol, was prominent (1.18 mg/100 g). Flavan-3-ols (i.e., catechins and proanthocyanidins) were other relevant flavonoids found. (+)-Catechin was the most abundant flavan-3-ol found in the fruits (3.59 mg/100 g), whereas cyanidin 3-O-glucoside was the only anthocyanin detected (0.68 µg/100 g). The studied fruits may have great potential for food industries as a source of colors and flavors, as well as bioactive molecules such as phenolic compounds for dietary supplements or functional foods.

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| KEY WORDS: <i>Rosa canina</i> , Flavonols; Flavan-3-ols; Anthocyanins; HPLC-DAD-ESI/MS. |
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A COMPARATIVE STUDY OF CHEMICAL COMPOSITION OF MORCHELLA ESCULENTA (L.) PERS. FROM PORTUGAL AND SERBIA SANDRINA

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Mushrooms contain a huge diversity of biomolecules with bioactive properties that should be explored. *Morchella esculenta* (L.) Pers. (morel) is one of the most highly prized edible mushrooms in the world.

In the present work a comparative study on the chemical composition (nutritional value, primary and secondary metabolites) of the two samples from two countries, Portugal (SP) and Serbia (SS), was performed. Carbohydrates were the most abundant macronutrients, followed by proteins and ash. Fat contents were low and similar in both samples. The energetic contribution of SS was slightly higher due to the higher contribution of carbohydrates. Regarding the sugars, mannitol and trehalose were found in both samples, but fructose was only found in SP. Polyunsaturated fatty acids predominated over monounsaturated and saturated fatty acids. Linoleic, oleic and palmitic acids were abundant in both samples, but only SS gave considerable amounts of α -linolenic acid. Concerning the tocopherols, the α -, γ - and δ -tocopherols were also quantified in both samples; γ - and δ -tocopherols were observed in higher levels in SS. Oxalic and fumaric acids were in both samples; malic acid was found in SP, while quinic and citric acids were observed in SS. Finally, protocatechuic and *p*-hydroxybenzoic acids were found in both samples, but *p*-coumaric acid was quantified in SP. As far as we know, this is the first study reporting the chemical composition of morel samples from Portugal and Serbia.

Acknowledgments

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KEY WORDS: *Morchella esculenta*; nutrients; chemical composition.

OBTAINING HYDROPHOBINS FROM SUBMERGED CULTURES OF THE FUNGUS

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Fungi are promising objects of biotechnology. Not long ago special proteins were found in mushrooms, which were later called hydrophobins. Hydrophobins are low molecular proteins (7-9 kDa), which have surface-active properties. They are able to self-assemble into amphipathic membranes at hydrophilic/hydrophobic interfaces. Also they can change the properties of the hydrophobic and hydrophilic surfaces and significantly reduce the surface tension of water. These unique properties open up broad prospects for application of hydrophobins. Such hydrophobin emulsions in their taste and consistency can resemble food fat. Combined with the ability of hydrophobins to stabilize the foam it makes promising their use in the food industry. Also the area of possible application of hydrophobins is tissue engineering, pharmaceuticals, etc.

As an object of research, we chose the filamentous fungus *Trichoderma sp.* The method of submerge cultivation was used to grow fungus. Fungal culture was grown for 3 days on glucose-peptone medium. After that the culture liquid was subjected to successive freeze-thaw for destruction of the cell wall of the fungus and increase the yield of hydrophobin into the culture medium. Culture liquid was foamed with aerator, then the resulting foam was dissolved in 70% ethanol. Undissolved substances and particles of biomass were separated by centrifugation at 6000 r / min. After that, ethanol was evaporated from solution on a rotary evaporator and the remaining aqueous solution was freeze-dried.

The protein concentration in the obtained extracts was determined using the method of Lowry. The presence of hydrophobins in the obtained extracts HPLC method was used.

Foam-stabilizing activity of obtained extracts was tested. For comparison we selected sodium caseinate - one of the most popular at present food foam stabilizers. 0.1% solution of the extract and 0.5% solution of sodium caseinate were prepared. In both solutions 0.5% xanthan was added as a thickener. The two solutions were foamed with aerator and then the volume of foam was measured every week for 2 month. The use of our extracts yielded resistant foam, and the loss of foam in the air phase for 9 weeks was not more than 45%. In the sample, stabilized with sodium caseinate, a week later there was complete loss of air phase and the deposition of foam.

KEY WORDS: Green tea, polyphenols, theanine

THE USE OF FLAX SEEDS IN HEALTHY PRODUCTS TECHNOLOGIES

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The use of biologically valuable plant materials is one of the ways of increasing the bakery products nutritional value. A rich source of biologically active substances are flax seeds. Their medicinal properties have been known for centuries and are recognized as official medicine. Flax seeds are characterized by the presence of functional food substances, such as proteins with a complete amino acid composition, essential fatty acid with predominant linolenic (ω -3) acids, dietary fiber. Currently, flax seeds are mainly used as raw material to produce linseed oil. At the same time, the number and quality of flax seeds proteins shows their promising use as a protein source to increase the biological value of bakery and confectionery products.

However, the protein products of flax seed in Ukraine are not produced. It was found that 100 grams of flax seeds provide more than 20% of daily energy needs of people, almost 30% of protein needs, more than 50% - needs in fats, phosphorus. The magnesium content of 100 g of flax seeds completely the daily requirement of this element.

By successive protein extraction from flax seeds it was found that predominant proteins are albumins which are extracted by water. Their content was 43.6% of the total protein content. Salt-soluble fraction (globulins) was 21.4%, alkali-soluble (glutelins) - 13.7%.

Flax seeds can be used as whole, as well as to receive flour and protein products - components to develop food products with a guaranteed content of functional ingredients such as proteins, essential ω -3 and ω -6 fatty acids.

KEY WORDS: flax seeds, healthy products, functional ingredient.

BIOORGANIC COMPLEX DERIVED FROM JERUSALEM ARTICHOKE PUREE

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The topinambur, also called artichoke, can be used as a promising raw material for the production of various dietary foods. The topinambur tubers are used as a source of biologically active substances.

The aim of our study was to develop a method for the topinambur puree to conserve natural resources and biological activity of its unique chemical composition, receiving dietary product of radioprotection and immunomodulating action. It used as the additive in the manufacture of different food products in order to give them the nutritional properties. Puree is homogenized pulp from topinambur tubers. Technology of producing does not change the chemical composition of raw materials. 100 g puree contains 8 g of inulin, 4 g dietary fiber, 1 - 1.2 g pectin, various macro-and micronutrients, vitamins.

Puree of topinambur is unique because of its hydrocarbon complex, which consists mainly of various degrees of polymerization of fructans - from inulin to fructose. Inulin has a positive effect on the metabolism while in the human body.

Inulin fiber exhibits antioxidant effect. Inulin (prebiotic fiber) has beneficial impact on the body. The fiber of inulin influence on the immune system, especially in the lymphoid tissue of gastrointestinal tract.

Puree of topinambur contains a lot of protein (3.2% of dry matter). It also contains 16 aminoacids (8 of them are indispensable.) Puree of topinambur has balanced of micro-and macro elemental composition. Puree of topinambur contains K, Ca, Mo, Zn, Si, Fe. Topinambur does not contain selenium, but it promotes the absorption of selenium from food (Selenium - one of the 19 vitally necessary elements for humans).

Puree contains many vitamins, especially C and B vitamins. Topinambur contains organic polyhydroxy acids, which we used for the hydrolysis of topinambur pulp after acidification in electro-dializatore assembled of cation and anion exchange membranes. Organic acids and vitamin C act as antioxidants.

KEY WORDS: topinambur, inuline, puree, bioorganic complex, biological activity.

OBTAINING FRUCTOSE – OLIGOSACCHARIDE MIXTURES BY APPLYING ELECTRIC PULSE TECHNOLOGIES

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The products of inulin hydrolysis, when heated with mineral acid have a low degree of polymerization. The product of dehydration, decomposition and subsequent condensation of fructose which are formed by secondary processes colored substances.

The use of electro-hydraulics for the inulin hydrolysis provides to neutral reaction and the absence of impurities of other chemical agents, and the purity of produced fructose-oligosaccharide mixture in comparison with the traditional methods of hydrolysis. Obtained mixture of fructose with an increased relative abundance of easily digestible inulooligosaharids can be used for the production of diet food. Through electro hydraulic effect and other physical effects that occur when a high-voltage discharge in a suspension, the mechanical rupture of inulin molecules in places glycoside bonds between structural units of fructose with the subsequent addition of water molecules. The effect of hydrolysis is achieved in a neutral environment, without adding any chemicals and is not accompanied by the formation of colored by-products. In this case, some of the molecules of inulin becomes final product of complete hydrolysis – fructose.

Electro-hydraulics hydrolysis is performed as follows: inulin diluted in water at room temperature until the solids content in a solution or suspension of 2 to 30%. In the preparation of a suspension of its mixed well. Powder for suspension pre-soaked in water for 72 hours for the swelling grain polysaccharide, which further contributed for very samples of hydrolysis. Prepared solution or suspension is subjected to electro-processing at a voltage 35 - 40 kV using a 5 to 75 high-voltage pulsed discharges. After processing, the solution was ready for immediate further use.

KEY WORDS: inuline, electro-hydraulic hydrolysis, fructose, oligosaccharides.

ENRICHMENT OF MEAT PRODUCTS BY IODINE THROUGH THE USE OF SEAWEED

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Iodine deficiency disorders - is one of the most common somatic diseases of humanity on the Earth. Radiation contamination of area leads to food contamination by isotopes of iodine, cesium, strontium and leads to the development and increasing the number of thyroid diseases, cardiovascular and hormonal systems, cancer and other diseases. Therefore an important role plays functional health food. Providing the population with valuable products has become an important economic, social and political factor in the modern world. The most effective and expedient way to solve this problem – is the development of different types of specialized foods that are fortified with extra vitamins, macro and trace elements to a level that corresponds to the physiological needs of a man. As a natural source of iodine and its organic compounds were selected seaweed fucus, Cystosira Black and kelp. The presence of iodine in seaweed and selenium in organic form, and the relationship between them ensures the normal function of the thyroid gland and the optimal development of its most important hormones thyroxine and triiodothyronine, which regulate the action of all organs and body systems.

On the basis of the above mentioned there were developed meat products including burgers, meatballs, rissoles, dumplings, sausages for grilling, which had various heat treatment in order to study the iodine and selenium in finished products and their receipt to the body when consumed products.

Based on selected groups of meat products, they had different heat treatment in order to bring to completion: frying, steaming, cooking, stewing and roasting on the grill. Determination of iodine was performed by stripping voltammeters, selenium by fluorometry method. It was studied the part of iodine, selenium in sausages for grilling and other trace elements in meat raw materials and ready-to-eat foods. By studied was found that iodine loss during heat treatment of sausages - roasted on the grill is 15,0 – 20,5%, significantly lower than rissoles braised in sauce, fried cutlets or cooked meatballs, ravioli. There are not so different losses when cooking burgers by steam method – 13,5 – 21,8%. It was found that the smallest loss of selenium is 7,3 – 8,3% when frying sausages on the grill compared to heat treatment - stewing, frying, boiling and steaming related products.

KEY WORDS: semi sausages for grilling, seaweed, trace elements, heat treatment.

USE OF EXTRUDATE GRAIN CROPS TO ENRICH TRADITIONAL FOOD ENVIRONMENTS

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The main directions of improving the range and technology of confectionery are: rational use of environmentally friendly materials, combining different natural and new advanced raw materials, production of confectionery products with low sugar content and low calorie rate, high in dietary fiber etc.

Extruded flour is characterized by a high content of water-soluble substances (58.5%), most of whom are dextrans. Among the proteins predominate low fraction (4.1%). Textured rye flour is considered to be appropriate for confectionary dough semis production. Using of confectionary textures rye flour allows to increase content of dietary fiber in products, macro- and micronutrients, to improve digestion of starch and proteins by the human body.

Patisserie pastry with physico-chemical point of view is a complex system, which consists of proteins, carbohydrates, fats, acids, in which these substances are in different states: in the form of limited swelling of colloids, suspensions and solutions.

The objective is to analyze the existing range of domestic cereals production, diversification of food with improved nutritional and biological value based on flour composition (wheat flour and extruded rye).

The effect of textured flour in gluten content in flour composition and found that the most suitable for the production of butter cookies are examples of mass fraction texturate within 5-13%, whereas in the technology used with weak gluten flour (the number of which is within 27 - 38%).

Samples of massive particles textured rye flour to 20% are used to determine the wettability of cookies. It was found that increasing the mass fraction of textured rye flour, reduces the wettability of cookies. ISO standard provides the wettability for sugar cookies no less than 150%.

The influence of the mass fraction of textured rye flour to dry dough and cookies. These changes occur within the normative values: for the dough - 15.0 ... 17.5; cookie - 3.0 ... 8.5%, an increase of mass fraction textured rye largely affects the moisture of dough and finished product.

It was found that for the obtaining of high quality products is feasible and appropriate the using of the composition of wheat flour and extruded rye when physical, chemical and organoleptic characteristics meet the requirements of technical standards.

KEY WORDS: Assortment, textured flour dough, butter biscuits, texturate

PERSPECTIVES OF PRODUCTS CREATION WITH ADAPTATION EFFECT FOR SPORTSMEN

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The image of any country depends to some extent on the results in the world sport competitions. This demands from a sportsman constant training which is characterized by high physical and competitive loading. It may create constant psychological and emotional tension that causes stress in the organism of the sportsman. To increase adaptation abilities of the organism of athletes one should introduce to their diet adaptation genes which make much bigger resistance of the organism to the action of stress factors of the environment. *Rhodiola rosea*, *Aralia Manchu*, *Eleutherococcus*, aspen bark extract, flax oil, extracts from unossified antlers, deer antlers and rhino horns, extracts from snails, pollen, bee glue, bee royal jelly, etc., belong to the most wide-spread adaptation genes.

Most adaption genes are produced in the form of medications. Taking into consideration the above mentioned information, the creation of foods with adaptation effect for sportsmen is becoming perspective. Functional products which contain adaptation genes are being produced abroad; for example, in the Baltic countries pollen is added to cookies, waffles and candies, in Poland chewing gums are produced from bee royal jelly, pollen, bee glue and herbs extracts. But in Ukraine the market of such products is empty. We have developed the jelly product which is enriched with phitoextracts and succinic acid that have adaptation properties. The developed product has high biological value and pleasant organoleptic characteristics. The usage of 100 gr of the product provides the daily need of the sportsman's organism in succinic acid by 50%.

KEY WORDS: adaptation effect, sportsmen, phitoextracts, succinic acid

REMOVAL OF PHOSPHOLIPIDS FROM VEGETABLE OILS USING OF ALUMINUM OXIDE NANOPARTICLES

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Vegetable oil phospholipids have a high biological value. However, it is practically impossible to ensure their high content in oils, as the presence of phospholipids reduces output neutral oils during alkali refining and leads to the formation of sediments during its transportation and storage. To remove phospholipids from vegetable oils their processing with water or aqueous solutions of acids is using. Parameters of hydration of phospholipids depend on such factors as the composition of vegetable oils in general, fractional composition of phospholipids, their mass fraction in oil.

In this work we investigated and assessed the possibility of using nanoparticles of aluminum oxide as adsorbent for the removal of phospholipids from vegetable oil. As the research object unrefined soybean oil of domestic production was used. Oil processing was performed at 60 ° C for 30 minutes. Mass fraction of nanoparticles in oil was 1%, 2%, 5%. Phospholipid precipitates were separated by settling during 2 hours. Under similar conditions removal of phospholipids by water hydration was performed. Residual phosphorus content was measured in the treated oils.

Mineralization of oil samples with magnesia was carried out to determine phosphorus content. The ashes, containing magnesium phosphate was dissolved in nitric acid and reaction of heteropolycomplex of phosphate with molybdate and vanadate formation was carried out. Using of this reaction provides the most accurate determination. Absorbance of obtained yellow solution was measured at photometer at 400 nm. Phosphorus content was determined using graduated plot.

According to our data, the use of oil processing by nanoparticles of Al₂O₃ obtained by thermohydrolysis leads to complete removal of phospholipids for all investigated concentrations of adsorbent. Using of water processing under similar conditions removed from 67% to 84% phospholipids from oil.

KEY WORDS: Vegetable oil phospholipids, nanoparticles, adsorbent

THE EFFECT OF GLYCINE ON THE GROWTH OF THE MICROALGAE SPIRULINA PLATENSIS

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The usage of different organic sources of carbon and nitrogen leads to the change of microalgae's metabolic processes. It leads to the biochemical composition of microalgae and intensity of their growth changes by turn.

The blue-green microalgae *Spirulina platensis* (further "spirulina") stands out of all the microalgae. Spirulina has definite advantages in comparison with other microalgae. That is why it is considered to be the most promising biotechnological object of research. Taking into account that spirulina is able to use some exogenous organic matters under certain conditions we made a research about the effect of glycine as an organic source of nitrogen and carbon on the growth of spirulina.

According to the results of our research we determined that bringing glycine in a culture medium leads to the intensification of spirulina's growth and accumulation of its biomass.

It was proved that the different concentration of glycine exogenously brought in has a different influence on the growth of spirulina. Concentration of glycine depends on the phase of spirulina's growth and density of culture glycine is brought in.

During our research it was proved that the most production capacity of spirulina (up to 2,1 g of dry matter/l) can be achieved by bringing glycine in the culture medium at the concentration of 100-150 mg/l on the phase of growth slowdown (with the density of culture approximately 1,0 g of dry matter/l). In that case productive capacity of culture increases on average up to 50% comparing to the productive capacity of cultivation without glycine.

It is proved that glycine provides the fragmentation of microalgae's trichomes. The intensity of the fragmentation in this case depends on the concentration of the brought in glycine and on the phase of culture's growth it is brought in.

It is registered that the later phase of spirulina's growth glycine is brought in, the more concentration of glycine is needed to get the most productive capacity of culture. Moreover high concentration of glycine brought in on the early phases of spirulina's growth leads to decrease of the production capacity of microalgae.

Fragmentation of the trichomes leads to the intensification of reproduction process of spirulina and as a result to the increasing of its production capacity due to increasing number of trichomes with the small quantity of cells which grow fast. Bringing of glycine in gives the possibility to increase the rate of spirulina's growth and to receive high density of culture even when the biomass of spirulina stops increasing.

KEY WORDS: Spirulina platensis, glycine, accumulation of biomass, fragmentation trichomes

INVESTIGATION OF SEPARATION METHOD FOR AROMATIC SUBSTANCES OUT OF ESSENTIAL OILS

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Aroma of food products is created by aromatic substances that are naturally present in the raw material or formed during the technological process. Flavourings which are either isolated aromatic substances or their mixtures are used to impart smell to food.

Separation of natural aromatic substances in pure (isolated) form from natural sources that would be equivalent in their quality and value to artificial analogues, but not associated with a potential risk to consumers' health, is very perspective in the development of flavouring technologies.

The aim of the research was to develop a rational method of separation of natural aromatic substances out of dill and caraway essential oils and to investigate their organoleptic and physicochemical characteristics. The rational separation of aromatic substances in pure form has required the sequential combination of three stages: vacuum rectification, preparative isolation and chromatographic control of purity of derived aromatic substances. Essential oils have been separated into the clean-cut fractions by vacuum rectification on the [packed column](#). About 30...90 % of the target aromatic substances have been accumulated in in the clean-cut fractions by the experimental selection of such modes as cube temperature, residual pressure, and reflux ratio. Because of irrelevance of vacuum rectification, preparative chromatographic separation has been used to separate the pure aromatic substances out of fractions. This process has been carried out by applying the packed column with the gradient of dispersion of solid support and concentration of stationary PEG-6000 phase along the length of the column. These solutions have allowed increasing the column efficiency to 590 theoretical plates. Aromatic substances have been separated with their purity up to 95 ... 98%. Each stage of essential oil separation has been accompanied with chromatographic studies of composition of fractions and aromatic substances on the analytical column with the stationary dinonylphthalate phase.

The organoleptic and physicochemical properties of obtained aromatic substances have been investigated: solubility and stability in alcohol (96.3% vol.), [aqueous-alcoholic](#) solution with strength of 40% vol., water, [kefir](#) with a 3.2% fat content, and refined sunflower oil.

KEY WORDS: Aromatic components, essential oil, preparative separation, flavouring

ON NONLINEAR MATHEMATICAL MODELS IN TECHNOLOGICAL PROCESSES

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To create a common methodology for optimizing the technological processes of sugar production, the creation of methods for thermal analysis of mixtures in the production of food products with different chemical composition, and the products heat treatment process, a need arise to create and solve mathematical models of these processes. The simplest and at the same time, the least precise formulation of laws leads naturally to linear problems of mathematical physics. Unfortunately, most research in food sciences are based on these problems. It is caused on the one hand with low success mathematicians in solving nonlinear differential equations, and on the other with insufficient mathematical background of researchers in food sciences. But the description of the processes in terms of linear equations is unsatisfactory because the corresponding mathematical model does not reflect more accurate nonlinear effects that the process possesses. A classic example here is the soliton equations describing the nonlinear effect of phase shift of the interacting soliton solutions. Thus, the next more precise step of approximation of the real process corresponds to a nonlinear mathematical model, for the study of which, unlike in the case of linear models, only rather limited set of mathematical techniques is available to the researchers. Moreover, in the study of differential equations with arbitrary functions, there is no general method for their exact integration. This situation changes significantly if the nonlinear differential equation corresponding to a certain model has a nontrivial symmetry properties. In this case, powerful methods of group theory and Lie groups can be used in the study and construction of solutions of the corresponding equations. The subject of our research was the nonlinear reaction-diffusion equation $u_t - u_{xx} = f(u)$, where $u = u(t, x)$, $f(u)$ is some fixed function of the dependent variable. We introduce a special substitution for reduction and efficient search of exact solutions of this equation with a cubic polynomial and exponential nonlinearity. In the case where $f(0) = f(1) = 0$ we obtained essentially new partial solutions of soliton type, and therefore have good prospects for various applications. We established that for the nonlinear reaction-diffusion equation with an arbitrary number of independent variables, there are the operators of conditional symmetry, and these operators are found in an explicit form. Using the Jacobi elliptic functions, we constructed infinite series of exact solutions, which can be applied to mathematical models of technological processes.

KEY WORDS: non-linear models, soliton equations, partial solutions, exact solutions.

EFFICIENCY OF FOOD FORTIFICATION PRODUCTS WITH ZINC REQUIRED TO CONTROL ZINC DEFICIENCY DISORDERS

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Zinc is widely used in human body enzyme synthesis with regard to small size of its ion and ability to readily bind to ligands. The main functions of this microelement are: growth, immunity, tissue repair, vitamin A metabolism, protection against oxidative damage, neuropsychological functions, sexual maturation, apoptosis, cellular signaling, zinc is necessary for DNA and proteins synthesis and many others functions in the whole body level. The biological functions of zinc can be classified into three main categories: catalytic, structural, and regulatory. Zinc metalloenzymes are found in six enzyme classes: oxidoreductases, transferases, hydrolases, lyases, isomerases and ligases. The ability of this microelement to stabilize the membranes and its antioxidant activity play a significant role in injuries prevention induced by free radical activity in inflammatory processes.

Zinc deficiency disorders are widespread in several developing countries. Zinc deficiency disorders occur in some regions of Ukraine. It was found that children aged from 6 to 12, who live in four subregions of Chernigiv region are suffering from zinc deficiency due to decline in adequacy of zinc intakes. Several strategies apart from the use of pharmacological supplements and food fortification have been suggested for the improvement of dietary zinc status in the developing country settings. The recommended zinc daily intake within the range 5-15 mg and it depends on the human age and gender.

We have been investigated the effect of milk and dairy products consumption fortified with zinc-containing complexes (alginates, sulfates and picolines) on the improvement of dietary zinc status. The approaches of milk products fortification with zinc have been developed. It was found that the novel dairy foods can effectively restore zinc level on humans suffering from deficiency of this microelement.

KEY WORDS: zinc deficiency, pubescence, metabolic disorders, antioxidant activity, food fortification

IMPROVING OF OAT MALT TECHNOLOGY

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Promising direction in the development of health food from germinated cereals is highly efficient selection of new varieties of oats, which are characterized by high yields and processing. Solving this problem is relevant, because it allows to obtain new kinds of competitive products with high nutritional value.

It is known that refined grain oats have dietary properties, because of their valuable chemical composition. The optimal ratio of carbohydrates, proteins, amino acids, fats, minerals and vitamins makes grain oats valuable raw material for various food products, including those with health properties.

Sensory, physiological, physical, chemical and biochemical indices of different varieties of oats and their changes during malting were investigated. It was found that bare-grained oats, compared with filmy oats, have significant advantages.

For the malting process an experimental malting setting was designed and constructed which can be used for germination of different cereals.

It was also found that during malting of bare-grained oat content of biologically active substances increases significantly. Thus the content of fats and proteins decreases. Optimal technological parameters of bare-grained oats malting are as follows: temperature with a gradual increase from 14 to 17 °C, humidity 41...42 %, duration 4...4,5 days.

Technological instruction "Production of malt of bare-grained variety of oat" TI 0207092010:38105 developed on the basis of the results and also tested under production conditions of PE "Neretin I.M.

Under production conditions several parties of oat malt were produced from bare-grained oats.

From the resulting malt in SPC "Ukrpektyn" a batch of polymalt extract "Polisol" was prepared. Using malt of bare-grained oats instead of malt of filmy oats increases the output of finished product by 10%.

KEY WORDS: oats, filmy, bare-grained, malt, malting, extract, biologically active substances.

THE RESEARCH OF THE USING STEVIA EXTRACT FOR PRODUCTION OF ICE CREAM OF HEALTHY ORIENTATION

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Traditional recipes of dairy desserts, ice cream in particular, include sugar in large quantities and therefore the range of consumers of these products is somewhat limited. Partial or complete replacement of sugar by natural sweeteners, stevia extract in particular, will provide the product with functional properties.

The condensed aqueous extract of stevia is an extremely technological component because it is thermally stable and persistent in acidic environment. That is why the enrichment of dairy desserts with it does not require significant technological changes and adjustments of processes of traditional product production.

Owing to great sweetness of stevia extract in comparison with sucrose (1:35), applying this component of recipe occurs in much smaller quantities than with using sugar. The final product has the same degree of sweetness as the one with sugar.

DFPH method, which is based on the neutralization of free radicals, namely α , α -diphenyl- β -picryl hidrazyl, has determined the antioxidant properties of condensed aqueous stevia extract. It has been found that the sample neutralizes a free radical DFPH for 66.6%.

With the help of the method of Folin - Denis, which is based on determining the total content of phenols, the number of phenolic compounds, which are powerful antioxidants, has been found out in stevia extract. Their contents are 17.01 mg/100 g.

An optimal amount of applying the condensed aqueous stevia extract for getting the best organoleptic and physico-chemical characteristics of ice cream has been found.

The recipe of ice cream of wellness orientation has been worked out and the contents of the main components have been scientifically substantiated. The energy and biological value of the finished product has been detected.

It has been found that with the use of the partial replacement of sugar by stevia extract the quality of finished product remains within normal limits.

Dairy desserts made with use stevia extract as a sweetener will expand the range of dietary milk-based products. Due to the slight contents of sugar or to the complete replacement of it by stevia extract, this product will be acceptable for people with diabetes, as well as for those who suffer from other diseases, when sugar consumption is prohibited.

KEY WORDS: extract of stevia, health feed, ice-cream, antioxidant properties.

INNOVATION INGREDIENTS IN DAIRY PRODUCTION

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The food of modern society is characterized by the lack of valuable food substances, foremost macro – and nutrients and by the surplus consumption of other nutrients.

For the population of Ukraine there is the so-called "hidden hunger" because of a deficiency in the food ration of vitamins. The lack of vitamins is observed at 90% of the population. The unbalanced food of our population is aggravated by unfavourable ecological situation and social tension. The insufficient consumption of microelements and bioactive components cause unfavourable influence on the health of workable population.

The aim of the work is to search and analyse the innovative ingredients that are presently used by the developers and producers of foodstuffs of the enhanceable food value, including the functional and enriched dairies.

While choosing the ingredient, included in recipes of the functional enriched foodstuffs, in particular milk ones, was there were taken into account the scientific criteria of the choice of enriching additions which are elaborated by home and foreign scientists.

Foremost it is necessary to enrich by vitamins and mineral substances foodstuffs of mass consumption, which are accessible for all groups of population and used regularly and everywhere in everyday nutrition. Among them we can distinguish dairy products: dairy drinks, soul-milk foods, curd foods, foods of milk processing, ice-cream, and other foods, containing milk.

An innovative dairy product is got with enhanceable maintenance of vitamins of group B1, B2, B6, B12, PP, that can be recommended to the different groups of the population. The estimation of the product's quality, and also the determination of the structural and mechanical descriptions are conducted.

The obtaining of new types of the foodstuffs enriched by biologically valuable components will allow to extend the ration of the population. The researches showed not only the economic viability of enriching the dairy products by such additives but also the high efficiency and safety of their use in nutrition.

It is shown that the enriching of milk by vitamins does not influence the cultures of microorganisms that are used for the preparation of the product. The containing vitamins also do not influence the taste, smell, consistency and color of the sour-milk product.

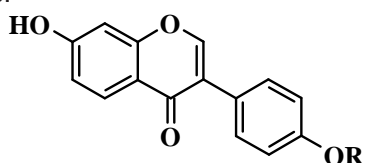
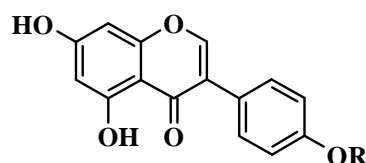
KEY WORDS: functional ingredient, milk, enriching

SYNTHESIS OF ISOFLAVONE PHYTOESTROGENS

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Some naturally occurring compounds presented in plants have been found to possess estrogenic properties, these chemicals have been termed 'phytoestrogens'. Phytoestrogens possess estrogenic properties due to their structural similarities to the hormone estradiol. These plant chemicals may have estrogenic or estrogen-blocking effects. The majority of phytoestrogens belong to a isoflavonoids. The most known isoflavones with estrogenic activity are daidzein (**1a**), formononetin (**1b**), genistein (**1c**), biochanin A (**1d**), etc.

**1a** R = H; **1b** R = Me**1c** R = H; **1d** R = Me

The comparative studies between Asian and Western populations showed that hormone depended disorders and diseases are a lot less common in Asia. This is explained by the Asian soya-based diet, which contains high levels of phytoestrogens. Today, soy extracts are commercialized for the prevention of female menopausal troubles. From this point of view, phytoestrogens are important compounds for using in medicine and food supplement preparation. Isoflavone content in the plants are low level, and isolation and purification of these compounds are consuming. Therefore chemical synthesis is an actual task.

We synthesized formononetin, daidzein, and cladrin by two methods. Starting materials for the constructing the chromones were 2,4-dihydroxydeoxybenzoines. These compounds were synthesized by Hoesch condensation of resorcinol with substituted arylacetonitriles in boron trifluoride etherate medium. 2-Unsubstituted isoflavones were synthesized by Vilsmeier formylation of 2-hydroxydeoxybenzoin with POCl₃ in presence boron trifluoride etherate and subsequent cyclization. Total yield of these isoflavones were 60 – 65 %. By "one pot procedure" these isoflavones were synthesized by Fridel-Crafts acylation of resorcinol with arylacetic acids in boron trifluoride etherate with subsequent chromone ring-closure formilation without isolation of 2,4-dihydroxydeoxybenzoines. In these cases total yield of desired phytoestrogens were lower. However, using of more accessible and cheaper chemicals, simple procedure, and short time reaction can become preferable for manufacturing for these compounds.

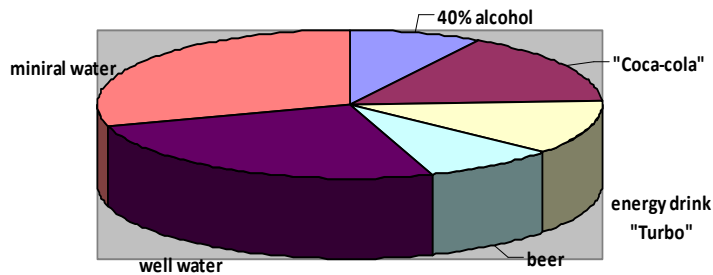
KEY WORDS: phytoestrogen, isoflavone, synthesis, daidzein, formononetin

HEALTH OF YOUNG GENERATION – THE BASIS OF STATE STRENGTH

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The aim of this work was to study the influence of alcoholic and soft drinks on the body of a young man by the examples of these substances enzymatic swelling, germination of crops. The experimental data are given in the form of caryopsides lifetime chart after their processing by consequent drinks.



The analysis of the results shows that germinate treated with 40% solution of ethyl alcohol, stop growing immediately after processing and on 20-day all the plants wither, processed coca-cola, inhibits growth on the 10th day after processing and at the 37th Day 2/3 plants wither and processed energy drinks on day 5 after treatment stimulate growth, the 20-day shoots appear irregular shape, withered on the 28th day 90% of young plants die due to plasmolysis of cells biochemical and disrupting the metabolism. Seedlings treated beer activate growth after treatment, but after 3-5 days - plant growth slowed, there are modified plants, changing the direction of growth of stem and root plasmolysis occurs in cells. On the 10th day after processing 50% of the plant dies, the other not grow, modify its shape, the root system appeared dead cells that are filled with water. On the 20th day all the plants wither. Standard sample processed by well water stops their growth on the 60th day. Plants of standard sample level, with the right fibrous root system, dark green turhornymy cells treated with mineral water were the most resistant and hardy. Their symptoms fits in the standard sample rates, the growth of these plants ceased on 70th day. The greatest degree of swelling of wheat was observed in mineral water, less in «Coca-cola», even smaller energy drinks «Turbo» and beer and a 40% solution of ethanol. Thus, beverages containing alcohol, damaging germ seed endosperm cells are not filled with water and there is almost no enzymatic reaction. It can be confirmed that regular consumption of alcoholic and soft drinks harmfully effect the biochemical processes in the body of young people.

KEY WORDS: alcoholic, soft drinks, swelling, germination, crops

NEW RICH BRINES TO SHRED INTEMS

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When made-making foods manufacturer has to solve two different problems: while some manufacturers direct their actions to ensure consistently high product quality, the others pay attention to the, therefore the development of stabilizing systems that would be able to cope with the objectives is relevant.

The analysis of the information available in the literature, the Internet and previous own studies enabled us to formulate the first, and then scientifically substantiate the hypothesis opportunities to target and control the main functional and technological parameters of the initial raw meat (pH VZZ, universality, plasticity, stress cutting and others.) multi-component brine to remove restrictions on the use of certain groups of raw materials (PSE and DFD) and thawed raw materials after long-term storage, which has properties different from the traditional, ones to expand the range, output and ultimately stabilize the product quality.

For finished products of consistent quality, we have developed special stabilizing system for adjustment of quality indicators meat. The composition includes a mixture of compounds developed phosphates (E450, E 451), hydrocolloids and proteins of animal origin from connective tissue protein and plasma of animals (Vepro 75 PSC, ScanGel C 95).

Each of the selected ingredients has directed action as the properties of the other components, and the physico-chemical, structural, mechanical and microstructural characteristics of the original raw meat and ready-shred products.

Using the developed compounds within the brines of different levels extrusion can get cooked smoked ham products, including sliced, high-quality, attractive presentation and consistency, regardless of feedstock. Due to the additional specific actions connective tissue proteins and blood proteins. These stabilizing systems are able to optimize the quality of the final product, including the terms of the physiology of nutrition, providing improved organoleptic and functional properties. Animal proteins that are used, have a neutral taste, and unlike plant proteins contribute to the formation of gelatinous structure that makes the product more durable and dry and provide the finished product a natural meat flavor. In the process of boiling compounds dissolve at temperatures from +50 to +72 ° C, depending on the product, as a result of subsequent cooling (from +40 to +50 ° C) freeze and turn into a dense structure that retains the shape of the product during slicing. Weight loss during while cooking or smoking are minimized.

KEY WORDS: phosphates, hydrocolloids, proteins

RHIZOPUS SP. 2000 FM IS THE ACTIVE FUNGI EXOLIPASE PRODUCER

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Selection of the fungi cultures creation and modification to use them as the sources of the ferments with the new properties is one of the most significant biotechnology direction. The object of the research was the thermotolerant fungus *Rhizopus* sp. 2000 FM. The cultivation was performed on the nutritive substrate during 72 hours at the 39-40 °C. For *Rhizopus* sp. 2000 FM cultivation the nutritive substrates with Chapek ambient were used with the addition of different carbon sources in various concentrations. The influence of the carbon nutrition components on lipolytic activity (LA) and fungus *Rhizopus* sp. 2000 FM growth was studied experimentally through the change of carbon sources in equivalent relation. The following plants oils were used as the carbon sources: sunflower, olive, lemon, castor, raps, walnut, maize; carbohydrates (glucose, arabinose, maltose, xylose, sucrose, lactose, starch); polyatomic alcohols (inositol, sorbitol, douleitol) and surfaco-active compound.

The experimental results support the fact that the sunflower oil is the effective inductor of exolipase biosynthesis. Maximal activity was shown for the substrate with addition of the 1% sunflower oil. Further increase of this oil caused the decrease of the fermentative activity. Thus, one could consider the sunflower oil to be not only the inductor but also the repressed of the lipase biosynthesis. Significant quantity of the sunflower oil also stimulates the growth of the micromycete *Rhizopus* sp. 2000 FM. The data on the growth rate and LA of the fungus strain *Rhizopus* sp. 2000 FM on the carbon sources, along with the detection of other components of the medium, is believed to support the optimization the content of the nutritive medium for the cultivation of the new active exolipase product—fungus *Rhizopus* sp. 2000 FM.

KEY WORDS: fungus, *Rhizopus* sp. 2000 FM, lipolytic activity, sunflower oil, lipas

GENOTOXICITY OF PHYTOPATHOGENIC *PSEUDOMONAS SYRINGAE* PV. *ATROFACIENS*

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The stability of chromosome structures is necessary for the normal growth and development of living beings. During the life a plant coexists with many types of microorganisms which influence the plant biochemical processes. Such interactions can affect the stability of plant genetic information, but this problem has not been studied enough.

The purpose of work was to investigate how phytopathogenic bacteria influence on the frequency of chromosomal aberration in plant cells. The sprouts of *Allium cepa* was used as a test-object.

The effects of the endotoxin and cultural liquid of *Pseudomonas syringae* pv. *atrofaciens* strains 9400 were studied. Bacteria were grown on potato broth under 28 °C at aeration during 24 hour. The cell free cultural liquid was obtained by centrifugation of the potato broth after bacteria growth. The cells of microorganisms were destroyed by ultrasound. The preparations of endotoxin was obtained by extraction with 0,85 % solution of sodium chloride.

It was shown that in *A. cepa*-test the preparations of endotoxin of *P. syringae* pv. *atrofaciens* strains 9400 induce the destruction of chromosomes. Cultural liquid of *P. syringae* pv. *atrofaciens* 9400 possess no effect on the frequency of chromosomal aberration.

Thus, the plant chromosome apparatus can be affected by phytopathogenic microorganisms.

KEY WORDS: chromosomal aberration, plant, phytopathogenic bacteria

LACTIC ACID BACTERIA AND THEIR ROLE IN THE PRODUCTION OF FERMENTED FRUIT

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During enzymatic processing of raw materials, microbiological processes are the result of natural microflora life, although it is more advanced to use special cultures of lactic acid bacteria. There is a large variety of microorganisms on the surface of raw material, so we can observe various processes during its processing, they are lactic, alcoholic, acetic, butyric, formic fermentation and also molding. For obtaining a quality product with aimed taste characteristics, lactic fermentation, which is started with bacteria of Lactobacillaceae family, is mandatory. Therefore, it is important to search for perspective strains of lactobacilli, which would provide typical fermented fruit flavor and taste.

Analysis of domestic pickled and dried fruit microflora showed that it is represented by lactic acid bacteria of genera *Lactobacillus*, *Leuconostoc*, *Pediococcus* and species of *Streptococcus thermophilus*. The majority consists of lactobacilli with homo- and hetero-fermenting lactic fermentation types. Lactic acid and CO₂, formed by them, act as a natural conserving agent, and preserve the form of fermented fruits. Along with the major metabolites, these microorganisms are able to synthesize different taste and aromatic compounds: aldehydes, ketones, non-volatile and volatile carboxylic acids, alcohols and others. Dominance of these lactic acid bacteria in microbial cenosis is the result strong adaptation to raw material and their ability to synthesize antibiotic substances. It is found out that the genus *Pediococcus* produce bacteriocins.

So, to obtain quality fermented fruits and berries, it is necessary to add pure cultures of lactic acid bacteria starter at the beginning of fermentation. Biochemical potential of these microorganisms is extremely broad and can provide customized features of separate fermented product, its dietary and functional properties.

KEY WORDS: Lactic acid bacteria, fermented fruits, lactate

THE INFLUENCE OF PH AND TEMPERATURE ON ACTIVITY OF *ASPERGILLUS* SP. 262 ENDOGLUCANASE

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The hydrolytic enzymes, particularly cellulases, attract attention of researchers owing to their technological importance and economic advantage. Among the factors influencing individual properties of cellulases complexes, it should be noted pH and a temperature optimum of action, that is their stability in specific conditions of application.

The research objective was a definition of influence of temperature and pH on activity and stability of endoglucanase by a thermotolerant strain of *Aspergillus* sp. 262. The studied strain was selected in Physiology and Systematization of Micromycetes Department of Danilo Zabolotny Institute of Microbiology and Virology by National Academy of Sciences of Ukraine.

Endoglucanases activity determined by decrease in viscosity 0,3% of Na-KMCs solution by means of Ostvald's viscometer (diameter of a capillary of 0,99 mm).

Optimum temperature conditions of endoglucanases activity determined by an incubation within 30, 60, 90, 120, 150 and 180 min. in the range of temperatures of 40-90 °C with an interval 10 °C and the subsequent determination of activity in standard conditions. Definition of a pH-profile of activity of enzyme carried out, measuring activity in similar temporary intervals in the range of pH values from 4 to 8.

The results of researches showed that endoglucanase of *Aspergillus* sp. 262 is stable in the range pH 4,0-7,0, since pH 8,0 there is its gradual inactivation.

During studying of dependence of endoglucanases activity from temperature it was shown that activity of enzyme gradually, with increase in temperature, increases to the maximum value at a temperature of 70 °C and only then begins decreasing of its activity.

The high thermostability of endoglucanase *Aspergillus* sp. 262, as well as the considerable range of optimum values pH testify to possibility of a broad application of studied enzyme in a forage production.

KEY WORDS: production, endoglucanase, *Aspergillus* sp.

FRIED SUNFLOWER OIL AS A SUBSTRATE FOR PRODUCTION OF MICROBIAL EXOPOLYSACCHARIDE ETHAPOLAN

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Ethapolan is a complex of microbial exopolysaccharides (EPS) synthesized by *Acinetobacter* sp. IMV B-7005. The use of sunflower oil as the exogenous precursor for EPS synthesis during the cultivation of IMV B-7005 stain in the medium containing the mixture of C₂ – C₆ substrates caused the changes of the rheological properties of ethapolan solution, as well as the increase of the biomass and EPS concentrations. Thus, the aim of this work was to investigate the possibility to intensify the ethapolan synthesis during cultivation of *Acinetobacter* sp. IMV B-7005 on fried sunflower oil.

The cultivation of *Acinetobacter* sp. IMV B-7005 was carried out in the medium with fried sunflower oil (1 %, v/v) as a source of carbon and energy.

To prepare inoculum, *Acinetobacter* sp. IMV B-7005 was cultivated in the medium containing glucose (0.5 %, w/v), sunflower oil (0.5 %, w/v) and fumarate (0.5 %, w/v). Bacterial cells from the exponential growth phase were used as an inoculum.

Glucose and fumarate (0.05 and 0.1 %, w/v) as the precursors for the biosynthesis were added to the medium at the beginning of the cultivation, in the exponential and stationary growth phase.

Independently of concentration and time of precursors addition to the medium with fried sunflower oil and nature of carbon source used for inoculum preparation, the increase in 2 – 6 times of the ethapolan concentration was observed, comparing to the cultivation of the IMV B-7005 stain in the medium without precursors. However, the use of 0.05 % of fumarate as a precursor for the biosynthesis and inoculum, grown on fried sunflower oil, was the most effective. Under such conditions the ethapolan concentration increased in 6 times.

The results can be used to develop the new technology of microbial polysaccharide ethapolan biosynthesis with addition of waste oil as an exogenous precursor.

KEY WORDS: exopolysaccharide, ethapolan, exogenous precursor, intensification

ETHAPOLAN: A NEW MICROBIAL POLYSACCHARIDE OF MULTIFUNCTIONAL ASSIGNMENT

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Although the number of exopolysaccharide-producing microorganisms runs into the hundreds, only a small number of microbial exopolysaccharides (EPS) are produced on a commercial scale. In order to be competitive new products should possess novel or improved properties in comparison to those already presented on the market.

Ethapolan – an exocellular microbial polysaccharide produced by a non-pathogenic producer has unique physico-chemical properties, which are determined by the presence of hydrophobic acyl residues in macromolecules. The composition of the exopolysaccharide can be varied widely through the control of its biosynthesis. This provides a basis for various technological applications of the polysaccharide.

Ethapolan has several considerable advantages compared to one of the best EPS available, xanthan. Amongst which are the following: ethapolan is being obtained by using of unfood substrate (ethanol), the duration of process for ethapolan synthesis is 3-4-fold less than that of xanthan, the ethapolan producer is characterized by high stability, yield of ethapolan from substrate is higher (60-85% against 40-70% for xanthan), the ethapolan solutions have higher viscosity values and possess emulsifying ability, ethapolan is resistant to heating and at low pH values.

Ethapolan presumably can be utilized by the various branches of food industry as a functional additive. The possibility of its use in baking have been shown. Ethapolan interacts with both the main groups of dough components – gluten proteins and starch polysaccharides. Complexation activity of ethapolan can cause the reduction in the intensity of amylolysis and gas formation and the inhibition of the starch retrogradation during the storage of finished products. Addition of ethapolan results in the improvement of structural-mechanical characteristics of crumb and its hinders their deterioration during storage. The technological efficiency of ethapolan use in baking is higher, than that of other microbial EPS studied – xanthan and polymyxan.

KEY WORDS: microbial exopolysaccharides, viscosity, emulsifying ability, functional additive

OPTIMIZATION OF FRUCTANS EXTRACTION FROM IN VITRO CHICORY “HAIRY” ROOTS

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Genetic transformation of plants is stressful factor and can cause a number of changes in biochemical processes in transgenic plants. Increased synthesis and accumulation of reserve compounds, including fructans of different degrees of polymerization (with low molecular weight - LMF, and with high molecular weight - HMF) is one of these changes. Fructans are biologically active compounds which are used in medicine and food industry. Transgenic roots, as well as natural plant material may be the source of LMF and HMF. Biotechnological techniques can increase the content of these compounds. Therefore, the development of effective methods of fructans extraction and fractionation, determination of their content in *in vitro* “hairy” roots, is the actual direction of scientific research. In our experiments we investigated the dependence of fructans extraction efficiency on time, steeping temperature and time of high temperature extraction.

Dried and powdered chicory *Cichorium intybus* L. cv Pala rossa “hairy” roots obtained by *Agrobacterium rhizogenes*-mediated transformation with pCB161 vector were used for research. There were used low- and high-temperature extractions: 1) fructan extraction without heating at +22°C during 0.5, 1 and 24 hours, 2) extraction with heating at +70°C, +80°C and +90°C during 10, 20 and 30 minutes. Fructan fractionation was conducted by two ways: 1) HMF separation by crystallization at +4°C, 2) NMF separation by extraction with 95% ethanol. To determine fructans concentration in the extracts McRary and Slattery method was used.

Based on the experimental data, a mathematical model of fructans extraction process was created. Its adequacy was tested with the Fisher criterion and coefficient of determination. There were optimal parameters of the extraction process chosen using the methods of linear programming. Extraction for 30 minutes at 90°C without steeping is identified as the most technological. It allowed to extract fructans general amount from transgenic roots (146 ± 8,77 mg/g of root dry weight). Fractioning by refrigeration at +4°C allowed separating the HMF fraction at the amount of 3% of the total fructans, refrigeration using activated carbon to increase the number of crystallization centres allowed to increase the yield of the HMF up to 14% of the total fructans. 18% of the total fructans HMF fraction was isolated as result of fructans two-stage extraction from “hairy” roots (the first stage - extraction by 95% ethanol to separate the LMF, the second stage - the extraction by hot water to separate the HMF).

Optimal mode of fructans obtaining from chicory “hairy” roots is extraction at +90°C for 30 min. Steeping time does not affect any effectiveness for such extraction. The most effective mode of NMF and HMF obtaining from transgenic chicory roots is two-stage extraction with 95% ethanol at +80°C and water at +90°C for the duration of each stage of 30 minutes.

KEY WORDS: fructans, extraction, chicory “hairy” roots

A NOVEL APPROACH TO THE PRODUCTION OF PECTIC-OLIGOSACCHARIDES

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Pectin has been utilized for his functionality in foods for many years. It is considered soluble dietary fibers which exerts physiological effects on the gastrointestinal tract. The inherent properties of pectin have not been fully explored and can show some novel and timely applicabilities. Today pectin is therefore beginning to gain interest as prebiotic.

It is known most of prebiotics are oligosaccharides - the relatively short chain carbohydrates. Due, however, to current enzymatic manufacturing technology of pectic-oligosaccharides should be used high purity pectin, as a substrate. This technology is expensive and can't be applied to the industrial production of pectic-oligosaccharides. A novel approach to the production of pectic-oligosaccharides is the using of abundant and inexpensive biological raw material.

Problems related on the rational use of raw materials are topical nowadays. Every year more than 500 tons of apples are utilized for juices and beverages in Ukraine, which also formed about 150 tons of pectin containing pomace. The present work is to determine the optimum conditions for the controlled hydrolysis of pectic-oligosaccharides using apple pomace as a substrate. In this field we dealt with the main different factors that affect the oligosaccharides productions, such as: temperature, pH, aeration, stirring, enzyme concentration. The objectives of the present work were also to isolate and characterize pectic-oligosaccharides.

The composition of the pectic-oligosaccharides isn't homogenous. In addition, it consists of oligosaccharides ranging from di-saccharides to octa-saccharides. The total amount of oligosaccharide product depends on the enzyme source, hydrolysis conditions and can vary from 10 to 70 % of the total sugar present. Highest yields are achieved with combined controlled hydrolysis with endo-pectolytic and lyase enzymes. It was investigated pectic-oligosaccharides are good fermented Bifidobacterium and Lactobacterium with the formation of short-chain fatty acids, acetate, propionate and butyrate, as well as hydrogen and carbon dioxide. So there is clear evidence that pectic-oligosaccharides are a better prebiotic candidate than the pectin, although their bifidogenic effect is low compared to oligofructose.

KEY WORDS: Pectin, pectic-oligosaccharides, prebiotic, hydrolysis

DEVELOPMENT OF THE COMPOSITIONAL MIXTURES FOR PRODUCING INSTANT PORRIDGES

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It is common knowledge, that porridges play an important role in healthy nutrition. These meals are easy to digest and substantial at the same time. In recent years, epidemiological studies have increasingly demonstrated that intake of cereal products is protective against cancer, cardiovascular diseases, diabetes and obesity.

Despite the health benefit of porridges, nutrient composition of these meals is not balanced. Porridges prepared from one cereal crop partially satisfy requirement of essential amino acids, because most of them are not biological full-value. Furthermore, long-term cooking of porridges significantly reduces the range of consumers.

The goal of the research was to develop the technology of dry compositional mixtures for producing instant porridges with balanced protein-carbohydrate composition. The primary tasks of the research work were rationale for choosing raw materials for dry mixtures, computer-assisted design of compositional mixtures with prescribed properties and choosing of processing treatment.

Considering polycomponent recipe composition, to produce products with recommended composition and ratio of the essential nutrients the selection of components was made using mathematical modeling. Cereal and leguminous crops were used for computer-assisted design of dry grain mixtures. Such kinds of raw materials as oil seeds, nuts and spices were used as additional components. High nutritional value and capability of mixing components were the major criterions for choosing raw materials to produce meals with high biological value and palatability. Extrusion technology of the raw materials with further grinding and sieving was used for producing grain mixtures. It was found, that extrusion of grains caused partial denaturation of proteins and starch dextrinization.

In summary, development of the recipes and technology of compositional mixtures for producing instant porridges is based on the conception of the balanced nutrition and provides the necessary part of essential nutrients when consuming recommended portion sizes of the developed products.

KEY WORDS: instant porridges, compositional mixtures, mathematical modeling, extrusion.

FUNCTIONAL FOOD INGREDIENTS ON THE BASIS OF POLYSACCHARIDES

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Polysaccharides are very important for the forming of food systems. They are structure- and texture-forming agents. Non-starch polysaccharides (food fibers) are widely used in the production of functional foodstuffs and dietary supplements.

This work was devoted to obtaining supplements with the multifunctional action based on polysaccharides of different origin - yeast, mushroom and wood that have positive physiological effects on a human body.

One of these polysaccharides is the β -glucan from the yeast cell wall. It shows immunomodulating and antitumor activities. The technology of obtaining the water-insoluble β -glucan from bakery yeast *Saccharomyces cerevisiae* was developed. For rising the physiological activity it was transformed into a water-soluble form by the tested enzymatic hydrolysis of this polysaccharide. That made possible to obtain the partially disrupted soluble β -glucan with the activated functional properties.

Biopolymer complexes were isolated from substandard raw materials that were accumulated during growing and processing mushrooms (*Agaricus bisporus*). The polysaccharides - β -glucan and chitin were their main components. They were the effective sorbents of xenobiotics and antioxidants. They efficiently bound cholic acids. That made possible to forecast the reduction of cholesterol level in the physiological fluids while oral preparation intake. In addition to sorption capacity, the biopolymer complexes showed a full range of properties that glucan has.

Due to its membrane permeation properties arabinogalactan is a prospective agent that deliveries of biologically active compounds to the target organ. Arabinogalactan was extracted from pine waste products. The complexes containing this polysaccharide and proteolytic enzymes of animal and plant origin were obtained. The immobilization of enzymes in the carbohydrate matrix did not reduce their activity. They had a greater resistance to the conditions of a human gastrointestinal tract than the intact enzyme.

Thus, a number of new functional food ingredients with a wide range of activities was obtained on the basis of polysaccharides.

KEY WORDS: Polysaccharide, β -glucan, chitin, arabinogalactan.

APPLICATIONS OF ENZYMES IN CEREAL RAW MATERIALS PROCESSING

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Cereals have been part of the human diet for many hundreds of years. Whole grains are rich sources of fibers, vitamins, minerals and phytochemicals. Important phytochemicals are bioactive compounds that may provide desirable health benefits to reduce the risk of the chronic diseases such as cardiovascular disease, type 2 diabetes and some cancers.

In Odessa National Academy of Food Technologies more than 10 years researchers have been applied enzymes for increasing nutrition value of foods obtained by grain processing. As a result, new technologies have been developed for reprocessing of cereal raw materials and by-products into food and biologically active supplements, as well as enriching agents and functional products.

The exploited technologies are based on activation of cereals' endogenous enzyme systems by supplementing exogenous enzymes to grain raw materials and by-products, as well as the enzymes modification of grain's cell wall structure.

The technologies of enzyme modification of starch raw materials have been work out for obtaining the wide range of important food substances and biologically active additives.

Degradation of cell wall polymers promotes for release of phytochemicals with high antioxidant activity, which are linked through ester and ether bridges to polysaccharides and lignin. Ferulic acid is predominantly phenolic compound in grain which high scavenging properties associated by presence of the CH=CHCOOH group.

That's why the technology of getting antioxidants from cereals is based on combined treatment of materials by cellulase, hemicellulase, pectinase, xylanase, and feruloyl esterase with followed drying and ethanol extraction. Residuary hydrolyzed polysaccharides are food for human's intestinal microflora. They are washing with followed drying and it uses for prebiotic producing.

In conclusion, it was able to get new bioactive supplements by application of the exploited technologies, as well as developed non-waste processing of cereal raw materials and by-products.

KEY WORDS: Cereals, enzymes modification, additives, ferulic acid

MAIN ASPECTS OF USAGE OF PLANT RAW MATERIALS WITH DIFFERENT FUNCTIONAL AND TECHNOLOGICAL PROPERTIES IN FARINACEOUS PRODUCTS TECHNOLOGY

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The analysis of chemical structure, the study of physiological and technological qualities of medicinal and aromatic plants, testify their application perceptiveness in bread-baking industry.

The correct choice of plants, their efficient compounding, preparation for production operations allows to ensure the necessary physiological and functional technological properties creation, thus solving relevant problems of the sector towards following directions:

- diversification of bakery products with improved physiological properties, of specific and functional orientation;

- improvement of intensified and traditional technologies, providing colloidal, biochemical, microbiological processes intensification. These raw materials content of scarce for flour intermediate products micro- and macroelements, some vitamins, organic acids allows to consider them as enzymatic activity regulators, efficient enricher for yeast and lactic acid bacteria activation (Humulus, Rosa canina, Berberis, Aronia, Craetegus);

- prevention of bakery products spoilage due to compounds with antibiotic properties content during highly microbiologically contaminated flour processing, at the time of fortified products, whole-grain bread, containing more contaminated with microorganisms ingredients, production (Humulus, Hypericum, Anethum graveolens seeds);

- development and introduction of technologies for national bakery products and products without yeast. Potentially detrimental microflora suppressing compounds availability and fermentative microorganisms resistance to them allows to develop measures of specific bread-baking intermediate products composition control, yeast and lactic acid bacteria development during sourdough propagation regulation in dilution cycle, their technological stabilization in production cycle, obtain end products with significant consumer-relevant properties, pronounced flavor, high assimilability (Humulus, Pimpinella anisum, Illicium);

- raw materials antioxidant properties make it possible to use them as substances alternative to food additives for preventing long-term products oxidative spoilage.

Thus medicinal and aromatic raw materials usage in farinaceous products technology including bread-baking enables solve in complex the branch problems, ensures the obtainment of products with high consumer-relevant properties, physiological value, microbiological attributes and safety during the changing of production conditions.

KEY WORDS: medicinal, aromatic raw materials, quality

THE PRIORITIES OF THE SCIENTIFIC RESEARCH OF THE KHARKIV STATE UNIVERSITY OF FOOD TECHNOLOGY AND TRADE

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At the University scientific schools were formed and they actively function devoting their attention to creation:

foodstuffs with application of untraditional raw material, in particular, bakery foods with incorporation of wild growing plant stuff, products of seaweed processing, germ polysaccharides, jelly products with application of natural colorants and flavorings;

natural fruit and vegetable products used as stuffing and thickening agents in different branches of food industry, in particular, fruit and vegetable pastes, powders, sauces, candied peel, quick-frozen fruit and vegetables of prolonged storage;

products of fast preparation of high biological value with application of colorants and flavorings of natural origin such as kissel concentrates, pasta of fast preparation, dried vegetables and fruit, excelling by complete maintainability, preserve maximum vitamin composition, taste, color and aroma, according to their quality they can be alternative to sublimated products;

products received due to power- and resources- saving technologies (there were developed production technologies of meat products on the basis of rigid parts of a carcass based fermentation by proteolytic preparation; a group of tomato sauces received on the basis of nonwaste technology of tomato processing; a group of fried culinary products on the basis of meat, vegetables etc., processed in different technological environments providing intensification of heat processing);

food biologically active additives which are sources of biologically active substances and are used as additional component in children's, medical and preventive nutrition as well as for immunoprophylaxis of population (BAA from ambrosia, carrot, pumpkin, horseradish, sweet pepper, blood of cattle, calcium containing additives on the basis of food bone etc.);

safe immune-response modulating agent with application of biologically active additives (phytosyrups and phytoconcentrates on the basis of BAA from multiform herbs and fruit juices, bakery products with application of BAA on the basis of cattle blood and a group of inalbuminate products on the basis of starch for hypoprotein diets and diets for the children suffering from phenylketonuria);

natural imitated food products that can be used separately as well as part of starters (restructured fish products in the form of ready to serve product of jelly-like structure with clearly defined fish tasty and aromatic properties; imitated black and red caviar on the basis of egg products) etc.

KEY WORDS: power- and resources- saving technologies, natural imitated food products, biologically active additives, foodstuffs from untraditional raw material

THE PERSPECTIVES OF GLUCOSE-FRUCTOSE SYRUP AND MALTODEXTRIN USAGE IN TECHNOLOGIES OF SWEET DISHES

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The main raw materials of the major part of desserts are fats, eggs, sugar, milk, cream, which specify their high calorie content. However, the role of desserts is determined by their high taste properties but not calorificity. Those dishes, which include fresh fruits and berries, have high nutritional value, as they are a source of vitamins C, E, minerals, organic acids, and a number of biologically active substances.

The Department of Food Technology and Restaurant Business of NUFT conducts research on the use of modern ingredients in the production of desserts. Attempts to reduce the compounding amount of sugar in products without compromising the basic technological parameters of products, using maltodextrin and glucose-fructose syrup showed the prospects in the development of this field.

The use of glucose syrups can keep freshness for a long time. Products acquire resistance to drying by increasing their ability to bind moisture.

The usage of glucose-fructose-syrup (HFSS) seems advantageous while cooking cream. Unlike regular sugar, the syrup can improve the structure of the cream, getting as a result an exceptional product's homogeneity, plasticity and stability. Cream keeps good shape, has got high pricing power, and does not splinter when combined with dietary fats, which substantially exceeds the normal shelf life of products containing creams.

To lower products' calorie significantly (30%) and simultaneously leave the necessary solids content while using protein could be reached by using HFS and maltodextrin.

Maltodextrins function well as sweetener, filler. Its presence in the technological system of a desserts production improves the stability of sweet dish shape. Maltodextrine has got recommendations for using in children's, athletes', sick people's nourishment.

Thus, the use of maltodextrins and glucose-fructose-syrup is a promising direction in the development of food products for people of all ages.

KEY WORDS: glucose-fructose syrup, maltodextrin, sugar, calorie, sweet dish.

INNOVATIVE BREAKTHROUGH IN THE RESTAURANT INDUSTRY

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Now the scientific approach to cooking is complicated by the fact that the food should not only be unusual and delicious, but also beautiful. The quality of the food is affected by selected products, skill of the chef and the usual methods of mechanical and thermal processing of food products. However, due to molecular cooking, for example, it was established, that texture and sound, which "reproduces" food (chips) affect its taste.

The music also has the relationship between the perception of the taste of dishes and emotionally-psychological state of the person. It was discovered that the taste and the words were matched with a certain tonalities in the music space. So, for example, acidic taste inherent high notes, short duration; bitter – low tone, poor articulation; sweet-duration, low-dissonance, tone and softness; salty - short duration and high articulation.

Unusual combination of incongruous foods plays very important role, or so-called "combining" foodstuffs of different types, at the molecular level, of a set of chemical compounds and amino acids, such as banana and parsley, caviar with white chocolate, etc.

Molecular technology of culinary production is the use of modern achievements of food chemistry with the introduction and cooking products of a new generation.

Innovative technologies are changing all of the traditional idea of the look and presentation of culinary dishes and products. The change of temperature and duration of thermal processing of foods are the factors that also contribute to this. Production of molecular technologies culinary products are made at the lowest temperature during long period of time.

Food has changed form - appetizer with virtual foam tomato; dumplings, which are transparent as crystal; jelly as spaghetti, gelatinous steak and edible tea. All of this has become a trend of the modern perception of dishes, and has led to the creation of a new direction of development of restaurant business, which is a promising field of research for scholars, as well as the next step in the development of the restaurant business in Ukraine.

KEY WORDS: restaurant industry, innovative breakthrough

RELEVANCE OF USING LOW TEMPERATURE TECHNOLOGIES IN THE CREATION OF PRODUCTS FOR SPECIAL PURPOSE

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Difficult environmental situation now leads to the spread of diseases among the population, many of which are related to nutrition. So products of special purpose, including free from some of the ingredients which are present in food is not recommended by medical guidelines (allergens, some types of proteins, etc.) is nowadays very important. Especially noteworthy problem creating gluten-free foods for celiac disease, the need for which in recent years has increased markedly.

Celiac disease is a disease that affects the intestinal tract of people who have absolute intolerances of identified cereal's proteins. Until recently, the disease was considered to be a rare disease, but research conducted independently in different countries, found that celiac disease affects approximately 1% of the world population. This disease is treated only by a special gluten-free diet, which categorically forbids using products that contain wheat, rye, barley and their derivatives.

Today we know the developing of gluten-free breads and pastas, but almost no data on flour food products (dumplings, pancakes, etc.) that do not contain gluten. Thus, the development of technologies such specialized dishes and products for cafes, restaurants, canteens and other facilities of the restaurant industry with the development of the restaurant business, is becoming more urgent.

It is known that in the food business the segment of visitors with celiac disease is small, so it is expedient to create gluten-free flour food products of long-term storage.

One way of solving this problem is shock freezing. Shock freezing system can reach - 18 °C in the product's body less than 240 minutes - the maximum time for microcrystallising of molecular products, but the organoleptic properties of manufactured food products remain unchanged.

The production technology of frozen "gluten free" pastries will allow to introduce their products to suppliers and provide them to restaurant business. People with celiac disease have a right to food, not only at home but also in the restaurants without compromising their health.

KEY WORDS: products for special purpose, low temperature

USING PHYTO- AND CAROTENE CONTAINING RAW MATERIALS IN EMULSION-TYPE SAUCES TECHNOLOGY

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The world ecological and social situation makes urgent demands new approaches in population preventive measures, adaptation and rehabilitation work. The introduction and production of mass-consumption products with biocorrecting properties (mother products, bakery and macaroni products, water, beverage foods, fruit juices, margarine, mayonnaise etc.) appears to be one of the ways of preventive measures and adaptation program practical implementation. For this purpose, food additives, so-called bioactive substances, are added to products. β -carotene, which is one of the main components of biological protection system of the human body against influence of hostile factors influence, takes a special place among such food additives. The role of β -carotene in the human body is inestimable from the modern point of view. The natural β -carotene, the converted model of which is the most biologically active, is the most attractive for people.

The researches of Nutrition and Restaurant Business Department and Alimentary Products Examination Departments of the National University of Food Technologies suggest phyto-oily and phyto-carotenoid oily semi-finished products manufacturing methods. The use of phyto raw materials and raw materials containing carotene allows to improve emulsion-type sauces quality and biological value at the expense of multiple-factor influence which contributes high flow properties establishment to final product at the expense of high-molecular polysaccharides (dietary fibers, cellulose), and allows to raise sauces structure stability at the expense of protective film formation around fatty drops.

KEY WORDS: sauces, β -carotene, polysaccharides, mayonnaise

**THEORETICAL AND PRACTICAL ASPECTS OF COOKING FLOUR PRODUCTION TECHNOLOGY
FOR SPECIAL PURPOSES**

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The current situation of the world population health, including Ukraine, necessitates eutrophy and creating products for special purposes. Unfortunately, in the world, more people face such diseases as diabetes, obesity of different degrees, endemic goiter, celiac disease, etc. Currently, among a wide range of special foods a demand for gluten-free products for celiac disease is growing.

Celiac disease is a hereditary disease associated with indigestion, caused by damage of the small intestine villi by food that contains special protein - gliadin (gluten) in wheat sekalin in the rye, hordeyin in barley, avenyn in oats. Celiac disease is considered to be incurable, but you can fight it gluten-free diet, for example products that do not contain gluten. The alternative feedstock from wheat flour production is buckwheat, rice, corn, beans - chickpeas, soybeans, nuts, roots.

Analysis of the literature has shown that the issue of celiac disease in the world pays much attention - industrial production of gluten-free products established in Italy (firm "Dr. Shar"), Germany (firm "Glutano"), Sweden (firm "Finax"), Finland (firm "Molias ") and other countries. Ukrainian scientists are also working on this problem, but the range of foods for celiac disease is limited to bread and pasta, so the development of new gluten-free product types is urgently needed today.

Restaurants have large and diverse range of products: meat dishes and offal, fish and non-fish, dairy products, but quite a significant share in it takes, that is why this type of product is the subject of research.

In order to develop technology for preparation of gluten-free flour culinary products the chemical composition and technological properties of buckwheat and rice flour have been studied. The using of the raw materials to expand the assortment of products for special purpose is feasible and appropriate. Innovative gluten-free products have good organoleptic quality and high nutritional and biological value.

KEY WORDS: celiac disease, gluten-free flour culinary products

Poster Presentations

Section **NATURAL BIOACTIVE COMPOUNDS, FUNCTIONAL AND TRADITIONAL FOOD PRODUCTS**

Sector B

POTATO CHIPS OF LONG-TERM STORING

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The analysis of consumption potato chips thconsumption in the world and Ukraine shows the popularity of the product among the different segments of the population, especially among children and young people. This fact leads to the search for raw materials of natural origin, which has antioxidant properties.

To this end, we studied the effect of aromatic additives to change the lipid complex molding potato chips pattern during storage. As a natural antioxidant supplements we used basil, oregano and paprika powder. Samples were prepared with the introduction of 1 and 2% of marjoram, basil and paprika powder.

Quality control of fats was carried out every 7 days of storage definition peroxide value for two months.

Analysis of the data showed that if you add in the chips recipe 1 and 2% of marjoram, the rate of accumulation of peroxide compounds in the product will be reduced by 26 and 37% relatively to control.

Basil in quantities of 1 and 2% can improve the monitoring indicator in relation to the control sample by 21 and 32%, respectively.

While making a prescription composition of potato chips paprika powder 1%, the rate of accumulation of peroxide compounds in the product is reduced by 24%. Adding 2% of paprika can reduce this process by 35%.

Due to the effect of the addition to the main technological parameters of test quality and organoleptic properties of the finished product, it is proposed to add oregano, basil and paprika powder in the amount of 2% during the molding of the test. This will provide extension of storage time of molding potato chips, as well as improve their organoleptic characteristics. Finished products get pleasant taste and flavor, typical to the introduced raw materials.

KEY WORDS: potato chips, paprika, oregano, basil, peroxide value

NEW IN BABY FOOD

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For young children the staple food is breast milk. With milk a baby receives all the necessary substances for the development - proteins, fats, carbohydrates, vitamins, mineral salts, etc.

Currently, there are a lot of types of baby formulas – Breast milk Substitutes, which are considered to be adapted to the child's body. Still, the children who are deprived of breastfeeding, stay on artificial feeding, do not get the amount of natural nutrients, which is found in human milk. To balance the composition in the adapted formulas they give different vegetable oils, vitamins, mineral supplements, etc. None of animals' milk is comparable to the composition of human milk.

Baby food use cow's milk as the main raw material in the manufacture of customized formula. But studies show that other types of milk are more balanced in composition and are closer to the composition of human milk.

For the research of domestic animal milk was taken milk of cows, goats and mares. Milk was studied for protein, fat, carbohydrates, as well as the amino acid, fatty acid and vitamin content. Many indicators of cow's milk are behind these indicators in milk of goats and mares. Based on these studies, goat's and horse's milk can be recommended for use in the production of baby food as milk-based. To approach the composition of the mixture to the composition of human milk, you can use the optimization techniques to combine different types of milk. It is necessary to combine them so that the missing amount of a component in milk A was compensated by an excess of this component in milk B.

Thus the resulting product will be less need for additional correction formulas by means of different additives. This is a significant step to improving the production of dry-adapted infant formula and bringing them closer to the composition of human milk.

KEY WORDS: baby food, milk, breast milk.

ENERGY SECURITY PROCESSES SPROUTING MALT

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It is known that the most significant problem in the grain mass changes is the accumulation of enzymes that provide the following process steps saccharification starching mediums. Special is the role of enzymes catalyzing the production technology of beer and alcohol, as energy crops are mostly starch. As a shiver-gee-shuger only need to supply sugar, the role of enzymes, which are accumulated in the very grain mass, is fundamental.

Storing grain weight is carried out with limited moisture and temperature. Grain moisture should not exceed 12%, as higher values of this parameter result in a significant acceleration of internal processes with the beginning of germination. Therefore, before germinating grain moisture-Xia to that of 48...50 %. Later humidity should grow this level. However, the outward simplicity of this formulation of the problem much more complicated other requirements of the process. The latter include the need for temperature stabilization and engagement in the grain mass of oxygen and discharge produced during respiration of carbon dioxide. This triple challenge in modern vision is executed only by a process of aeration of grain arrays. The air required adequate preparation - conditioning and increasing its relative humidity up to 100 % and then some temperature to 10 °C. However, this set of problems by aerating grain arrays inherent thermodynamic inconsistency. The latter is connected with the fact that the removal of heat from the grain means the perception of its air flow up to 12...16 °C (for inshugering different days). This means that the relative humidity is less than 100 % and it starts to dry a little grain mass and temperature adjustment layer equality is violated. If the lower layers through which the "fresh" air flow, have a nominal temperature. That upper higher than in the 3...4 °C. The experimental studies confirmed the phenomenological considerations given and allowed to determine the conditions, if not completely, then at least at approximate temperature stabilization. Among protection of them are modes of "inverse" aeration, that changes the direction of flow of air, increasing air flow with recuperative return to circulation circuits, use the sequence mode of aeration systems and regenerative rekuperative restoration of streams.

KEY WORDS: energy, security, system, temperature, stabilization, aeration, inverse, air flow

ENERGY EFFICIENCY OF CARGO HANDLING FOOD PRODUCTION

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Features material flows food production determine the types of used transport systems. A comparison of energy efficient transportation feasibility of continuous and batch machines. The structure of energy costs related to periods of steady motion to transients and determined that a significant share of concerns modes of dispersal mechanical systems due to the accumulation of kinetic energy of moving units. Maintenance transient dynamic component loadings also means the presence of dissipative losses.

The combination of transport and technological machines means the need for synchronization of work to limit stops and their influence on all transport-technological system.

Determined that in the case of combined transportation systems with conveyors with horizontal plots, with plots, made at an angle to the horizon line and elevators value of energy costs on the form highway beyond. Provided continuous transportation energy costs transient processes related to short starts, which means you can ignore them. Under this condition the components of energy associated with transporting goods relate only potential energy moves in the gravitational field and energy to overcome the forces of friction and additional related only with goods. Thus this component of energy regardless of the form and combinations in the system is always determined by the product of the friction force $f \cdot m \cdot g$ the length of which is determined by the horizontal projection of the transport system. Hence the importance of the maximum limit of mass moving elements of components as they also lead to overcome the additional friction forces in the form $f m_{tp} g$, where in contrast to the mass m of cargo m_{tp} value corresponds to the mass of moving parts of vertical silos. Options under f and g is the coefficient of friction and the acceleration of free fall.

The conclusion regarding the limited energy in transportation systems is reduced to the following recommendations:

- advisable to opt for a machine that operates on a steady movement;
- to limit of stops transport technological systems complete their devices for storage;
- maximum weight limit elements of vehicles;

appropriate choice of materials ensure restriction friction forces.

KEY WORDS: energy, transport system, dynamic

ENERGY TRANSFORMATION IN PHYSICAL SYSTEMS WITH MICROORGANISMS

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Planned interaction of microorganisms with medium may have different objectives. They may relate to, for example, the accumulation of baker's yeast and then the process is constructed as aerobic. When fermentation processes are the same yeast culture media become anaerobic and transform sugar into ethanol and carbon dioxide. The differences in these processes require appropriate technology, physical and chemical conditions, modes of supply of food, aeration.

Extended search capabilities intensification mass transfer processes in gas-liquid systems, the estimate exposure to elevated pressures. The latter is due to the double impact of the changes. Henry's law indicates graving of the gas solubility with increasing pressure, however, with this rising power losses on compressed air. In this case, it is possible to increase the rate of oxygen delivery shields on Wednesday by raising the intensity of aeration. This study shows the possibility to achieve the optimal choice. Mathematical models that reflect the changes in the energy costs associated with air supply and overcoming the hydrostatic political pressures, as well as positive changes, reflecting an increase of constant violence of the oxygen. Simultaneously, gas-liquid system are estimated at several components for the gas phase, because in addition to the oxygen it contains nitrogen and carbon dioxide, the dynamics of interaction with the liquid phase is quite different, as the consumer of nitrogen in the system, and CO_2 is generated at all in it. At the interface mass transfer takes place, although the nitrogen it somehow limited due to the approach to saturation. However, the vertical circulation of the liquid phase at the saturation state violates the N_2 and simultaneously affects the dynamics of mass transfer of oxygen and carbon dioxide. Further complicated by the presence of the fourth stream - water vapor. In mathematical models take into account the driving forces of mass transfer of the different solubility of gases for systems close to isothermal. Determined that among the important factors Mass should include the ambient temperature, although a number of physical and chemical options, add microbiological effects.

KEY WORDS: energy, transformation, system, model, gas-liquid, masstransfer

RESEARCH IN HEAT TRANSFER AND DEVELOPMENT OF EFFICIENT ECONOMICAL EVAPORATORS AND EVAPORATOR PLANTS WITH JET-PERCUSSION GENERATION OF FLUID FILM

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The results of the research of the processes of heat transfer with jet generation of a film are presented in this work which show that this method is characterised by constructional simplicity of realization, makes it possible to obtain stable thin film flow, prevents heating surface from uncovering and ensures high heat transfer coefficient due to high speed of spreading.

The object of the research is a jet method of film generation which appears to be one of the most efficient in heat exchangers and evaporators. It consists in receiving of a thin film of fluid on the heat transfer surface which is obtained by percussion of the film with the force of the jet flowing from a nozzle or outlet. Local velocity at the point of percussion (critical point) measures up to 10...15 mps, and the film thickness measures 0,1 mm or less, which, with this method of generation, determines high heat transfer coefficient to the film. As film generation occurs locally in many points of heating surface, it is easy to ensure optimal regime of the apparatus work. Heat transfer intensity remains nearly the same along the pipe.

It is necessary to mention that heat transfer coefficient does not depend on temperature driving force and this fact makes this method of heat transfer similar to the converter one and provides special advantages of multicylinder evaporators. Jetting action considerably reduces residue. Thin film shortens stay time of evaporating solution and improves technological parameters.

As evaporation occurs from the film surface, heat transfer coefficients considerably exceed the values of those in the best film apparatus.

On the basis of obtained experimental data and theory, a new design of the jet film evaporator is proposed.

The use of jet evaporators is most efficient for evaporation of thermolabile solutions and solutions causing intensive residue on the heating surface.

KEY WORDS: evaporator jet fluid

HYDRODYNAMICS IN GAS-LIQUID MEDIUM

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Gas-liquid system on a significant amount of technology in the food industry, microbiology, pharmaceutical and chemical industries. Cause and effect of a gas-liquid systems is the organization of mass and heat transfer processes, mechanical agitation in the interest of the technological process. Among the "hidden" and practically investigated potential gas-liquid atmospheric patterns, describing Henry's law.

Potential use of dissolved gases in liquid media refers to applications of technological devices with significant hydrostatic pressures-governmental media. According to Henry's law hydrostatic pressure must be accompanied by a concentration gradient of CO₂ in height units. This means the possibility of additional energy-material transformations in their energy supply.

Increased physical and hydrostatic pressures in the process equipment in which the synthesis of carbon dioxide or the forced flow and dispersion in the liquid phase means higher solubility according to Henry's law. In the fermentation media, as CO₂ is generated in them, paired pressure are common pressures. The latter have calculated the amount of pressure in the gas phase system and hydrostatic pressures. This means that, for example, such devices considerable height, as CCT brewing industry, solutions of carbon dioxide in height will be different, which gives rise to a concentration gradient tsentratsiynogo, especially in reduced vertical circulation. However, even with the existence of such a situation would be achieved by the proximity of the alignment of CO₂, but the physical basis of uneven distribution force disappears. This means that the formation of a dispersed gas phase adjustment devices will be different. The consequence of such a situation would be different speed transformation of CO₂ in the gas phase medium height and density of different dispersing bath gas phase. Given the phenomenological considerations should come to the conclusion that the density of the dispersed gas phase determines the hydrodynamic performance of gas-liquid systems, including those holding power to the gas phase, the absolute rate of ascent of gas bubbles as a sign of the Archimed's force and the intensity of the circulation circuit. Additional impact on the latter have a cooling modes environments.

Completed technical developments on the use of the concentration of the potential in gas-liquid media.

KEY WORDS: hydrodynamic, energy, security, system, temperature, stabilization, aeration, inverse, air flow, gas-liquid

FOAM CONFECTIONERY PRODUCTS WITH PREBIOTIC PROPERTIES AND REDUCED GLYCEMIC LOAD

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Foam confectionery products (marshmallow, paste, soufflé type foam cream cakes) enjoy wide popularity with people of all ages, especially with children and the elderly. In the 21st century the number of people suffering from pancreatic diabetes has sharply increased. Diabetics cannot consume confectionary with a high glycemic index. National University of Food Technologies has conducted a great number of researches aimed at the estimation of a possibility as concerns the use of new generation sweeteners with prebiotic properties and low glycemic load (such as lactitol, maltitol, erythritol, isomaltitol, fructose monosaccharide, lactulose prebiotic) in course of confectionary production. By means of experiment multifactor planning mathematical method the receipt formulations which secure the decrease of glycemic index in sweetener-based and fructose mixture-based confectionary by 30% or more relative to sugar-based (sucrose) products have been developed. The University has researched the influence of new generation sweeteners upon the foam masses structural and mechanical properties (viscosity, solidity, adhesion, boundary shear stress), upon the finished products sorption-desorption properties with equilibrium humidity ascertainment under different a_w values. Thus the lactulose prebiotic optimal dosage has been defined and by means of high-performance liquid chromatography method its availability during the guaranteed storage period has been determined. Therefore innovation technologies and foam confectionary new kinds receipts acceptable for the consumption by all population groups including people suffering from pancreatic diabetes have been developed. Nutritive value (by an integral score), biological value (by an aminoacid score), glycemic load (by glycemic index – NUFT technique), prebiotic load (by prebiotic quantity) have been calculated for the confectionary of a new type. The foam confectionary technology and receipts are protected by the patents of Ukraine.

KEY WORDS: pastry wares, glyckemy, structure, laktuloza.

FRUCTOSE AND PROBIOTICS APPLICATION IN TECHNOLOGY OF DIABETES BAKERY

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Polyol alcohols are widely used in the production of bakery products, aimed for the diabetes patients. These alcohols are sweet, have low glycemic index and probiotic potential. Predominantly, this is sorbitol.

Lately a major attention has been drawn to the disaccharide of lactulose. Lactulose, similarly to sorbitol, has a sweetness rate of 0,5...0,6 of sugar sweetness, it possesses a low glycemic index, but it is considered a much more effective probiotics than sorbitol. Both sorbitol and lactulose are not fermented by bakery yeast. As sweetener fructose monosaccharide can also be used. It doesn't possess probiotic properties, but can be fermented by yeast. During our experience we prepared the samples of dough with the sugar contents of 6 % to the mass of flour, the samples with the adequate content of sorbitol, lactulose and with the composition of these sugar substitutes with fructose with the relation 1:1.

It has been determined that the dough with sorbitol and lactulose have a reduced branching of yeast cells, accumulation of biomass. Also their rising potential osmotic sensitivity has reduced. As a result of these the intensity of dough fermentation has lowered.

The dough elasticity measurement carried out with a pharinograf proved that due to the lactulose content the dough elasticity betters.

In case of the sugar substituted with the sorbitol and lactulose mixtures with fructose, the intensity of dough fermentation increases significantly.

The elasticity of dough also betters. The increase of fermentation intensity and dough elasticity as a result of application of sugar substituted compositions help the increase of the products volume and their porosity, especially for products with the compositions of fructose and lactulose.

Addition of nearly 3 % of the flour mass of sorbitol or lactulose determines the contents of 2-3 g of the probiotic in 100 g of product.

KEY WORDS: diabetes products, sorbitol, fructose, lactulose

BREAD FOR HEALTH-IMPROVING

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According to the FAO data, the problem of children's overweight and adult's obesity has escalated for the last 20 years. About 25% of the population in our country has certain diseases associated with overweight. Traditional bread products are low protein and characterized by large amount of easily digestible carbohydrates.

The recipes of protein-groats bread comprising wheat flour, groats flakes (both oats or buckwheat) and dry wheat gluten (DWG) in the amount of 20 % instead of the weight of wheat flour were developed.

Adding flakes improves the rheological properties and shape-stability of dough, increases its water-absorbing and water-holding capacities. It is explained by presence of dietary fibers, pectins and pentosans in their structure. The time of dough development was increased by an average of 6 - 7 minutes which is obviously caused by the slow speed of flakes swelling.

The research showed that adding flakes facilitates the intensification of gas-formation in the dough. Production of cereals presupposes hydrothermal treatment, which leads to partially gelatinization of starch. It helps to improve the splitting of starch by flour amylase and intensity of the fermentation process.

The importance of loosened structure of bread crumb is determined by the ability of gluten network to hold the CO₂. It was proved that increasing portion of flakes in the mixture slightly decreases the gluten ability to retain CO₂, but it doesn't affect the quality of the end product.

Adding flakes enriches bread with dietary fibers, minerals and vitamins. And the presence of DWG allows increasing the amount of groats in the products without impairing their quality, increasing the protein value to a great extent, reducing the amount of easily digestible carbohydrates and lowering glycemic index of bread. The resulting mixture of components provides production of bread for health-improving with increased nutritive and decreased energy value.

KEY WORDS: protein-groats bread, oat, buckwheat

THE USE OF HOP FOR MAKING BREAD WITH HEALTH IMPROVING PROPERTIES

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The acute problem of baking in Ukraine is the production of bread and bakery products with health-improving properties, of high competitive quality and long shelf life. That's why the use of functional ingredients such as hop cones in baking is indispensable. New scientific data on hop functional properties drew attention of bread makers. Hop cones are rich in resin, polyphenols, volatile oils which are natural antioxidants and biologically active compounds with health-improving properties.

The authors researched biochemical indices of delicate aromatic and aromatic hop sorts Klon 18, Zlato Polissya, Slovyanka, Zagrava, Gaidamatsky and found that Zlato Polissya and Gaidamatsky are the most promising for bakery as they contain more polyphenols. Taking into account lower content of α -acids and general resin, better ratio of β and α -acids (in Zlato Polissya and Gaidamatsky) present-day hop doses in bread can be doubled.

Natural hop preparation with reduced content of bitter compounds, containing 2,5-3 times less α -acids and having slightly reduced by 8-9% content of polyphenols has been elaborated. It gives possibility to increase hop dose and enrich bread with polyphenols and other valuable hop compounds without increasing the excessive bitterness.

Baking bread with hop leaven helps escape the use of compressed yeast without quality deterioration. New hop doses let bake bread of high quality with excellent consumer properties, long shelf life and high content of biologically active compounds and may be included to diet products with health-improving properties.

KEY WORDS: hop, hop preparation, biologically active compounds, bread, quality.

USAGE OF WHOLE-WHEAT FLOUR AND BRAN FOR MAKING MACARONI PRODUCTS

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In recent years, the consumers are becoming more and more interested in the food that contains dietary fiber which is very useful for the health. It includes dietary fiber of grain products as well. Functional properties of these substances are mainly related to stimulation of the gastrointestinal tract and cardiovascular system; they regulate the cholesterol exchange through sorption and excretion of bile acids which affect carbohydrate metabolism (diabetes prevention) and others. The diet of modern person is depleted by dietary fiber and, in the average, it contains 5 grams of it, when the dose is 23 - 30 g.

Nowadays, domestic scientists and technologists are working out how to use all the valuable and useful substances that were taken away within grain processing procedure in our healthcare. The most appropriate and effective way is to use the peripheral parts of the grain (bran) and whole wheat flour. The advantage of grain products usage is preserving native properties of grain dietary fiber, a possibility of complex use of plant products and also their low cost.

Macaroni are those promising products which can enrich the diet with dietary fiber.

We have developed macaroni products made of whole wheat flour and also products with 15 – 25 % addition of wheat bran. We have defined the content of dietary fiber in raw products and calculated it in macaroni products. It has been found that whole wheat flour contains 2,4 % of fiber, 7,81 % of hemicellulose, 1,24 % of lignin, consequently, altogether there is 11,45 % of fiber; and, respectively, there is 6,12 %, 30,87 %, 1,40 %, and so, together, there is 38,39 % of fiber in bran. The defined bran dosage provides the same content of dietary fiber in macaroni products.

All products have good organoleptic characteristics. Its thickness is reduced, and acidity and the quantity of solids passed into cooking water increase.

Thus, macaroni products made by means of adding wheat bran and whole wheat flour have acceptable organoleptic and physical and chemical indicators of quality, however in order to reduce the production costs it is considered to be more reasonable to produce products using whole wheat flour.

KEY WORDS: macaroni products, whole-wheat flour, dietary fiber

DEVELOPMENT OF THE TECHNOLOGY OF WAFFLES ON THE BASIS OF GLUTEN-FREE FLOUR

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Increase the number of patients suffering from celiac disease requires the development flour confectionery products with the use of gluten-free kinds of flour. We are currently carrying out work on the development of technologies of wafer sheets with the use of rice, buckwheat, corn flour and different kinds of starch. It is established, that the direct replacement of the wheat flour on the gluten-free kinds of flour is not possible, the dough of rice flour has a very liquid consistency, which is not peculiar for the waffle dough, the buckwheat flour creates dough with the elastic structure.

Due to the implementation of complex technological activities became possible approximation of the rheological and structural - mechanical properties of wafer dough on gluten-free flour to the relevant characteristics of the dough on wheat flour, which allows production of new wafer sheets on the existing equipment.

The duration of thermal processing of wafers sheets with buckwheat flour on 33 % more than of the rice and of corn flour ones, which is explained by the greater humidity of the dough, and larger percentage number of bound moisture in the dough of buckwheat flour

Waffles on gluten-free flour manufactured due to the developed by us prescription compositions and technologies have structural physico-chemical characteristics of the fragility, humidity and swell, which approaching for the characteristics of waffles on wheat flour.

KEY WORDS: Waffles, gluten-free, celiac disease

THE USE OF PLANT MATERIAL TO CREATE SEMI-GELATINOUS PASTRY PRODUCTS

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Taking into account the increase in consumption of confectionery products, more priority is given to the creation of a new range with original organoleptic characteristics enriched with polyfunctional systems, including vitamins, macro and micro- elements. Such raw materials are preserved vegetables, including carrots and pumpkins. In developing confectionery, besides unique biochemical properties, unconventional feedstocks should have certain functional and technological properties to create products with original organoleptic properties (taste, aroma, structure), and ensure their quality during storage.

One group of confectioneries that is in high demand among consumers - are combined products: cakes with gelatinous semi-finishing, butter cookies with jelly fillings.

Jelly intermediates, which are used in combined flour products should have some structural and mechanical properties, maintain the structure during heat treatment and storage. When creating new types of gelatinous fillings from carrot and carrot-apple puree pectin, modified starch and calcium salts were used as additional structure.

Research has found that the desired structure toppings can be obtained already at a concentration of 1% pectin, but pectin is quite an expensive component and in this regard we have tried to reduce the cost of the finished product by adding starch to mashed structure. The best result was obtained by adding starch Prejel 200G-acetylated starch. But after adding starch filling had tough, tighten structure. Therefore apple pectin ARA 300 FB was used as additional structure-forming material. It was found that getting a good gelatinous structure can be achieved by adding starch, reducing the number of added pectin. The sample with the addition of 4% starch and 0.5% pectin has a gelatinous structure, smooth glossy surface.

It was found that semi-based plant material with the addition of pectin and modified starch do not lose their structural and mechanical properties during heat treatment, which is appropriate when they are used as fillings for pastry products.

KEY WORDS: confectionery, jelly filling, carrot puree, pectin

STUDY OF OAT MALT INFLUENCE ON BUTTER BISCUIT STRUCTURING

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The usability of pastry items depends on the quality of formula components, their chemical composition and technological properties. Therefore, the use of new types of non-traditional raw materials for confectionery industry is one of the priorities in the creation of innovative technologies. The by-products of grain malt are classified as plant raw materials with high nutritional and biological value. The sprouted grains contain ingredients necessary for a balanced diet: low molecular weight proteins, amino acids, carbohydrates, food fibers, minerals, vitamins.

The scientists of NUFT have developed the modes of obtaining unfermented malts from different grain varieties with the high activity of enzymes and fermented malts. In the process of seed germination involving enzymes, the macromolecular substances are hydrolyzed to low molecular water-soluble components. Ratio of the essential amino acids to their total number is 34%.

Sugar content is an important aspect from the technological point of view, when using malt flour from various grain crops. It was found that the amount of reducing sugars in the oat malt flour is up to 13%.

When treating oat malt flour in a formula in an amount of from 20 to 50%, butter biscuits were characterized as having delectable taste and flavor as well as uniform porous structure. The studies of oat malt influence on the process of dough formation have been conducted in order to determine the optimal amount of new material and to form dough having specific structural and mechanical properties.

The results of theoretical and experimental studies have demonstrated the expediency of oat malt flour application aiming to improve the organoleptic quality of butter biscuit and to increase its physiological value. The use of oat malt flour in the recipes of butter biscuits allows to decrease the amount of sugar and fat and reduce its caloric content.

KEY WORDS: Oat malt, grain malt, oat malt flour, butter biscuits.

TECHNOLOGY INCREASED COMPETITIVENESS GINGERBREAD PRODUCTS IMPROVING

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Spice constant demand on the consumer side, due to their original organoleptic characteristics and relatively low cost. The disadvantages of gingerbread products are high in sugar, low food and biological value, products staling during their storage. In regard to manufacturer's gingerbread products remain relevant issues, which are related to improving and maintaining their quality, extension of life.

The physical-chemical and structural and mechanical changes are very important in storage gingerbread undergoing complex. The main factors that cause changes in the structure of the crumb during storage are associated with the loss of moisture from the retrograding starch process and sucrose crystallization. The longer the moisture contained in gingerbread products, the longer the cakes will be soft. Therefore, slow process staling gingerbread advisable adding prescription composition of vegetable raw materials rich in dietary fibers with high water-retaining capacity, glucose-fructose syrups.

With the use of glucose-fructose syrup, carrot and pumpkin puree vegetable custard cakes developed technologies that preserve quality for a long time.

In order to determine changes in the amount of free and bound moisture during storage cakes with added vegetable puree pectin used the method of differential thermal analysis. Analysis of the data revealed a temperature zones that correspond to removal of free moisture adsorption and osmotic bound. Pectin is based on the analysis derivation concluded that gingerbread with vegetable puree. It contains large amounts of osmotic and bound moisture adsorption by binding moisture dietary fiber and pectin.

The technological solutions can increase the bound moisture process number and finished products to reduce moisture during the storage of products.

Thus the vegetable puree using is possible to increase the nutritional value of carrots, organoleptic properties (color, texture), contributes to the quality of the products during storage by binding moisture dietary fiber and pectin.

KEY WORDS: technology, carrots, vegetable pectin puree, pectin, dietary fiber

IMPACT OF HYDROTHERMAL TREATMENT ON CHEMICAL COMPOSITION AND QUALITY PARAMETERS OF MUSHROOM PRODUCTS

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This paper is dedicated to the investigation of hydrothermal treatment and taste additives influence on the changes of chemical composition and quality parameters of *Pleurotus Ostreatus* and *Agaricus bisporus* mushrooms and their ready-to-cook mushroom foods which are used in the developed innovative technologies for chips and snacks on the basis of edible mushrooms.

The optimum mode of hydrothermal treatment of *Pleurotus Ostreatus* and *Agaricus bisporus* mushrooms has been determined: temperature (95±5) °C, processing time 5 minutes. We researched the practicability of using the taste additives salt and citric acid in the hydrothermal treatment and scientifically motivated their dosages. The best characteristics of mushrooms products were observed at the dosage of salt of 1.00 % and citric acid of 0.02 % in the solution for treatment. Comparative analysis of the impact of above-mentioned additives on the activity of polyphenol oxidase showed that the combined use of additives accelerates the inactivation of this enzyme compared with their individual use.

We tested the impact of hydrothermal treatment on the protein substances changes of ready-to-cook mushroom foods. Such biochemical changes of products as protein content and nitrogen form, albumin/globulin/prolamine/glutelin concentration, essential and nonessential amino acids contents in the process of hydrothermal treatment have been studied and scientifically motivated. It has been discovered that with the introduction of salt and citric acid in the solution the amount of protein losses has decreased in *Pleurotus Ostreatus* by 5.0-29.5 %, *Agaricus bisporus* – 5.7-19.0 %. The individual amino acids losses in *Pleurotus Ostreatus* are 6.3-26.1 %, *Agaricus bisporus* – 8.3-26.5 %.

The combined use of salt and citric acid decreases carbohydrates losses during hydrothermal treatment in *Pleurotus Ostreatus* by 5.6-6.3 %, *Agaricus bisporus* – 3.0 %.

The obtained scientific results can be useful and applied in technologies of food mushroom products.

KEY WORDS: *Pleurotus Ostreatus*, *Agaricus bisporus*, mushroom products, hydrothermal treatment.

MAYONNAISE TECHNOLOGY IMPROVEMENT

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Mayonnaise production technology combines five major operations: recipe components preparation, mayonnaise pasta making, emulsion preparation, emulsion homogenization, mayonnaise filling and packaging. Depending on the installed technological equipment and its productivity, manufacturing cycle of a mayonnaise batch can take from 6 to 12 hours.

Duration of technological operations depends on the recipe compound of the mayonnaise: dosage, blending, dilution, pasteurization, and cooling. This all leads to the additional labor and energy costs. In order to intensify the mayonnaise production technology and to optimize the recipe compound, authors explored the «Stabilex» compound. This complex supplement includes components which perform emulsifier, emulsion stabilizer, and thickener functions (for the low fat mayonnaises).

High microbiological purity of the used feedstock and modern conditions of production allow obtaining of the European level stabilizers. Precisely calculated ratio of the components allows the use of the developed systems for the production of all mayonnaise groups.

Ways of leading of the complex supplement «STABLEX» were tested under laboratory conditions. It was found that the optimal conditions are adding of the supplement with a part of recipe oil (ideal ratio of the oil is 4:1) after the dissolution of water soluble components and before the the adding of vegetable oil. Optimal temperature of adding is 25-27 °C.

The results of organoleptic, physicochemical, and microbiological studies of developed mayonnaises show that the product has high quality indices and meets the requirements of the existing normative documentation.

KEY WORDS: mayonnaise, emulsion, complex supplement.

XANTHAN GUM USING IN THE MAYONNAISE TECHNOLOGY PRODUCING

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Mayonnaise is an "oil in water" emulsion consisting of 50–85% edible oil, 5–10% egg yolk, vinegar, salt and seasonings . The emulsion is stabilized by egg yolk phospholipids. Products with a lower oil content (<50%) may contain thickening agents such as starch, pectin, traganth, agar-agar, alginate, carboxymethylcellulose, milk proteins or gelatin.

Mayonnaise technology is wide field for xanthan gum using. Its stability at low pH, salt tolerance, high viscosity at low shear and pseudoplastic rheology make it an ideal thickener and stabiliser for products. For example, dressings formulated with xanthan gum have excellent long-term stability and a relatively constant viscosity over a wide temperature range. Due to the pseudoplastic rheology imparted by the xanthan gum they pour easily but cling well to the salad. Using level is typically between 0.2 and 0.4% of xanthan, depending on the oil content. Generally, as the oil content of the dressing increases, less xanthan gum is required for stabilisation.

Low levels of xanthan gum provide high viscosity in sauces and gravies at both acid and neutral pH. Viscosity is also stable to temperature changes and is maintained under a variety of long-term storage conditions. Although xanthan gum provides stable, high viscosity over a range of temperatures, this viscosity is temporarily reduced at retort temperatures, ensuring good thermal penetration in retorted foods. At the same time the ability of xanthan gum to recover its viscosity upon cooling, provides good re-suspension of particulates ensuring a uniform, high quality product. In retort pouch products, xanthan gum improves filling and reduces splashing and fouling of the critical heat-seal area of the pouch. Xanthan gum can be used to partially replace starch in this application to improve heat stability and give a cleaner, less pasty mouthfeel. Typically xanthan is used at a concentration of 0.2±0.4 %.

KEY WORDS: viscosity, synergy, galactomannan, stability, rheology

TECHNOLOGY OF PROTEIN PREVENTIVE ADDITIVES FOR QUAIL WITH FLAX ADDING

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One of the top issues of the Ukrainian market of quail is lack of specialized feed for them. Those feed mixtures which are offered by domestic feed mills do not contain the required number of vital ingredients for quail. Therefore, any, even the "right" domestic mix practices recommend enrich them with proteins, minerals and vitamins.

So today feeding of quail remains an important subject for research. Solving this problem is connected, first of all, with studying process of birds need in protein, some amino acids and with the development of specialized feed mixes and enriching protein supplements using high-protein raw material for quail feeding.

Lately, feeding livestock and poultry are more focused on using flax seeds. Today in Ukraine there are some studies known which indicate the feasibility and effectiveness of adding flax seeds and derived products to the birds and animals diets. This allows to enrich the diet not only with complete proteins, but also with fats, most of which are composed of essential fatty acids (linoleic and linolenic). Using flax seed can be effective in the production of animal feed and protein supplements for quails that require high-protein materials.

We have developed the recipe, technology and special equipment for obtaining preventive protein supplements by extrusion of processed soybeans, dry whey and flax seeds. This technology can be widely used in the production of feed. Developed formula is balanced in fats, proteins, carbohydrates, vitamins, minerals and medical components. Using whey can provide the product with valuable components like milk fat, vitamins, minerals and serum proteins. Those can stimulate the enzymatic activity of the stomach, promote absorption of vegetable protein fraction. It is a carrier of immune properties too. The main suppliers of fats, proteins, vitamins and mineral substances are soy beans and flax seeds. Besides of all these it provides products of fodder with therapeutic and prophylactic properties.

KEY WORDS: protein supplement, flax seed, whey powder, medical-preventive properties.

PHYSICAL RESEARCHES OF MODIFIED STARCHES SWELLING IN WATER

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The use of different methods of starch processing enables significantly alter its structure and properties. Hydrophilicity primarily belongs to these properties. Starches with modified hydrophilic properties form a large group of modified starches that tend to swell. The study of the modified starches properties is topical. These properties have to satisfy the technological requirements: serve as a thickener, stabilizer and gelling, have resistance to high temperatures, and be well assimilated and meet sanitary requirements.

The aim of the research is to determine the optimal concentration of starch in water in the swelling process by using a mechanical method of free torsional vibrations and dielectric method for the development of sustainable technologies of food concentrates of fast preparation, which are based on the modified starch raw materials.

The object of the research is modified potato and wheat starches.

We researched dependencies of damping decrement (a measure of internal friction) and electric capacity (a measure of electric dipole-dipole interaction) on the concentration of starch in solution to determine the optimal ratio of solvent and starch.

These dependencies are not linear for research starches.

Experimental curves can be divided into three zones. The first zone is characterized by the complete swelling of starch particles in water, which are in a suspended state considering its large number while their molecules are placed far apart from each other. This is confirmed by low values of damping decrement and electric capacity of the solutions. Swelling particles begin to touch each other in the second zone. This zone is characterized by the increasing the level of intermolecular interactions, which is leading to intensive growth of the damping decrement and capacity. Starch grains begin to stick surfaces due to the lack of solvent in third zone. Viscosity of system increases sharply and capacity reduces due to partial loss of dipole moments as a result of their compensation. That is why, the optimal concentration of the solvent and starch should be measured in the second zone, where there is the beginning of a sharp increase of the internal friction and maximum capacity of the solution.

Thus, the use of physical methods of swelling process is appropriate to determine the optimal concentration of starch in water.

KEY WORDS: Modified starch, optimal concentration, damping decrement, electric capacity

ADVANTAGES OF ETHANOL PRODUCTION FROM STARCH-CONTAINING RAW MATERIALS USING POLIHEKSAMETHYLENEGUANIDINE (PHMG) SALTS

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Expediency of using of poliheksamethyleneguanidine (PHMG) salts is reasonable as the antiseptic preparation «Polidez» in producing alcohol from starch-containing raw materials grounded. In working environment its influence on the course of microbiological and biochemical processes, quality of semiproducts and alcohol was investigated and efficiency of the preparation «Polidez» for inhibition of contaminating microflora growth was confirmed.

It is established that adding the mentioned antiseptic preparation into mash for productive yeasts growing slightly reduced the reproduction speed of yeast cells. But after 3 generations of the intensification process of yeast biomass accumulation took place during all period of their generations by 6,7-10,6 %, compared with the control as a result of their adaptation to the antiseptic. Furthermore, in all control yeast seed vessels, in which the antiseptic preparation "Polidez" was added, dead yeast cells were absent. The concentration of yeast cells made up 120...125 mln/sm³.

Adding the antiseptic preparation "Polidez" to mash substantially repressed the accumulation of acid-formed bacteria, that was confirmed in comparison with the control speed decrease of mash acidity accumulation. Eventual acidity of productive yeasts with addition of the antiseptic was lower by 0,04 gr.

During the researches it is that adding the antiseptic preparation "Polidez" in fermenters in the established amount 20 sm³/m³ of mash at the beginning of the fermentation process largely influenced the motion of biochemical processes and chemical-technological indexes of fermented wort.

It is established that the antiseptic mentioned used in the concentration marked above repressed the process of acid accumulation in mash according to the control model, at 31...46% during all process of its fermentation and reduced eventual acidity of fermented wort by 0,18 gr.

KEY WORDS: alcohol production, contaminating microflora, antiseptic.

FINAL SUGAR MASSECUITE COOLING CRYSTALLIZATION

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Based on the material balance equations and understanding of the final massecuite cooling crystallization process as the technology object, a simulation model of the process has been developed with the help of which the computational experiments have been conducted. The constructed model has been used for research of the industrial cooling crystallization process. It is proved that the results of the experiment of the developed simulation model fully reflect the nature of the final massecuite industrial cooling crystallization process. Typical industrial cooling crystallization scheme with massecuite water dilution or impure sugar solution dilution into the mixer- crystallizers and the scheme has been proposed by the authors with a massecuite intermediate heat during cooling have been considered.

It's experimentally shown that the use of final massecuite intermediate heating after its cooling up to 50-52 °C by 7-10 °C increases the effect of crystallization to 8.4 % in comparison with the water dilution where it is 3.6 %, and with the impure sugar solution dilution it's 4.2 %. It can be explained by the decrease of massecuite viscosity, the surface tension and alignment of the massecuite cooling rate at a sucrose crystallization rate. It has been established that when heated massecuite by 7-10 °C the syrup viscosity is significantly reduced. In this case, the surface tension decreases from 0.06598 N/m to 0.06492 N/m, and the massecuite viscosity does from 1.7 Pa s to 1.2 Pa s. In this case, a significant improvement in the sugar grains size moves up in fractions of 0.63-1.0 mm and greater than 1.0 mm due to the recrystallizing of the oscillating process.

Therefore, the intermediate heat provides a more complete exhaustion molasses and increases sugar grains content and size distribution of the sugar massecuite.

KEY WORDS: massecuite, syrup, dilution, the intermediate heat, grains

GRAIN'S LAYER DRYING RATE INFLUENCE ON RESISTANCE TO MOISTURE DIFFUSION

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Energy charges of drying exceed more than twice a calculation needed. Additional losses of heat are explained by the presence of resistance of internal moisture diffusion of capillary - porous bodies (CPB).

These researches set dependence of CPB on drying rate. Drying rate was changed by the temperature of drying agent and rate of its flow.

The size of CPB was set by volume of eaten up by grains gases after stopping of drying process. The dynamics of resistance changes was set by balanced pressure in a capsule with grain. For coverage of "deficit" of gases in a capsule gases of environment were used. Gases of environment were given into a capsule with a measuring capacity.

Dependences of volume data of gases absorption by grains on intensity of drying and kinetics of their absorption have been obtained.

Actual volume of the gases absorbed in directly by grains was set taking into account the change of volumes of grains ($dV_g/d\tau$), gases between grain-growing space ($dV_{e,air}/d\tau$) and over grain-growing space of capsule ($dV_{air}/d\tau$).

On the basis of results of researches conducted dependences of CPB data and their dynamics on drying rate (1) and the temperature of drying have been set (2):

$$\delta_e = -1,8 \cdot \left(\frac{\partial W}{\partial \tau}\right)^2 + 4,6 \cdot \left(\frac{\partial W}{\partial \tau}\right) + 38,7 \quad (1)$$

$$\delta_e = 52 \cdot \ln(t_1) + 13,6 \quad (2)$$

where V_e – volume of eaten up by pores grains gases, $\cdot 10^{-6} \text{ m}^3/\text{kg}$ grain; δ_e – specific part of eaten up by pores grains gases to the general volume of withdrawn moisture %; Θ – temperature of grains, °C; t_1 – temperature of drying agent, °C.

Conclusions:

1. CPB is directly linked with its drying rate ($dW/d\tau$).
2. Duration of reduction of CPB is in direct dependence on drying rate ($dW/d\tau$), sizes of grain and is about 2 - 8 minutes for wheat grain and 7 - 18 min for corn grain.

KEY WORDS: grain, drying, convection, heat, resistance of moisture diffusion.

ENERGY-SAVING TECHNOLOGY OF THE MOIST GRAIN SEPARATION

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The separation processes become worse with the increasing of the humidity of the grain mixture. Separation processes of are the mixtures related to friableness. Friableness of a mixture is characterized by the angle of natural slope and depend on the number of factors.

With the increase of the mixture humidity an angle of natural slope grows and its friableness gets worse. With the reduction of a model mass of the particles their friableness correlates greatly with the level of humidity.

For the improvement of the particles of friableness a grain mixture (GM) we have worked out the technology of convection of method for managing particles humidity in superficial layer and we also calculated the rational modes.

This technology takes into account the features of structurally-mechanical, biochemical and thermophysical indexes of different components in the mixture.

Experimental research confirms technological possibility and financial viability of the worked out technology. The coefficients of moisture diffusion of coefficients of the proportion that shows the dependence of GM wheat separation efficiency from semiempiric equalizations is specified from the speed of separation[^]

$$E_{oil} = 174,63 - 159,0 \cdot (G), \% \quad (1)$$

We specify the conformities to moisture diffusion low and the changes of friableness in GM particles different thickness, form and antiparticles.

Conclusions:

1. Separation processes are connected with grain mixtures friableness.
2. The coefficient of external friction is related to the humidity of superficial layer particles;
3. The Friableness of the particles of different thickness and form depends differently on the humidity of their surface.
4. The Technology of intensifying separation the by changing friableness of bread components is worked out.

KEY WORDS: grain, admixtures of grain, humidity, separation, friableness, coefficient of friction.

APPLICATION POTENTIAL OF MILK WHEY PROCESSED WITH ELECTRICAL SPARK DISCHARGES

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Manufacture of whey-based beverages provides an opportunity to obtain dietary, preventive and therapeutic food products, ensures waste-free production, and extends a line of the products.

To ensure appropriate organoleptic properties, a significant range of whey-based beverages are manufactured from the whey purified from protein particles. Using the traditional methods of whey purification (separation, filtration, settling, membrane methods, etc.), the whey is separated into clarified whey as a basis for beverages and protein concentrate. After when the protein component is removed from it, a biological value of the beverages decreases.

Therefore, new method should be sought to process the whey that would allow to preserve protein composition and, at the same time, to ensure a system stability for sediments.

The whey was exposed to processing tests at the laboratory-based electro-hydraulic facility (Ukrainian Patent # 22033 dated 10 April 2007). The processing was carried out using voltages of 30, 35, 40, and 45 kV and discharges ranging from 5 to 30, at a pitch of 5.

Test samples were exposed to a dispersion analysis of the protein particles carried out using Zetasizer Nano ZS device (Great Britain), electrophoresis was performed using Hoefer Mighty Small device (Amersham Biosciences, USA), and ion-exchange chromatography using the T 339 automatic amino acid analyzer (Microtechna, Czech Republic), while microbiological data were received using standard approaches.

The dispersion of protein particles was found to be positively effected by electrical sparkling processing; in particular, particles were ground by 1.5.....10.0 times depending on the number of the discharges. The best result was obtained when processing patterns by 20 discharges at the voltage of 45 kV, with the average size of particles ranging from 89 nm to 100 nm.

The obtained results evidenced that the whey processed by electrical spark discharges contained α -casein and β -casein in the quantity of 20...25% and 16...18%, respectively, which precipitated upon storage, and α -lactalbumin (11...12%), β -lactoglobulin (72...85 %), immunoglobulin (4...6 %) retained in the solution.

The next stage of the research proved a positive impact of this type of processing on the microbiological indicators of milk whey, in particular, a total composition of microorganisms.

It is proved an inactivation influence of the electrical sparkling processing on microorganisms, including yeast and mould. The most efficient inactivation of microorganisms in milk whey was observed when processed by 15...25 discharges of 45 kV voltage, with their total quantity decreasing by average of 50...55%.

KEY WORDS: milk whey, electrospark discharge, inactivation

EXPANSION OF ASSORTMENT OF BEVERAGES WITH USE OF NATURAL UNCONVENTIONAL RAW MATERIALS

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Nowadays producing beverages on the basis of natural raw materials is perspective. Natural raw materials should be accessible and include biologically active substances. In our researches it was offered to use such raw materials as sweet sorghum. Sweet sorghum is a perspective crop for Ukraine. There are some main advantages of sweet sorghum in beverage industry: sweet sorghum has a great tolerance to a wide range of climatic and soil conditions; it has short vegetative period; sweet sorghum has high and stable productivity. Producing fermented beverages on the basis of sweet sorghum will expand assortment of the existing market of beverages. Sweet sorghum juice which is offered to use in technology of fermented soft drinks, is characterised by revitalizing action as contains essential macro- and microcells, such as iron, calcium, potassium.

Defining of suitability of sweet sorghum juice to use in the beverage industry was the purpose of our researches. Qualitative characteristics of sweet sorghum juice and wort made on its basis have been studied. Qualitative characteristics such as pH, total soluble solids, reducing sugars, total sugars, amine nitrogen, total nitrogen content, and starch content were defined. All qualitative characteristics of juice and the wort were measured with the help of [standard test procedures](#). In our studies the basic technological parameters of preparation of wort for its further fermentation by yeast are investigated and defined. Wort preparation carried out by means of hydrolysis of starch of juice with use of thermostable alpha-amylase (Termamyl 120L) at the first stage which brought in juice and maintained it at temperature 80°C within 30 minutes. And at the second stage of hydrolysis gluco-amylase (SAN Super 240L) was added after wort cooling to temperature 55°C and then maintained juice within 15 minutes.

It has been estimated and optimised quantity of the enzyme preparation necessary for carrying out of hydrolysis of starch. It has been established, that for the achievement of full hydrolysis of starch of raw materials under certain conditions it is necessary to bring to 0,34...0,45 unit AA/g of raw starch of enzyme Termamyl 120L and 9...10 unit GIA/g of raw starch of enzyme SAN Super 240L. It is possible to recommend the received wort to use in technology of fermented beverages.

KEY WORDS: sweet sorghum juice, fermented beverages.

DETERMINATION OF CARBOHYDRATE COMPOSITION OF AROMATIC RAW MATERIALS

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The use of aromatic raw materials in the formulas of dairy products is a promising direction to expand their assortment. Spices give products not only variety of taste qualities, but also favor better digestion, have preventive and curative properties. Diverse taste and aromatic properties which spices give to products depend on the content of different groups of organic and inorganic matters - essential oils (terpenes and their oxygenates derivatives - aldehydes, cetones, acids, alcohols and their esters), carbohydrates, organic acids, minerals etc. A large role in the forming of food gustatory qualities belongs to carbohydrates, which somehow cause compatibility of spices in the compositions and determine the direction of their future use.

As the research objects anise, star anise, cloves, sweet pepper, ginger, cardamom, cinnamon, turmeric, nutmeg, fenugreek seeds, sumac and black pepper were used. The carbohydrate composition of these spices subject to the content of sucrose, fructose and glucose was investigated using the method of liquid chromatography (see Table).

Table

Carbohydrate composition of spices

| Title of spices | Mass fraction, % | | | |
|-----------------|------------------|----------|---------|---------|
| | total sugar | fructose | glucose | sucrose |
| Nutmeg | 12,94 | 3,06 | 9,06 | 0,82 |
| Anise | 10,19 | 2,14 | 3,21 | 4,84 |
| Sumac | 8,54 | 2,23 | 5,45 | 0,86 |
| Ginger | 8,39 | 1,70 | 5,38 | 1,32 |
| Cardamom | 8,34 | 0,88 | 6,46 | 1,01 |
| Star anise | 7,20 | 3,76 | 2,92 | 0,52 |
| Fenugreek | 4,54 | 0,001 | 3,51 | 1,03 |
| Sweet pepper | 3,10 | 1,18 | 1,12 | 0,80 |
| Black Pepper | 3,04 | 0,13 | 0,83 | 2,08 |
| Cloves | 2,99 | 1,06 | 1,21 | 0,73 |
| Turmeric | 2,90 | 0,67 | 1,64 | 0,59 |
| Cinnamon | 2,55 | 1,09 | 1,08 | 0,38 |

It was found that the largest carbohydrate content was characteristic of nutmeg (12.94%) and anise (10,19%). Moreover it was defined a relatively high content of sucrose (4.84%) in anise, which provides sweet flavor while used. In nutmeg there prevails glucose, which is less sweet than sucrose, therefore the sweet aftertaste is hardly noticeable. Rather high carbohydrate content was found in the spice of sumac - 8.54%. But this spice is characterized by a relatively high content of organic acids, which mask sweet flavor. Such spices like cloves, turmeric and cinnamon are characterized by a relatively low carbohydrate content. That is they give a pronounced nutty flavor and aroma and can be used in foods adding both salt and sugar, and mix well with other spices.

The results obtained can be used to create compositions based on the spices above mentioned and to develop the technology of products with their usage.

KEY WORDS: aromatic raw materials, carbohydrate composition.

IMPROVING RECIPE COMPOSITION AND TECHNOLOGY OF BREAD STICKS

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It is possible to improve usefulness of bread sticks due to the making in their recipes the alternative for baking natural ingredients with high nutritional and biological value. We can offer such functional ingredients as basidiomycetes, in particular *Pleurotus ostreatus* mushrooms that contain significant amount of nutrients.

To enrich recipe composition with more protein was decided to add alimentary casein, which proteins by amino acid composition blend well with flour proteins and *Pleurotus ostreatus* mushrooms.

With the help of software «Optima» and experimental laboratory baking a new recipe of bread sticks with a balanced chemical composition was designed. The products, which recipe contained *Pleurotus ostreatus* mushrooms and casein in the amount of 25 % and 7 % to their weight of flour respectively, had high organoleptic, physical and chemical properties. The investigations have shown that in the finished enriched sticks proteins content increases by 50,5...52,5 %, protein's quality index rises from 0,71 in traditional products to 0,81.

The production of bread sticks requires a complex of specialized equipment (dough sheeting machine, plaits cutting forming machine, etc.). It is offered to improve the technological process of enriched bread sticks production due to the introduction of fermenting-forming aggregate (extruder) that was developed by scientists of our university. In the aggregate cold extrusion processing of the dough at higher pressure, namely its ripening, standing and forming, take place. By the method of mathematical planning of multifactor experiment it was determined that dough with *Pleurotus ostreatus* mushrooms and casein should knead for 10...11 min. The optimal pressure in the vessel of the fermenting-forming aggregate is 0,2 MPa, the duration of dough ripening under the pressure is 10 min. It was received a mathematical model that adequately describes the influence of technological parameters on the quality of finished products.

KEY WORDS: bread sticks, *Pleurotus ostreatus* mushrooms, alimentary casein, fermenting-forming aggregate

THE USE OF NANOTECHNOLOGY FOR SURFACE PROTECTION OF MEAT PRODUCTS

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Fundamental basis of nanotechnologies are new, previously unknown properties of the materials arising from the transition to the nanoscale particle size. The nanometer scale properties specificity and the new physical phenomena resulting are caused by the dimensions characteristic in the nanoobjects structural elements (they are in the range 10^{-9} - 10^{-7} m), then we can consider nanostructures regarded as a special state phase. By working with such small sizes manifest quantum effects and intermolecular interactions.

An integral part of the paradigm of a healthy diet is to ensure safety for the user of the food, because today food is one of the main sources in chemical and biological nature exposure hazardous substances of. These contaminants can appear in it during production, storage and sales, as well as come from the environment (according to the literature, about 90 % of food poisoning caused by biological factors).

The nanotechnology using is the packaging materials manufacture of food products. Package based on nanotechnology are divided into active and effective. Active nanopacking – is packaging, which has constant properties (e.g., plastic, blocking the penetration of carbon dioxide, oxygen and / or pathogens).

Efficient nanopacking reacts to changes in the environment – the emergence of a pathogen, food deterioration. For example, a package with immunoactive indicator changes colour during the violation of temperature storage products.

Advanced are antibacterial and antifungal surface package coated with silver-, zinc- or magnesium nanoparticles, a lightweight and durable heat-resistant film with silicate nanoparticles coated with modifiable permeability and others.

One solution of the problem of protecting meat from defeat by various microorganisms is a way of packaging as protective coatings from aqueous polymer dispersions directly on the surface of the product.

Such protection is regulated by the mass transfer processes, reduces the weight loss of the finished product, improves the sensibility, as well as ensuring that the technology of packaging and storage is a modern and rational. A characteristic aqueous polymers dispersions feature is the possibility it's applying to the surface of any shape.

KEY WORDS: nanotechnology, packaging, meat products

IMPROVEMENT TECHNOLOGY SEMIS CULINARY OF POULTRY

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Muscular tissue in poultry dense and close-grained. In comparison with slaughtered animals, it is less permeated by connective tissue, more tender and friable, and therefore better absorbed by the human body. In chicken meat much muscle tissue, thus it differs from the meat of animals that have denser connective tissue. Due to even distribution of fat between muscle bundles poultry has delicate texture, a pleasant taste and aroma. Red meat contains less than white, nitrogenous extractives and more fat. Most developed pectoral muscles, which share almost equal to the mass of other muscles.

In terms of nutrition physiology poultry is an important source of protein in the diet of both healthy and sick people. Today poultry meat consumption per capita in most countries is on the second line after pork and perhaps in the near future, it will take first place. Fowl nutritious and easily digestible (93%). The meat contains minerals potassium, sodium, phosphorus, calcium, iron, and copper since. In many poultry extractives as broth, fragrant, causing increased excretion of digestive juices, and it promotes better digestion.

The aim of our work is to improve production technology of meat products, namely chicken "popcorn" by making the recipe carotene in the form of plant material (pumpkin) and activation of protein ground meat by adding food alumina. Carotene (Latin carota) - C₄₀H₅₆, soluble orange-yellow pigment from the carotenoid group, the precursor of vitamin A. The norm for body vitamin A 1.5 mg, carotene to 4.5 mg in 1 kg of carrots contains from 50 to 200 mg carotene concentration of carotene in pumpkin 5 times higher than carrots.

Alumina – a natural form of distribution of aluminium oxide Al₂O₃, the quantitative composition of the earth's crust, he is second only to silica.

Investigation into functional and technological indicators possible modifications combined ground meat from chicken using hydrophilic forms of alumina allowed bacteriostatic increase stability and functionality of food products from poultry quick cooking.

KEY WORDS: meat, chicken, pumpkin, carotene, alumina

INNOVATIVE MODEL OF MEAT PRODUCTS WITH THE USE OF MUSHROOM RAW MATERIALS PRODUCED INDUSTRIALLY

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Interest in mushrooms is due to special flavouring properties of fruit bodies and a unique complex of biological substances, especially proteins. Depending on the type of mushroom, the content of nitrogenous substances ranges from 15,31 to 60,3% (in recalculation to dry substance), which is more than in meat, eggs, peas, and rye. The nutritional value of protein mushrooms is considered with the optimal quantitative ratio of amino acids, as their combination satisfied the needs of the human body at best. They contain more than 20 amino acids, including all the essential ones. In addition, champignons contain an urea (up to 13%), which given carbohydrates can be synthesized into amino acids.

The purpose of our work was to summarize a data of the protein quantitative content and evaluate a balanced amino acid composition of the fresh industrial production mushrooms (mushrooms, oyster mushrooms, shiitake), as well as their use in the development of new meat products formulations. Content of protein in mushrooms and meat products were determined using the method of Keldal. The calculation of the balance of amino acid composition of mushroom protein was carried out according to the methodology suggested by academician N.N. Lupatov. The following was estimated: an utilitarian coefficient of the amino acid composition of protein, reflecting the balance of essential amino acids with respect to the chosen standard; comparable redundancy rate, which characterizes the total weight of non-utilized amino acids in a quantity that is equivalent to their potential utilization in 100 grams of protein-standard. Comparative characteristics of balanced amino acid composition of proteins mushrooms according to the standard of FAO show that the limiting amino acid for the majority of mushrooms is tryptophan, and for certain mushrooms - isoleucine, methionine and cystine. Mushroom protein contains a significant amount of lysine, phenylalanine, tyrosine, valine.

We have developed a technology of boiled sausages and meat loaves with mushroom raw materials. Mushrooms were processed preliminary at $t = 100\text{ C}$, for 20 minutes, cooled at $t=0$ to 5 degrees or frozen at $t = -18$ degrees C. Before adding to a minced meat mushrooms crushed up to 0.5 - 1 mm to increase the contact area of the particles and the formation of solid adhesion layer between muscle proteins and mushroom raw materials.

Organoleptic evaluation results of minced meat pattern suggested that a mushroom raw materials adding, at the stage of mixing, in the following quantities of mushrooms - 25%, oyster mushrooms - 35% and shiitake - 30% is appropriate for the formulation development.

KEY WORDS: meat product, mushrooms, amino acids

INNOVATIVE TECHNOLOGY OF CONDENSED MILK CANS

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Financial instability, lack of high-quality raw milk and its cost, increase of competition with the imported products, and tendencies to improvement of balanced daily diet of people – are the main factors influencing development of canned milk industry in Ukraine. These factors stimulate producers to direct their activities towards the development of innovative, cost-effective, energy-saving technologies with the intensification of technological processes and production of new types of condensed milk products with a balanced composition, higher biological value with desired organoleptic and physic-chemical properties.

Since the chemical composition of condensed canned milk with sugar does not meet the modern requirements of nutrition, namely daily needs in the use of vitamins, minerals and nutrients, it is proposed to use as filler for canned milk plant material. Plant origin supplements can reduce the deficit of daily diet in vitamins, minerals and other nutrients.

Fruit syrups are recommended from wide range of fillers for use thanks to their organoleptic, physical and chemical characteristics.

The analysis of trends in the food products market has shown that due to unhealthy diet, which leads to the development of several diseases (cardiovascular, obesity, tachycardia, and hypertension), there exists the need for health-care, dietary, healthy and functional products. Analysis of Ukrainian nutrition shows lack of nutriciology due to inadequate consumption of vitamins, minerals, and overload of carbohydrates.

Taking into account current priorities of food industry direction nutrition the technologies of condensed canned milk with sugar and fruit and berry syrups and technology of canned milk with sweeteners (fructose and crystalline fructose syrups) were developed by department of the technology of milk and dairy products. It was found out that adding syrups contributes to the formation of better consistency comparing with traditional products, generates stronger taste and smell of the product. It was established that introduction of the fruit syrups in milk cans allows to receive product with a higher content of biologically active substances.

KEY WORDS: condensed milk cans, fillers, sweeteners.

CHEMICAL REAGENTS FOR INTENSIFICATION OF DIFFUSION JUICE PURIFICATION

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We have developed methods of raw juice purification with progressive preliming, defecocarbonatation, use of high molecular complex reagent "CROSS - 5" and ammonium dihydrogen phosphate.

Addition of reagent "CROSS-5" to the juice before removing predefecocarbonatation mud improved both the sedimentation/filtration properties and adsorptive capacity of the mud. Thin juice had purity on 1,4...2,0 units higher and calcium salts 70,6...81,0% lower, colour to 44,3...54,4% lower.

When sugar beet is of high quality the clarified defecocarbonatation juice is subjected to a main liming and two-stage 1st carbonatation, passing CO₂ to pH 11,6...11,8 and then to pH 11,0...11,2. Then follows the juice without filtration passing CO₂ to pH 9,2...9,5 optimal for 2nd carbonatation. Thin juice had purity on 1,6 unit higher and anions of acids on 44,2% lower, colour – on 47,7% lower. Lime consumption decreased from 120,0 to 77,0% CaO on non-sugars of raw juice.

Investigations showed considerable advancement in the efficiency of raw juice purification by means of using NH₄H₂PO₄ on the primary and on the last stage of purification. It is ascertained that addition NH₄H₂PO₄ in alkaline medium at zone pH 11,5...9,5 at the high ionic correlation Ca/P as 1,67 generated hydroxyapatite with the big specific surface (100m²/g). The mechanism of formation hydroxyapatite by means using NH₄H₂PO₄ is suggested.

Addition of 0,2% NH₄H₂PO₄ on filtered preliming juice permits to increase degree of precipitation and flocculation of high-molecular compounds on 84,0%, calcium salts and precipitation of anions which form insoluble lime salts – on 93,0%, colour – on 27,0%. Thin juice had purity on 2,0 units higher.

Addition of 0,10...0,15% NH₄H₂PO₄ on filtered juice of 1st carbonatation at zone pH 11,5...9,0 degree of precipitation anions acids and calcium salts increased on 85,0%, colour – on 55,0%, high-molecular substances as protein – on 70,0%. Thin juice had purity on 2,0 units higher.

The suggested methods of juice purification by using high molecular complex reagent "CROSS-5" and ammonium dihydrogen phosphate allow to the reduce lime consumption to purification, increase the efficiency of lime-carbon dioxide purification, the yield and quality of white sugar.

KEY WORDS: defecocarbonatation, flocculant, hydroxyapatite, big spesific surface, adsorptive capacity.

INCREASE OF EFFICIENCY DIFFUSION JUICE PURIFICATION USING COMPLEX REAGENT

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We have developed methods of raw juice purification with progressive preliming, defecocarbonatation a small amount of lime and use of high molecular complex reagent "CROSS-5", precipitate of coagulate high-molecular compounds and slightly soluble calcium salts before the main liming.

Passport of security is approved, resolution the state sanitary-epidemiological expertise and State Standard, as well as the permission to use in the sugar industry is received on complex reagent "CROSS-5".

Basic constituent substance of high molecular complex reagent "CROSS-5" is a copolymer of N,N-dialkyl-N,N-diallilammony chloride and methacrylic acid - polymeric quaternary ammonium compound, cationic substance, the positive charge which is in each link of the macromolecule.

The introduction of high molecular complex reagent "CROSS-5" with high content of cationic groups to predefecocarbonatation juice with pH of 9,0...9,5 in the amount of 4,0·10⁻⁴ ...5,0·10⁻⁴ % on juice violates the stability of the heterogeneous dispersed medium, stabilizing solvate layers of high-molecular compounds in consequence of intensive intermolecular interaction.

The mechanism of action of reagent "CROSS-5" consists in that macromolecules of polycationic type can adsorb different parts simultaneously on a few particles of the dispersed phase, forming hydrogen bonds between them.

The interaction between the polymeric links "CROSS-5" and the surface charges of the suspended particles causes destabilization of the surface negatively charged groups of the high-molecular compounds, that leads to their rapid coagulation and precipitation, a significant improvement of the sedimentation-filtration characteristics of juice and to the increase of the degree of precipitation high-molecular compounds, calcium salts, protein and colour compounds.

Use of the reagent "CROSS-5" allows us to partially simplify technological scheme, move to directly carbonatation juice of main liming to pH 9,25...9,5, optimal for II carbonatation, without intermediate separation of the precipitate after the I carbonatation: the purity of the purified juice increased by 1,6 units, the content of anions of acids - by 44,2%, colour juice is reduced by 44,7%, the total lime consumption to purification down from 120,0 to 77,0% CaO on non-sugars diffusion juice as compared to a standard method of purification.

KEY WORDS: dfecocarbonatation, complex reagent, copolymer, polymeric quaternary ammonium compound, total lime consumption.

TECHNOLOGICAL CONDITIONS OF OBTAINING THE PECTIN FROM CABBAGE

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It is known that natural supplements that contain pectin perform complex effects on the human body:

Pectin substances - are biopolymers, containing carbohydrates, with complex chemical macromolecules. Its configuration and conformation change, depending on the temperature, duration of the process and concentration of hydrolyzed reagent. Extremely different in molecular weight pectin chains differ in structure and character of supramolecular structures. Pectin molecules have a predominantly filamentous structure and relate to linear colloids with a length of molecules about 0.00001 cm. In aqueous solutions pectin molecule takes the form of a spiral.

The aim of our work was to study the optimal technological conditions of extracting pectin from cabbage, improvement of wasteless technologies of plant material processing and determination of physical and chemical properties of pectins obtained.

A series of studies on the allocation of pectins, which precipitate alcohol were conducted in the lab out of white cabbage. Hydrolysis- extraction was carried out using hydrochloric acid. Pectin hydrolyzate was concentrated, pectin was precipitated with ethanol, centrifuged, washed three times with ethanol, dried and crushed.

Yield and analytical characteristics of obtained pectin - methoxy and free carboxyl groups content uronic component was determined by titration method.

Investigation of the pectin structure of cabbage was conducted by IR spectroscopy, which confirms the presence of functional (carboxyl, hydroxyl and ether linked) groups in the molecules of the polysaccharide

The method of mathematical modeling was applied to planning the experiment on optimization of the allocation of pectin in cabbage.

One of the types of regression analysis was chosen for the experiment, rotatable plan of the second order at three factor experiment. Temperature, duration of the process, content of hydrolyzing reagent (% HCl) were chosen as the variables of the experiment.

The largest yield of pectin was obtained at 65 ° C, pH 1.35 and duration of 180 min. Samples of pectin under different conditions of hydrolysis differed in the degree of esterification, which indicates their different molecular weight.

The equation of the relationship of the kinetic characteristics of the process was obtained. Computer processing of the data, using the software package MathCAD, allowed to get a power dependence of the yield of pectin on factors that influence the course of the process.

KEY WORDS: Pectin, Ester, Hydrolysis, Optimization, Carboxyl Group

USE OF MODIFIED STARCHES IN PASTRY PRODUCTS MANUFACTURE WITH EXTENDED SHELF LIFE

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Perfection of the technology and improvement of the quality of the finished products are the main objectives of confectionery industry producers. However, more attention is paid to the lengthening of shelf life of finished products, as this factor has got a direct impact on the competitiveness of food products. Factors that affect the rate of spoilage are different, but if speaking about pastry with sufficient moisture content, the main factor is concretion of products.

The aim of our research is to study the effect of modified starches on quality of confectioneries with prescribed shelf life. It is known that the cause of pastry concretion is the redistribution of moisture in the product, drying and starch retrogradation process. In this case, the change in the structure of starch during storage determines mainly the speed of a product's concretion.

Such modified starches were used in the experiments: «Microlys FH02», «Swely Gel Soft», «Cold Swell». All selected starches have the same primary raw materials - native potato starch and is the starch of cold swelling that differs by the ways of modifications during production.

The study of changes in the structure of starch flour in the ready-made biscuit semi fabricants were carried out by X-ray diffraction obtained by X-ray diffractometer DRONUM-1 through radiation.

During 9 days the changes in the samples of semi-finished biscuit with modified starches addition were observed in the amount of 1% to weight of flour. As a control sample a precooked baked biscuit without introducing additives was used.

Diffractograms of different samples have show that the addition of these modified starches leads to less destruction of the crystal structure, in contrast to the control sample. This may explain a great deal of moisture absorption by additives. Our experiments showed that the modified starch Swely Gel slows down the product concretion more than other additives.

KEY WORDS: lengthening of shelf life, modified starches, biscuit, confectioneries

INFLUENCE OF USE OF FOOD ADDITIVES ON THE STABILITY AND SAFETY OF THE POULTRY MEAT SECOND RAW MATERIALS

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The poultry meat is a relatively new and economically attractive kind of raw materials for Ukraine. It is explained, first of all, by its low prime price and by the fact that the production volume of poultry meat constantly increases. Increasing of the production volume of poultry meat causes the necessity to improve the technology by introducing the deep complex processing of the raw materials which is characterized by the variety of the technological and organoleptic properties. Considerable proportion of this production belongs to the mechanically separated poultry meat (MSPM) and a new product – collagen gel (CG). MSPM – is a natural product with the content of 12% of protein and 14% of fat. CG's content of protein is 16.53 %, lipids – 13%.

The particularities of this poultry meat second raw material influences its properties during the processing and its storage. First of all it refers to the lipids fraction which undergoes a rapid oxidation and is accompanied by the change of the organoleptic properties, quality and nutritional value of raw materials.

To improve the stability and safety of MSPM and CG can be used food additives. As a dietary supplement we can consider the sodium citrate (SC), which has a complex effect and is used to inhibit the growth of undesirable microorganisms, forming colour of meat products, rising their stability, preserving taste and aroma of products. Accepting the relationship of these processes to the oxidation of lipids it is interesting to study the SC as an antioxidant.

For meat-based systems that grounds on MSPM an CG obtained directly after machining with SC after ending the term of preservation inhibition of the oxidation process was small comparatively with the control system. On a system with additives (SC and sodium nitrite) during this period decreased rate of oxidative process lowered at 1,38 times. Phosphate which was leading in this system practically didn't effect on intensity of making an oxidation products. For meat systems the greatest antioxidant effect after heat treatment was observed in the sample with a complex Supplements (SC, sodium nitrite, phosphate) for which the speed of oxidation was less at 1,67 times.

The same dependence was set for the model system based on MSPM and SG after the frozen storage.

Thus the facts give us the possibility to suggest that the effective inhibition of the lipids oxidation of MSPM and CG is possible in case of introducing new integrated additives.

KEY WORDS: poultry, dietary, supplement, antioxidant, raw

CREATION OF FUNCTIONAL MEAT PRODUCTS WITH THE USE OF BIOMASS OF *PLEUROTUS OSTREATUS* (JACQ.) P. KUMM., CULTIVATED BY MEAL

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The relevance of the research in the field of healthy nutrition of the population directed on expansion of assortment of products with high biological value, because the food is a source of energy, plastic substances, which are necessary for building and reconstruction of protein structures of the organism, vitamins and mineral salts.

Of special importance in this aspect has a rational use of valuable kinds of natural raw materials, which include mushrooms. Their uniqueness is due to the relatively high content of protein and biologically active substances, dietary fibers. Repeatedly scientists have proved that the use of mushrooms is recommended for strengthening of the immune system, anemia, mental and physical fatigue, demineralization, uremia, normalizes blood pressure and cholesterol level, prevents the formation of cancer cells. The biological value of the proteins of mushrooms determined the optimal ratio of amino acids, as well as their high-quality content conforms to the needs of the human body in the best way. Mushrooms contain of sterols, phosphatides, ethereal oils and polyunsaturated acids (up to 67% of the mass of lipids), which are not synthesized in the human body.

For the scientific substantiation of a possibility of creation and development of functional products and products of special purpose, in the framework of the state subjects «Development of innovative technologies of meat products with mushroom raw materials that are nutrient adequate to health-improving, therapeutic and herodietary food» (ST № 0113U001426) at the Department of technology of meat and meat products is conducting research on the use in the composition of meat products (cooked sausages, sausage meat, loaves) the biomass of mushrooms, cultivated by meal of medicinal plants.

The results of the research revealed that *Pleurotus ostreatus* (Jacq.) P. Kumm. (oyster mushroom) growth with various intensity on selected different meal – seed of wheat germ, cucurbit, Silybum, Linum, oats, rose hips and walnut. It is set the maximum mushroom bioconversion of wheat germ meal, which is 40%, and bioconversion of Linum meal and oats meal at the level of 26,2% and 26.5%, respectively. The number of educated biomass of oyster varied from 7.5 g/l (on the walnut meal) to 24.1 g/l (on the wheat germ meal). The method of computer modelling developed recipe of sausages, in stuffing by the replacement of beef and pork at the mushroom biomass of *P. ostreatus* in the amount from 10 to 30%.

It should be noted that the creation of meat products on the basis of nutrient-enriched edible mushrooms, with can growth on ecologically clean substrates, consistent with the concept of functional and therapeutic nutrition.

KEY WORDS: meat product, bioconversion, mushrooms,

MEAT SNACK PRODUCTION WITH USING ENZYMES

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The modern meat processing technology is aimed at expanding range of new products. One of the improvements in technology search solutions is to adapt the traditional "national cuisine" to the globalization of production.

The developing global market snack products are active. Snack – a convenient way to satisfy hunger on the road, at work and at home. Fashion for a healthy lifestyle contributes to market those snacks made from natural ingredients with a minimum number of different additives. Cured, dried meat snacks, meat chips, sausages, chips, and steak – all kinds of meat snacks.

The production involves fermentation of meat (ground beef restructured) using enzymes, soy sauce and other spices combined compositions, complex sugars, with further drying at temperatures of 18 to 76 ° C. The main objective of the drying step is to remove the active water Aw and bringing the product to perfection. In traditional forms of these products normal moisture content of 25-35%, which allows for long-term storage without refrigeration chambers, while minimizing the Aw of 0.6 units (stops the development of mould.)

While improvements in technology restructured Jerk meat snacks were made as part of a combination product of beef first (higher) class, lean pork, and enzymes salt ingredients with a high degree of maltodextrin in the fermentation of raw meat to further reduce Aw.

While studies we have investigated the conditions for drying samples of ground meat in the two ratios main raw recipe (beef and pork).

As a result (after drying) the output is a product with an intense red colour and high-touch indicators.

KEY WORDS: meat, enzymes, beef, pork, fermentation

MEAT OF TURKEYS, AS AN INNOVATIVE PRODUCT OF THE 21ST CENTURY

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Functional food products have become one of the popular directions of innovative development of many countries of the world, the production of which is growing every year on 15-20% and makes up: in the USA, 38% of the volume of sales in Europe was 31%, in Japan - 23%, respectively. Since our market is largely adopts the ideas and fashion in the West, it can be stated that in Ukraine functional products have considerable potential for development. According to the FAO world meat production in 2012 increased by approximately 2% and amounted to 302 million tonnes due to the production of pork and poultry meat, which is 103,5 million tons. Products containing poultry meat have become the most popular object of innovative development of many countries of the world, because the market requires novelty. Of the total number of poultry meat, that is, up to 86% of chicken meat (meat broiler is 72,9%), and this figure has remained stable in recent years. The annual growth of meat of broilers is more than 1 million tons. The share of manufacture of meat of turkeys is 7-9% in world production of poultry meat, meat waterfowl - 6,4%. The annual consumption of the meat of turkeys per capita is in Israel - 12,0 kg, in the USA - 8,0 kg, in Europe - 4,0 kg, in particular in Poland - 4.5 kg, in Russia, about 1 kg, in Ukraine - 0,2kg.

The main operators of the market on manufacture of meat of turkeys in Ukraine there are 8 enterprises. Turkey meat is a unique dietary product, which combines the properties of chicken, veal and lamb. The share of muscle tissue in the carcasses of turkeys And II category is within 44-47 %, and the content of the skin with subcutaneous fat is 13-22%. FROM one ton of meat of turkeys get 700-800 kg of pure meat, including up to 300 kg of the pectoral muscles. Fraction of total mass of white meat without the skin in Turkey reaches 22.3 per cent), red - 18,9%. In red muscles contain less protein, fat, cholesterol, phosphatides, ascorbic acid; in the white muscle more than 350, glycogen.

At the Department of technology of meat and meat products of National University of food technologies, a study was conducted of chilled meat of turkeys of the different producers of Ukraine. These indicators of the quality of the product, - the food and biological value, compared with similar characteristics meat dairy veal and lamb, which is traditionally used as a dietary and environmentally safe raw materials, in the production of functional and dietary foods.

According to the physical-chemical indices of the meat of turkeys almost does not differ from meat of milk veal, and protein content (22,0%) has the advantage over other types of meat. Compared with the meat of chickens-broilers, the meat of turkeys have higher level of these essential amino acids, as lysine, methionine, leucine, isoleucine, threonine.

The content of essential amino acids in meat of turkeys (from 7.23 to 7,831 g per 100 g of meat) is the highest compared with the proteins of meat other species of birds, is second only to milk veal in 1.3 times. On the content of amino acids, which depend on the formation of the organoleptic properties of meat products (alanine and glutamine acid, methionine, threonine), Turkey meat exceeds the calf and the young mutton in 6,072 against 5.15 and 5,075 respectively per 100 g of meat.

The greatest changes in the chemical composition of meat associated with quantitative and qualitative composition of lipids, the obtained data testify to the fact that Turkey meat is a valuable and dietetic food, which is especially important for people with obesity, hypertension, diabetes mellitus. Turkey meat and products from it have a chance to take a strong position on the market, so how are characterized by high biological value, the higher the muscles and the edible parts of the compared with the meat of chickens-broilers.

KEY WORDS: meat product, turkey meat, amino acids

MEAT OF FERAL ANIMALS AS RAW MATERIAL FOR DIET OR MEDIOPROPHYLACTIC MEAT FOODS

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Today there is a drop in production of meat and meat foods in meat production. This is due to a considerable reduction in the number of cattle and pigs, and the high cost of meat and meat products, as well as consumers' distrust in meat derived from industrially grown animals using a variety of chemical additives, antibiotics, stimulants and hormones in their fattening. Traditionally, in our country, meat products are made from beef, pork and poultry. However, from the point of view of the science of food, these types of raw meat is largely inferior to the meat of wild animals, which has always been a healthy and nutritious food.

Meat of wild animals is always considered something exclusive. Thus, the average consumption of the meat in Europe is 400 grams per capita per year. Wild ungulates take high, and in many countries leading role in hunting industry, in addition, the benefits are obvious exploitation of wild plant mammals, such as: more complete and efficient use of unproductive lands, a wide range of different food consumptions, and hence low cost of meat, resistance to diseases and natural disturbances, high commercial quality of meat, delicious, dietary and anti-cholesterol qualities of meat, possibility of multiple use (industrial, sport hunting, and various forms of breeding).

The nutritional value of meat due to its composition of complete proteins, containing the essential amino acids (valine, leucine, isoleucine, lysine, methionine, threonine, tryptophan, phenylalanine), interchangeable - alanine, histidine, hydroxyproline. Each protein in the organism is unique and exists for a particular purpose, the proteins are not interchangeable. They are synthesized in the organism from amino acids, which are formed by the breakdown of proteins that are in food. Thus it is an amino acid, but not the proteins are the most valuable nutrients.

We have studied the examples of meat: wild boar, pork, hare, rabbit, red deer, reindeer and sika deer, beef. Among the most irreplaceable amino acids the largest quantity of methionine is in meat of red deer (2,56 gr/100 gr of protein), the largest quantity of threonine is in the meat of wild boar (5,56 gr/100 gr of protein), which is rich in tryptophan (1,37 gr/100 gr of protein), the largest quantity of phenylalanine are in meat (4,14 gr/100 gr of protein). Meat of wild animals is particularly rich in essential amino acids. Arginine, aspartic acid and histidine are mostly in the meat (7,32; 9,82; 1,73 gr/100 gr of protein correspondingly). There is much glycine in reindeer (7 gr/10 gr of protein), and the largest quantity of glutamic acid are in meat of different species of deer (16,7 gr/100 gr of protein). Minerals do not have energy value, but human life is impossible without them. The greatest amount of potassium and sodium is found in deer meat (333 mg per 100 gr of meat and 84 mg in 100 gr of meat correspondingly), hare is rich in calcium and zinc (21 mg in 100 gr of meat and 2985 mkg in 100 gr of meat correspondingly). Unlike meat of farm animals meat of wild animals contains less fat that is saved on the inside and subcutaneous tissues, and in the muscle tissues it is usually absent.

KEY WORDS: Meat of feral animals, amino acids

MASS EXCHANGE PROCESS OPTIMIZATION WHILE PREPARING VEGETABLE RAW MATERIALS IN THE ICE-CREAM TECHNOLOGY

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The assortment increase in natural biologically proper products on the basis of raw materials of vegetable and animal origin is considered reasonable in modern bad conditions as well as against the background of complicated and highly psychological and physical loads on a person in different fields of activities.

Within the research work on elaborating new types of dessert foodstuff by mathematical modeling method amidst MathCad 15 there was conducted complex research and mass exchange process analysis during hydrometric processing of vegetable raw materials which are used in ice-cream of various types.

We have received the regression equations in the form of polynomials of the 3d-5th orders and plane graphic presentation which describe the process of getting vegetable extract together with the functional and technological characteristics of the apple puree under changeable technologic conditions. While extracting the main influence factors on the process efficiency we have selected the following: temperature, duty of water, duration. While processing the apple puree we have taken into account the following: temperature, duration, active acidity and homogenization pressure.

Due to conducted researches there were optimized the conditions of getting vegetable extracts from the marginally necessary contents in the quantity of 100 extract stuff to be used in ice-cream on the lactic basis and on the basis of sugar syrups (the fruit one and the sorbet). Moreover, optimal conditions for leading the protopectin destruction in the apple puree to increase its ability towards structuring, emulsification and stabilization in milky and fruit ice-cream were discovered.

The elaborated engineering and mathematical database gives us the opportunity to optimize the extract process as well as to find optimal parameters due to which it is possible to reach the marginally necessary content of dry stuff in the extracts of chicory and hibiscus (no less than 2, 7% for hibiscus and no less than 7% for chicory) which is stated by ice-cream technology characteristics and by the content of typical recipes.

Also it was found out that the marginally necessary content of dissolvable pectin (no less than 9,5%) in the apple puree can be obtained by applying homogenization no lower than 20 MPa and at the temperature of 75-85°C in accordance with regression equations.

Mathematical models of vegetable raw materials processing will be of practical importance and will contribute to the considerable energy and resource saving in the ice-cream technology containing natural aroma and coloring substances, herbal extracts, natural emulsifying agents and substances creating froth, thickeners and structure stabilizer.

KEY WORDS: optimization, mathematical models, ice-cream technology

EFFECT OF LASER IRRADIATION ON THE YIELD OF EXTRACT AT MASHING GRAIN FOR BEER WORT

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The research of laser irradiation influence on the activation of malt enzymes during mashing grain for obtaining beer wort are provided. The optimum time of laser irradiation on mash (extractive solutions of grain products) to increase the stability of beer wort and improve its quality is determined.

One of major processes of brewing is mashing process - the transfer into solution extractive components of the grain material. Malt enzymes and concentrated enzyme preparations (CEP) are used for mashing grain products.

However, it should be noted such a significant drawback as the high cost of malt and CEP, which leads to increase in cost of final product - beer.

The aim of research was activation and stabilization of enzymatic processes that take place during mashing grain, followed by filtration of mash and examining the resulting wort. To achieve activation of malt enzymes it was used treatment of beer processing mash with laser beam. As a source of irradiation it was selected a nitrogen gas laser with ultraviolet wavelength range ($\lambda = 4,00 \times 10^{-7}$ m).

Objects of research are aqueous solutions of shredded grain (mash before and after treatment). Duration of laser irradiation treatment was in the range from 1 to 20 minutes. As a control were tubes with solution (mash) that were not treated with laser beam. After treatment, solutions with control tubes were filtered, and the resulting wort was examined by standard methods. The task of research to find the optimal duration of treatment in which the quality of the finished (laboratory) wort is optimal by composition of soluble components. It was proven the effectiveness of the conditioning laser ultraviolet

wavelength range ($\lambda = 4,00 \times 10^{-7}$ m) on the activation of malt enzymes in mashing grain products by example of examination of processes that occur while making beer wort.

KEY WORDS: enzyme preparation, batch, mash, fermented wash, organic impurities.

THE INFLUENCE OF TECHNOLOGICAL TREATMENTS ON PHYSICAL AND CHEMICAL STRUCTURE OF WINE

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One of the most common types of turbidity is colloidal turbidity that is detected at low temperatures. The main reason of colloidal turbidity appearance is a presence of substances with colloidal nature or those that express significant colloidal properties. Nowadays there are a lot of means for wine stability, which are recommended to the wine manufactory for deleting colloids and prediction from colloidal turbidity. However they can provide the long-term wine stability not always.

Gelatin and bentonite are ones of the most widespread preparations in wine making which possess purifying and stabilizing properties.

Gelatin is used in the wine making for purification of wine materials and stabilizing of prepared wines mainly for reversible colloidal turbidity. In addition, gelatin gives good results in correction process of rough wine materials with large content of phenolic compositions.

Finally the choice of an appropriate gelatin needs to be a compromise between its ability to flocculate and to interact with wine tannins, it must work in the assumed conditions, and in particular in cold. At the same time a great importance plays the type of wine and the goal of processing. For example, for pink and faintly red wine a lot of attention should be paid to preserve colour intensity. For white wine it is important to prevent overfining.

Among reasons of wine destabilization one is excess of heavy metals, which catalyze the oxidative processes and participate in formation of turbidities.

As a result of the researches of many authors (Rodopulo, Tyurin, Ogorodnik, Ribero-Gayon) it is proved that iron in wine is in bivalent or trivalent cation forms which capable to form the relevant complexes with organic acids, phenolic substances, proteins, and polysaccharides. Over time some complexes lose their solubility that leads to wine turbidity

KEY WORDS: gelatin, colloidal haze, phenolic substances, table wine materials, stability.

IMPROVEMENT OF TECHNOLOGY OF FERMENTATION OF MASHES OF HIGH CONCENTRATIONS

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To organize and establish the alternative energy sources to provide them competitive in the energy market of organic origin.

Considering the potential of Ukrainian agriculture promising direction in the organization of alternative energy sources are fuel ethanols - bioethanol.

Development of energy-and resource-saving technologies of grain raw bioethanol fermentation wort requires high concentrations of solids (SR) and the use of high osmofilynyh termotolerantnyh and yeast strains.

The National University of Food Technologies carried out the breeding of thermo- and osmotic strain of yeast *Saccharomyces cerevisiae* TO-11, which retain high biosynthetic properties at temperatures of fermentation 35-37°C, the initial concentration of CP wort – 28-32% and the concentration of alcohol in mash is 14-16% vol.

The optimal technological parameters of preparation and fermentation of wort concentration of 26-32% CP using yeast strains to - 11, which are to ferment the wort at 35-37 °C.

It was determined the influence of the degree of dispersion of grain raw material for the fermentation of wort of high concentrations.

As a result, the researchers found that to intensify the bioethanol technology is appropriate grinding grain dispersion not less than 100% passes through a sieve with a mesh diameter of 1mm.

It was determined the effect of initial concentration of seeding yeast on technological parameters of alcoholic fermentation at a concentration of wort 26 - 32%; the amount of yeast should be 40 - 60 million / ml, depending on the concentration of wort.

It was defined limiting boundaries of temperature of increase fermentation, which provide high activity enzyme preparations while maintaining biosynthetic properties of alcohol yeast.

Energy and resource saving technology of ethanol from grain feedstock has been proposed.

KEY WORDS: batch, termotolerantni and osmofilni yeast, fermented wash, bioethanol.

RECTIFICATION OF BIOETHANOL IN THE GUIDED CYCLES MODE

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Technical progress in alcoholic industry can not take place without development and introduction of high-efficiency columnar vehicles and energy keepings methods of mass-transfer in the process of bioethanol rectification. Plate contact devices are applied in the production to divide multicomponent mixtures with a help of which there is a step contact of the phases on the height of a column. The rectifying plates are produced different constructions. An output-input ratio of plates depends on their construction a diameter and free cut of the column, its loading, interdish distance, speed of steam, physical properties of the mixture which is a subject of a division and others like that. It is determined by an experimental way. For most plates it does not exceed more then 0,4...0,6.

The researchers efforts are directed on the perfection of the construction of the devices for providing of the most intensive contact of steam and liquid, efficiency of which is determined by a degree of the phase equilibrium achievements. Practically on the real plates such equilibrium is almost never reached. One of the sufficient causes of it there is an insufficient time interval of stay of the contacting phases on a plate. Obviously, there is a limit, below which time of contact of the liquid and steam unsuffices to achieve the phase equilibrium. A duration of the cycles is determined experimentally, as the time of phases contact in every special case depends on high-quality composition of streams of feed and structural features of the contact devices. To provide maximally possible output-input ratio of the simplest plate for its construction it is necessary to create certain conditions what force delay of liquid on a plate is till complete satiation of steam by the easy admixtures of liquid, and liquid – by the heavy admixtures of steam.

To increase an efficiency of a line-to-line contact the technology of rectification, is suggested which foresees the lead through of the guided delay of liquid loops on the plates of a column for the set time and its synchronous flowing from a plate on a plate on all height of the columns due to the mobile valves additionally set in a plate device, which are related to the drive mechanisms. Their action takes place after the set algorithm in accordance with the inspector program and does not depend on the mode of serving warming steam and its pressure [1]. A duration of the cycles is determined experimentally depending on the degree of phase equilibrium achievement. Introduction of innovative technology allows to approach efficiency of every real plate to theoretical efficiency. Thus the charges of warming steam go down largely on the process of rectification, the volumes of spirit containing production wastes decreases, the prime price of the equipment diminishes.

KEY WORDS: rectification, bioethanol, a column, mass-transfer, plates.

A CONCENTRATION OF ORGANIC COMPOUNDS OF ALCOHOLIC DISTILLATE UNDER BIOETHANOL PRODUCTION

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For providing of competition possibility of bioethanol, as an alternative energy source there is, a necessity in development and introduction of innovative technology of rectification. This paper is devoted to solving of this problem. The technology of the guided rectification has been offered, which foresees realization of defined in time delay of liquid loops on the plate of column and its synchronous flowing on plates in two successive stages: at the first stage liquid is over flown from each odd onto each successive pair plate, at the second - from each pair onto each successive odd in order of location plate [1].

The objective of paper was research of efficiency of the offered technology in production terms. For this purpose starting column with 30 sieve by plates it was equipped with mobile valves, which in turn closed and opened the flowings openings of plates depending on the set algorithm. On a plate of feed 135 litres/h of absolute alcohol (a.a.) acted: main faction of ethyl spirit - 8,5 %, shoulder-straps from the condenser of distillation column – 9,4 %, condenser of separator of carbon dioxide - 3,0 %, fusel alcohol - 1,5 %, unpasteurized alcohol – 1,5 % from a.a. of alcoholic distillate. Time of delay of liquid on plates was 15 seconds., flowing time – 4 seconds. Pressure in the cube of column was 17,5 kPa, in its top part - 2.5 kPa; temperature in the cube of column fluctuated within the limits of 102-103° Centigrade, in its top part of 90-91° Centigrade, temperature of cold water at the condenser inlet of 15° Centigrade, on the outlet after dephlegmator – 65° Centigrade. The softened water for hidroselection acted on the top plate. Its charges provided the change of concentration of ethyl spirit in the cube of column from 15 to 4 %. Estero-fusel concentrate formed in the process of acceleration was selected from a columns condenser in an amount of 0,23 - 0,27% from a.a. of alcoholic distillate.

The analysis of results has shown that in the process of the guided rectification intermediate and final admixtures possessed the properties of main. Regardless the degree of gidroselection aldehydes, esteras, akrolein, crotonic aldehyde, acetone, iisopropyl alcohol and n-pentanol were withdrawn completely. Methyl alcohol for greater extent was withdrawn under moderate of hidroselection.

It is experimentally well-proved that software of cycles of rectification under conditions of deep hidroselection allows effectively to withdraw main the intermediate and final organic admixtures of alcohol, to increase multipleness of aldehydes concentration by 43,0 %, esters by 46,7 %, fusel oil by 54,0 %, to reduce the charges of warming steam for the process of acceleration of spirit-containing factions by 40 % at stably high quality of commodity products. Cube liquid, released from the different groups of organic admixtures, should be used for gidroselection in a column for the epuration of alcoholic distillate.

KEY WORDS: bioethanol, a column, rectification, guided cycles, hidroselection.

IMPROVING TECHNOLOGY ALCOHOLIC WASH OF RAW STARCH USING ACID ENZYMES

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Introduction of innovative energy-saving technologies is a major challenge facing the alcohol industry. This will greatly reduce material and energy costs per unit of commodity products, enhance its competitiveness on both domestic and foreign markets.

One of the main reasons for the decrease of the specific yield of alcohol is the vital activity of extraneous microflora and related excessive losses of fermented carbohydrates. It has been offered a method of reducing infection of intermediates of alcohol production by reducing substrate pH to 3.4 - 4.5, which inhibits the development of irrelevant microflora.

It was investigated the acid enzymes of firm "Danisko" that can hydrolyze starch components at 50 - 63 ° C and pH 3.4 - 4.5.

The efficiency of acid-resistant enzyme preparations in obtaining fermented washes from starch-containing raw materials is defined. The optimal concentration of amylase and glucoamylase for batch dilution and sugaring of the diluted mass is set.

The influence of multienzyme complexes of enzyme preparations on the degree of bioconversion of grain biopolymers is researched. The chemical and technological indexes of fermented washes with the use of enzyme preparation complexes with selective effect and an activity stabilizer of ion Ca⁺⁺ enzymes are given.

I was found that the use of enzymes not only provides high microbiological purity alcohol production, but the fermentation activity of yeast reduction of fermented carbohydrates by 10 - 20% and increase the concentration of alcohol in mash by 0.8 - 1.2%. The content of higher alcohols, esters and organic acids in distillate mash is reduced by 6, 15 and 43%, respectively. Studies on the fermentation of wort justify the use of stainless enzymes in alcohol production.

KEY WORDS: enzyme preparation, batch, mash, fermented wash, organic impurities.

INNOVATIVE TECHNOLOGIES OF FERMENTED NON-ALCOHOLIC AND LOW-ALCOHOLIC BEVERAGES

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Innovative technologies of fermented beverages with different content of alcohol were developed at the Department of Biotechnology of Fermentation and Winemaking Products of National University of Food Technologies.

Fermented beverages are produced by incubating mono- or associated cultures of the microorganisms. The following were taken into account when developing new technologies: an exclusive use of natural raw materials (grain, fruit, spice, aromatic, and medicinal ones, honey); the necessity of increasing a share of the health-care, functional, special and general health appointment beverages and the extension of their assortment; the appliance of mono- and associated cultures of the microorganisms with different types of metabolism; the use of new highly efficient strains of the microorganisms obtained on the basis of a target separation and selection, which allows to intensify technological process without additional investments; the introduction of new methods of the fermented wort processing that provides stable physico-chemical, high organoleptic rates and preserves the content of biologically active substances; the increase of the biological stability of the beverages with the ensuring of their bottling; the appliance of the bottling lines of the drinks in the kegs that allows to mobilize their transportation, including cafes, bars, and so on.

KEY WORDS: fermented beverages, microorganisms, stability

CO-EXTRUSION PRODUCTS WITH FRUIT STUFFING

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The actual task of food industry is the development of extrusion technology of products with natural fruit stuffing. The main issue here is that the co-extrusion products have low amount of moisture (4-6%) and a porous structure that can lead to a migration of moisture and make the product wet. In order to prevent this process from starting the hydrocolloids are added to a prescribed mixture. Hydrocolloids (pectin, starch and its mixtures) are substances that interact with water and create structural systems.

For identification of hydrophilic properties of hydrocolloids the scientific experiment on sorption ability was conducted.

Different kinds of both natural and modified starch as well as apple pectin were taken for these scientific experiments. As a result they showed the apple pectin had the best sorption features and thus the following stuffing preparations were decided to conduct with the hydrocolloid mixtures based on pectin.

The rheologic features of different types of compositions of corn, potato and modified starch with apple pectin were researched and the optimal correlation of polysaccharides in mixtures for the receiving of a strong structural system were determined.

Likewise the experiments were made on moisture to determine the changes of moisture state in the fruit stuffing with the help of a derivatograph by the warming up speed of 5 C/min to the target temperature of 180 C. It is determined that when the stuffing with hydrocolloids gets warmed up the insignificant increase of free moisture occurs and not going to lead to a significant changes in the process of conservation.

The optimal dosing of hydrocolloid mixtures in amount of 5% to the weight of stuffing was determined, the correlation of pectin and starch in a mixture depend on certain necessary rheological parameters of a ready made stuffing that has either soft or hard structure.

Thus, on the basis of the conducted experiments the recipe of fruit stuffing for co-extrusion products was developed.

KEY WORDS: Hydrocolloids, pectin, modified starch, products of co-extrusion, fruit stuffing

RESEARCH OF EXTRUDED STARCHES PROPERTIES

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Starch and its modified products are widely used in all branches of food industry. The basic property of native starch is its ability to form viscous, transparent, but unstable paste or gel, which is destroyed when stored for a long time. To improve its functional properties the native starch is modified and as a result acquires preliminary set properties. One of the perspective kinds of modified starches is extruded starches classified as swelling starches. They are obtained by thermal processing of the native starch resulting in the preliminary pasting of starch molecules.

The extrusion process leads to the destruction of the starch grains and forming products with smaller molecular mass. That is why the extruded starches are able to swell in cold water and don't form draggles.

The research was carried out on extruded potato, corn and tapioca starches.

With the aim to give recommendations for applying the given kinds of starch the following groups of indexes were investigated: mass part of sugars and dextrans, swelling ability of extruded starches as well as crystallinity change in the modification process.

It was established that after thermal treatment the structure of native starches changed: the amount of high-molecular compounds diminished and the amount of dextrans and sugars increased. Swelling ability rose (extruded and native potato – 1.6 sm³/g - 0.2 sm³/g; tapioca extr. and native 0.9 sm³/g – 0.36 sm³/g; corn extr. and native – 1.4 sm³/g - 0.7 sm³/g). Research of the modified starches crystallinity by X-ray structural method showed that the part of their crystallization phase diminished considerably and the starch molecule acquired amorphous structure.

The data obtained evidence that extruded starches of potatoes, corn and tapioca lead to their changed structure and creates new properties allowing to use them in manufacturing products that require no culinary processing.

KEY WORDS: extruded starches, dextrans, crystallinity, culinary processing

HARDWARE DESIGN AND TWO-STAGE CARBONATION IMPROVEMENT

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Two-stage carbonation process was elaborated and implemented by scientists of NUFT at many sugar factories in Ukraine and Russia. This way of the first carbonation has confirmed its high expediency and efficiency in a point of increasing thin juice purity, efficiency of absorption of carbon dioxide and improvement the filterability of carbonate cake. According to stream structure in 1A saturator the direct current was organized and in 1B apparatus it was mixed and recycled. The circulation tubes and carbonator-router were traced inside the both of saturators. On practice, during the 1A saturator exploitation the rising efficiency of impurities adsorption on precipitate calcium carbonate has shown. But the formation of lime-scale on the gas-tubes surface was found. So, to extend the duration of their activity it was necessary to decrease the level of gas using and the level of carbonatation. In this regard in 2009 there were proposed and manufactured the mechanical cleaners. As a result there were able to maintain an optimal level of carbonatation in 1A saturator, a high quality of in-process products and their good filtering properties.

KEY WORDS: carbonatation,, filterability, saturator

PRE-LIME-CARBONIZATION JUICE PROCESS IMPROVING

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The optimum temperature of leadthrough of process of preliminary step of diffusive juice is set which makes 65-75°C with duration 10-15mins At these parameters the high sedimental and filtration indexes of sediment of pre-lime-carbonization juice are arrived at, and there is insignificant growth of maintenance of anions of acids and colour.

It is set that method of cleaning of diffusive juice with the separation of sediment to the basic liming, does not give possibility to carbonate juice of the basic liming to eventual alkalinity of II carbonization without intermediate filtration.

Using the method of cleaning of diffusive juice of separation of sediment to the basic liming and carbonization of the limed juice with a step dealkalinity on II carbonization is instrumental in the considerable increase of cleaning effect – the purity of the cleaned juice rises to 1,1 %, and the general effect of cleaning makes 39,68%.

KEY WORDS: cleaning of diffusive juice, adsorbent, rendement

MATHEMATICAL MODEL OF JET GENERATION OF FLUID FILM

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A film fluid flow in thin layer generated in different ways is frequently used in apparatuses for food technologies to intensify processes. One of the most effective methods of a film flow generation is a jet-percussion method, when a fluid jet flows around a flat or cylindrical wall. This provides a considerable resistance of a film flow, high fluid speed and its very thin layer over the surface. There is a need to apply the mathematical description of the fluid flow in these apparatuses to calculate the residence time of the fluid, optimization and automation. A method of solving this problem is proposed in the present paper.

The solution to the above problem can be obtained by separating it into two problems (with subsequent solution of each problem and the superposition of these solutions).

1. Problems of flowing around a circular cylinder without circulation with the set speed value at infinity at points of a finite part of the plane.

2. Problems of a pure circulatory flow with the set circulation value.

The study of heat exchange in film apparatuses and other researches proved that different factors affect the heat exchange intensity. These are film thickness, speed of its movement, water concentration, heat flow, temperature difference etc.

The analysis of theoretical studies on the development of the new advanced equipment with intensifying action during the jet generation of a film is carried.

It was identified that the value, speed components, flow trajectory (which are defined by the characteristic function) depend on the speed value and particles at points which in turn vary depending on the inclination angle the flow. With an increasing number of points, which are introduced in the calculation, the accuracy of the function determination increases. Using the complex function basic characteristics of the flow can be determined.

KEY WORDS: MATHEMATICAL JET GENERATION FLUID FILM

STUDY OF REDUCING SUGARS DEGRADATION DURING MAIN LIMING PROCESS

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This work has shown the behavior of reducing substances degradation products, which obtained during main liming process, in the next stages of in-process products purification. In this research, the classical method was used to purify the beet raw juice. In the both diffusion and purified juice the contents of lime salts, colouration and amount of reducing substances were measured.

It was established, that more then 76-81 % colour substances were eliminated during the first carbonatation. Moreover, coloured products obtained as a result of reducing substances degradation at low temperatures (40 C), were eliminated more than those at higher main liming temperatures. But only 14-15 % lime salts obtained at the high main liming temperatures (80-90 C) were adsorbed on the calcium carbonate surface.

14-16 % reducing substances are removed after the first carbonatation of their original level in main liming juice obtained at 60 and 80 C. But if conduction of the main liming was at the temperature near 90 C only 5 % of them were removed during the first carbonatation.

High temperatures and long residence times of main liming decreased the reducing substances content, although they resulted in increased colour of thin juices. Nevertheless, these juices subsequently exhibited a lower colour formation in beet thick juice during evaporation compared with thin juices subjected to milder conditions of main liming.

KEY WORDS: main liming, reducing substances, temperature, degradation

PERSPECTIVE SOURCES OF BIOLOGICAL ACTIVE FATTY ACIDS AND THEIR APPLICATION IN COSMETICS TECHNOLOGY

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We are conducted the analysis of traditional and exotic vegetable oils with the aim of establishing the potential possibility of their application in cosmetics technology, in particular emulsive nature. Fatty acids contain mustard, coconut, corn, flax, olive, soya-bean, sunflower, palm, rape, apricot stones, amaranth, vine seeds, pumpkin, walnut, coffee, cedar, hemp, sesame, almond, oleum, wheat, ryzhiy are investigated. The fatty acid detection was carried out using gas chromatography manufactured by Hewlett - Packard HP6890 with a flamingly-ionization detector.

It was found that palmitic C16: 0 and stearin C18: 0 acids are contained in all investigated oils. Vegetable oils are in the liquid state at a room temperature(all investigated oils after the exception of coconut and palm) contain greater palmitic acid than stearin.

Arachic C20:0 and behenic C22:0 fat acids are widely widespread in the nature and contained mainly in vegetable oils, but in small amounts - from 0,16 and 0,14% in flax to 3,05 and 0,80% in coffee accordingly. Fat acids with the odd amount of carbon atoms are not specific for vegetable oils, however margaric acid of C17:0 is 0,04% in hemp oil, The 0,05% in oleum oil, 0,08% in amaranth oil, 0,09% in coffee oil and 0,11% in palm oil. 0,07% of genekozane acid C21:0 and 0,09% of tricozane acid C23:0 are contained in coffee oil. The fizete acid C17:1 is exceptionally in oleum oil in the amount of 1,27%.

Monounsaturated fatty acids are most widely widespread with one double connection. In liquid fats they are contained in considerably greater amounts, than the saturated acids and fold 80-90% general fatty acid containing. Vegetable oils mostly contain nonsaturated olein C18:1 9c and elaidic C18:1 9t fatty acids with 18 atoms of carbon and in considerably less linolic acid. Oil from apricot stones and almond contain about 70% of olein acid, in mustard and rape - 58-59%. Linolic C18:2 acid are absent in drupaceous oils - apricot, vine and almond ones.

The most linolenic acid of C18:3 ω -3 among vegetable oils contains flax oil (55,53%), γ - linolenic acid is educed in cedar oil (18,81%) and in hemp oil (2,57%).

KEY WORDS: fatty acids, exotic vegetable oils, gas chromatography, fatty acids contain.

APPLICATION OF DIFFERENTIAL EQUATIONS ANALYSING THE FOOD PROCESSES

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Mathematical models of many engineering and technological processes can be equated to a single differential equation or to their system. For instance, studying kinetics of ion exchange in processes of flowing extraction, filtering of liquid, analyzing settling of solid particles the significant results were brought by wide application of differential equations. Therefore qualitative theory of differential equations is an effective mathematical instrument for describing of phenomenon in many fields. The usage of differential equations defines their practical value. Owing to their usage it is possible to set up a connection between a basic physical or chemical law and often a whole group of variables, which have major significance studying the food processes.

This article is dedicated to the construction of the mathematical model of the diffusion problem which is accompanied by a chemical reaction. The diffusion's speed in the liquid is proportional to the concentration gradient. The functional dependence has been found, which shows a change of concentration of soluble gas in thickness of the diffusion layer in the form of a second-order differential equation with constant coefficients. In case, concentration of gas in the boundary layer and in the layer at l distance from the boundary one is known, then a solution of Cauchy problem has been received.

Also a problem of an application of ordinary differential equations construction and solving an equation of inverse chemical reactions happening by the constant volume has been investigated. A mathematical model of this problem has been built in the form of a second-order differential equation with constant coefficients as well. In addition, a reaction of carbohydrate oxidation has been examined as a first-order reaction in one direction and as a second-order reaction in the opposite direction. In this case, the speed of carbohydrate oxidation is assumed to be proportional to a square of its concentration but the inverse reaction passes as a first-order reaction. These presumptions about speeds of reactions are considered if reactions proceed at constant temperature and constant total volume. A solution of the problem has been received as a solution of ordinary differential equation i.e. as a solution of Cauchy problem.

KEY WORDS: differential equation, mathematical models, an inverse reaction, diffusion, a solution of Cauchy problem.

ULTRAFILTRATION OF PROTEIN CONTAINING WATER BY METAL MEMBRANES

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Application of the process of whey ultrafiltration enables to isolate in native form and receive concentrated whey protein with a wide range of components and value storing functional properties.

The main feature of cheese whey is high acidity (pH 4,4-4,5) that affects the status of all components of the serum. Since proteins are in the area below their isoelectric point, which leads to increased hydrateness of protein molecules. Besides, redistribution and change of equilibrium and solubility of mineral fractions take place. Another feature of cheese whey is the presence of fine particles of cheese, called casein dust.

Casein dust is electro-neutral particles of 0,05-1,0 or more microns in size. The amount of dust casein in cheese whey makes up on average 0.5%, which may significantly affect the ultrafiltration of protein.

Advantages of metal membranes compared with polymeric ones are reduced to the stability of their mechanical and chemical properties that can be implemented in filtering liquids with different pH values and temperatures.

Normally, the mode for filtering involves one or more of the following mechanisms:

- forming sediment;
- gradual choking of pores;
- a complete blockage of pores.

The most common are the first and the second modes.

In the process of filtering a thin layer, with high concentration of substances, which lead to increased hydrodynamic resistance of the membrane and decrease of productivity process is formed on the membrane.

However, it was found that the sediment formed on the membrane surface has selective properties and determines all further filtering process.

KEY WORDS: ULTRAFILTRATION METAL MEMBRANES

NATURAL POLYSACCHARIDES AS STABILIZING SYSTEMS

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Fast life pace of nowadays and ever increasing the number of people on the Earth requires a large amount of food stuff production with high quality. Different food additives are used in food products for providing the quality and presentation of products during their storage. A number of stabilizers and thickeners (E400-499) should be highlighted among the variety of food additives which are used to create necessary consistency and texture of food products. Pectin and starch are natural representatives of this group. They function as stabilizers, bulking agents, gelling agents, thickening agents, etc.

A wide range of technological functions of these food additives is provided with different types of modifications which they are pretreated. The necessary function of starch depends on the type of modification. It is possible to use mixtures of different types of modified starch and pectin to obtain the food products with desired consistency, texture and viscosity. The analysis of mixtures rheological properties allowed to point out the following.

The structure of the systems formed by a mixture of pectin and starch, for the same mass fraction of solids (5%), has much lower viscosity than the structure of the system formed by pure pectin. Increasing the share of starch in the system reduces the strength of the structural frame, however the strength of the structural bonds in the system increases.

Systems with potato starch are more plastic than those with corn starch and are destroying slowly under increasing load. Adding pectin to potato starch has less impact on the fluidity of the system than to the cornstarch. The structure of systems formed by a mixture of pectin with modified starches is found to have lower strength than that of the system formed by pure pectin. In general, increasing the share of modified starch in the system reduces the strength of the structural frame. The system, formed by adding of swelling starch is characterized by more strength of structural of the frame than the system with of gelling starch.

Therefore, combination of different types of modified starches and pectin makes it possible to achieve necessary consistency of desserts food concentrates.

KEY WORDS: starch, modification, pectin, rheology, desserts.

INVESTIGATION OF ORGANIC IMPURITIES MOVEMENT BY ACCELERATING COLUMN OF ALCOHOL WHICH IS UNDER PRESSURE LOWER THAN ATMOSPHERIC

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The movement of organic impurity in the columns of ethanol rectification units (ERU), working in energy-saving mode under pressure lower than atmospheric with aim to improve the quality of rectified spirit and increase specific output of marketable products is investigated. The most optimal technological parameters of the rectification work installation with additional columns and modes of control and regulation of this ERU were identified. The series of experiments was conducted to determine the degree of concentration and removal of organic impurity by performance booster column, which operates in vacuum.

KEY WORDS: organic impurities alcohol rectification plant, the quality of rectified spirit, the degree of concentration, the degree of extraction.

IMPROVING THE PROCESS OF DRYING THE FRUITS OF HAWTHORN

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Rare medicinal raw materials, particularly hawthorn is promising for the production of special-purpose products with a high content of biologically active substances with antioxidant properties. The aim of our work was to develop a process of production of dried products using various methods of dehydration, you first need to set the parameters and the optimal mode of the process is when the stored original taste and nutritional properties of high-grade hawthorn fruit. Critical indicators of dried hawthorn berries, are biologically active substances such as carbohydrates, ascorbic acid, carotene, pectin and polyphenol compounds.

On a range of physical and chemical parameters established that the fruits of wild and cultivated varieties of hawthorn are high in total sugars (69,9-80,0%), pectin (5,9-25,9%), titrated acid (2.9 - 13.6%), ascorbic acid (53,7-270,4 mg/100 g), polyphenols (1695-9346 mg/100 g), β -carotene (mg/100g 4,8-17,7). Itself to consumption and processing, as compared with other varieties or species of hawthorn, in particular the content of ascorbic acid, polyphenols pectins and β -carotene, there are varieties Shamil, Lyudmila, Zbigniew, and wild species of hawthorn Alma-Ata and one Royal .

Found that with increasing temperature of the coolant convection drying process time is reduced to achieve a moisture content of the final value $W_c = 31.6\%$, which corresponds to $W =$ humidity of 24%. The heating-haw as the temperature of coolant from 60 to 100 °, respectively, reduced from 50 to 5 minutes. Period of constant drying rate observed in the first critical point. The processing of drying curves were obtained according to the drying rate of hawthorn Shamil on moisture content. As the temperature of coolant, it increases from 0.37% / min. (To 60 ° C) and 1.03% / min. (To 100 °).

With increasing temperature, the drying agent, despite the reduction in the duration of the drying process, the carbohydrate content is somewhat reduced, which indicates the beginning of the caramelization process. Found that getting high quality raw materials dried by convection drying method may be achieved only if the limit of the drying temperature below 90 ° C. Implement below 70 ° C is not economically tselesoobrazno. Protsess hawthorn microwave drying method depends on the drying магнетрона.Продолжительность decreases with increasing magnetron power at maximum power (1000 watts) of 1.6.

KEYWORDS: Keywords: varietal fruit Glod, convection and microwave drying.

PROSPECTS DRYING APPLE POMACE

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One of the main and the most energy-intensive process at processing Apple pomace is their drying. The traditional methods of heat treatment all the more difficult to achieve a significant acceleration of the production processes, as the ability of these methods are often exhausted. Infrared drying Apple pomace, as the technological process, based on the fact that the infrared rays with a wavelength of which are in the range from 2,0 mkm up to 4,0 mkm, actively absorbed by water which contains the overflow, but are not absorbed by the fabric of the dried product (and the materials from which the equipment was manufactured drier), so the removal of a moisture may at low temperature (40 to 60 °C), which allows almost entirely preserve vitamins, biologically active substances, the normal color, taste and aroma of Apple pomace.

Experimental study of the kinetics of the process of drying of Apple pomace in the energy supply consisted in determining the duration of the process, and the value of the radiation, which determines the quality of the finished product. Therefore the task of the research was the development of an optimal regime of drying Apple pomace with IR energy supply.

Constructed curves of the kinetics of termoradiatsiynogo drying Apple pomace with different values of irradiance: 2080, 2600 and 3200 W/m². Curves of drying characterize the change of the integral moisture content W depending on the time. With the growth of the value of E , the duration of the process of drying is reduced by a small amount to achieve the ultimate values of moisture content $W_{c.}=13,65\%$.

Design of semi dryers with infrared rays supply and the established parameters of the dryer. By design, it represents a tunnel dryer with horizontal mesh conveyor belt. Over the conveyor belt and between the working and idle branches are located tubular radiators. Heating elements placed above and in the middle of the conveyor belt, so as to ensure uniformity of exposure of the product because the absorption of radiation is carried out within the absorption band of the product. To improve the conditions for the establishment of uniform irradiation, over heating elements installed reflectors infrared rays of the sheets of polished aluminum and insulation. This moisture is removed via ventilation, equipped with a fan. The recommended thickness of the layer of dried material 10mm is provided with the help of the boot device, which aligns the layer of raw materials for the height and the width of the tape dryers. With the help of the gear unit can be properly change the speed from 0.1 to 0,7m/min.

KEYWORDS: Infrared drying, Apple pomace.

CONVERSION OF SUGAR IN THE PROCESS OF DEFECATION

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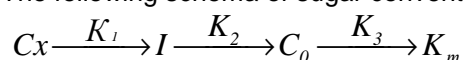
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Sugar convention has been extensively studied in recent years. A brief overview is given by A.Sapronov in "Dyes and their Impact on the Quality of Sugar". The hydrolysis of sucrose forms invert sugar, i.e. an equimolar mixture of glucose and fructose. The latter is responsible for the further decay of staining in the production of sugar solutions, as well as makes it difficult to process. The major task of this study is to provide various schemes of monosaccharide's conversion, which pass through the phenolic form.

It is known that the conversion reaction of sugars at high temperature and alkalinity within a hot main liming extent continues to form hydroxymethylfurfural and products of polymerization and then organic acids.

The aim of the study is to determine the basic mechanisms of chemical reactions occurring within the process of diffusion juice defecation for its optimization.

The following schema of sugar convention suggests:



where Cx – sucrose; I – invert sugar; C_0 – hydroxymethylfurfural and products of its polymerization; K_m – acids; K_1, K_2, K_3 – rate constants of the reactions, min^{-1} .

The scheme above corresponds to the following system of equations:

$$\begin{cases} \frac{dCx}{d\tau} = -K_1Cx \\ \frac{dI}{d\tau} = K_1Cx - K_2I \\ \frac{dC_0}{d\tau} = K_2I - K_3C_0 \\ \frac{dK_m}{d\tau} = K_3C_0 \end{cases}$$

The kinetic coefficient of the chemical reaction rate of hydroxymethylfurfural decomposition in alkaline field and its dependence on temperature in the range of 70 to 90° C has been defined on the basis of the solution of the above scheme of differential equations system and their analysis with the experimental data. It has been proved that during defecation at low temperature 40-50° C hydroxymethylfurfural quickly turns into organic acids. Moreover, its concentration in the juice is much less than during defecation at 85-90° C.

KEY WORDS: SUGAR DEFECATION

NEW MULTIFUNCTIONAL DIETARY SUPPLEMENTS BASED ON RAW CARROTO.Bessarab¹, G.Bandurenko¹, T.Levkivska¹¹*National University of Food Technology, Ukraine, Kiev, Volodymirska st.*

The growing worldwide trend towards healthy food led to the development of functional product. Functional foods, due to bioactive components presence in its composition are capable to support human health and increase the body's resistance to adverse environmental factors. To correct the nutritional value and food properties biologically active additives (BAA) are used, which allow to optimize the composition, improve the nutritional value of foods and form their functional properties. Food additives production is a perspective direction, which can significantly extend the range of functional foods and products for special purposes. Due to the fact that in Ukraine biologically active additives are produced in limited quantities, current market is filled with imported goods. In this regard, development of domestic production of new types of supplements from plant material is relevant and promising. Among them vitamins-multifunctional additives are of greatest interest that are complex multicomponent systems with certain properties. Natural complexes of carotenoids are especially valuable, they've got high stability, resistance to process and are physiologically active. B-carotene is of great importance, as except for pro-vitamin properties it possesses also antioxidant ones to promote products' quality improvement and its life extension.

The aim of the work was scientific justification of an integrated approach to processing carrot to get two carotene-compound multifunctional food additives in dry and liquid form.

As a result of researches, optimum conditions of preparation carrot and technology of two products were found - dry carotene-compound enrichments "Karotyinka", derived from carrot pomace and liquid carotene-compound filler "Carrot Honey", derived from carrot juice. Both products represent carotene-compound multifunctional additives and their chemical composition differ from similar supplements presented on the Ukrainian market. An enrichment "Karotyinka" received in a production environment by microwave drying, has got a high content of β -carotene (130-140 mg/100 g) and fat (11 g/100 g), and filler "Carrot honey" (70% solids) - rich in sugars (52-55 g/100 g), β -carotene (up to 11 mg/100 g) and pectin (up to 4 g/100 g). The apparent advantage of these received products is their high resistance to various technological modes, allowing them to be widely used in various sectors of the food industry. This made it possible to suggest ways to use them in the manufacture of confectionery, dairy, meat and canned foods fortified with β -carotene and dietary fiber.

Thus, thanks to implementation of developed technologies and application of proposed carotene-compound multifunctional food additives, one can get a wide range of products with high nutritional value.

KEYWORDS: carrot, β -carotene, dietary supplements processing.

METHODS OF INTENSIFICATION OF THE HOPS BITTER SUBSTANCES USE

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The problem of saving resources, such as energy and material is on the first place in the modern brewing. And if extractives of malt are used almost completely, the bitter substances of hops have the conversion factor equal to 0,4-0,6. The need to maximize the transition of its valuable substances into finished products considering the high cost of hop and uniqueness in comparison with other kinds of raw materials is evident. The best way to solve this problem is to create conditions for more complete isomerization of bitter substances of hops and reduce losses at the technological stages.

Modern methods of processing hops by making iso-extracts and iso-granules allow you to use a full range of valuable substances of hops (polyphenols, essential oils, etc.). Hop products are made with the addition of catalyst and with the subsequent packing and shutter speed during a period of 1 month to complete the process of isomerization. As a result of this preparation, the manufacturer can't exactly specify the actual number of isomerized alpha acids, which makes it difficult to ration this hops product.

The purpose of research is to study the conditions maximizing the bitter substances using granulated hops. The investigations of the technology of isomerization of bitter substances of hops in a special machine here are represented to use magnesium oxide and maintaining of optimum temperature and pH as a catalyst. Along with it sugar substitutes of malt, such as maltose syrup, sugar and glucose-fructose syrup, were used as factors influencing the process of isomerization.

As a result of the research the optimal contents of magnesium oxide and sugar substances were determined which allows fuller use of bitter substances of hops to increase the output of isomerized alpha acids by 3-5%; reduce the loss of isomerized alpha acids with protein precipitates and reduce the rate of hops product introduced.

KEY WORDS: bitter substances of hop, isomerisation, sugar containing substitutes of malt, magnesium oxide

INVESTIGATION OF A HEAT TRANSFER MECHANISM AND HEAT EXCHANGE INTENSITY AT SOME NANOFLUIDS BOILING

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Intensification of heat transfer is one of many urgent problems of modern science, technology and industry (nuclear power, rocketry, chemical and food). All above listed machinery, equipment and technologies can not operate without intensive heat output. The solution is realized through the growth of the specific heat fluxes (SHF). Significant success has been achieved over the last decade in this field due to researches, developments and implementations of new processes, devices and technologies (heat pipe, heat transfer in porous structures, nanofluids at boiling regimes). Significant success has been achieved over the last decade in this field due to researches, developments and implementations of new processes, devices and technologies (heat pipe, heat transfer in porous structures, nanofluids at boiling regimes).

The presented study is dedicated to the last scientific direction. For this purpose there were constructed tests units, where pool boiling of nanofluids was conducted. As a heater it was used nichrome wire. Nichrome resistivity is depended on a temperature. This fact was taken as a basis of determining of the heater's temperature. All measurements and calculations of the parameters (current, voltage, SHF, heat transfer coefficient, etc.) were performed by a computer and developed software in real time.

Obtained results have allowed to make conclusions about an essential increase of specific heat flux when the heater continued to function (without burnout) for a number of nanofluids; an influence of initial concentrations of nanoparticles in liquids; a presence of dispersants; a nature of nanoparticles on SHF and heat transfer coefficients.

Present research allows to assume, that usage of nanofluids as heat mediums is able to intensify heat exchange in boiling modes with SHF under critical value. Such heat fluxes are applied in steam generators, sugar producing equipment etc.

KEY WORDS: Heat pipes, specific heat flow, dispersing, heat transfer coefficients.

HEAT EXCHANGE AT BOILING OF MASSECUITES

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Intensity of heat emission to boiling massecuites submits more difficult laws as compared to one-elect liquids. Value of coefficient of heat emission of α_2 to massecuites considerably below as compared to saccharine solution and solvent and depends on maintenance of dry matters of CB, intensity of thermal stream of q , pressure of p , thermophysical and regime factors. The low value of α_2 is aggravated that massecuites of thermo-failing and process of heat exchange in vacuum pans conducted at decompressed and small q . Known publication on heat emission for one-elect and binary liquids and solutions however much these information not fully reflect a physical picture at boiling of suspensions and does not allow to define α_2 at the calculation of vacuum-crystallizations. We are get information in quasistatistical terms at boiling of stable and not stability massecuites with the concentration of $CB_y = 73,6-92,4\%$, $KP = 10-50\%$, $p = 5,2-68,4$ kPa, $q = 2-100$ кВт/м². Pressure in every experience was supported permanent, and a thermal stream changed, that had conducted to the change of α_2 . Thus dependence of α_2 on q is ambiguous, that shows on existence of the different modes of heat exchange – convection, undeveloped and developed boiling. Because α_2 at a convection heat exchange and undeveloped bubble boiling very unstable, scopes are certain by us beginnings of the developed bubble boiling, which show that with the increase of amount of crystals in massecuite beginning of the developed boiling delays, although massecuite in a bordering layer arrives at considerable overheats. It is explained the increase of effective viscosity which diminishes mobility of massecuite. As far as the increase of maintenance of hard phase the turbulization of bordering of layer diminishes, and small bubbles can not overcome growing hydrostatical pressure and range of their action diminishes. Findings enable to define the limits of adjusting of thermal stream in the period of boiling of massecuites with the optimum using of energy for certain pressure in with massecuiting space of vehicle and shows that more stable area heat and mass-transfer is in area of higher than some line with certain maintenance of crystals of sugar in massecuite.

KEY WORDS: Massecuite, heat exchange, crystals of sugar

THE DEVELOPMENT OF NEW TYPES OF BEER USING SUGAR CONTAINING SUBSTITUTES OF MALT

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Beer is a popular and promising drink, as a social alternative to strong alcohol products, and a unique source of biologically active substances.

The expansion of assortment is one of the integral areas of improving the quality and competitiveness of beer. The classic technology provides a lot of options for creating new types and sorts of beer according to the indicators of the content of the extract, alcohol, acidity, taste, aroma, foam and other properties, their stability, sustainability of the drink in the process of sale. Of primary importance are the varieties of extractive raw materials and hop in the form of its products as a specific irreplaceable taste-aromatic raw materials, which generates more than 60% of the parameters of the quality of beer. One of the perspective types of raw materials for the production of beer is the sugar based substitutes malt, first of maltose syrups and glucose-fructose syrups. The authors present the results of the carried out researches of influence of the amount and ratio of different types of raw materials for their rational refining and power consumption economy. Practically achieved a more wide use of enzymes contained in the raw materials and products, yeast, and also parameters of boiling of the wort, fermentation, maturation, marketable product. Scientific-practical research results are promising in terms of mini Breweries with various types of hop with integrated into account the quality of its valuable substances, the use of domestic sugar-containing raw materials. Also need for and feasibility of new instrumental methods of analysis of the technological processes was proven.

KEY WORDS: the sugar based substitutes malt, colloidal and biological resistance, parameters of quality of beer

RESEARCHING OF MICROBIOLOGICAL PARAMETERS OF APPLE JUICE, PROCESSED BY SHUNGITE

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However, juices have the highest water activity - 0.98 ... 0.99 and present themselves as a favorable environment for microbial growth. Content of sugars stimulates the growth and reproduction of lactic acid bacteria, T-CFC, yeast and micro fungi.

One of the priority areas for improving the quality of apple juice is the use of natural dispersive minerals, including carbon containing adsorbent shungite.

The results of the previous studies had established environmental safety of using shungite for processing vegetable juices.

The purpose of this work was to study the microbiological parameters of apple juice processed with shungite.

The results of the conducted studies showed a decrease in quantity of microorganisms in 1.5 ... 100 times, and in some samples, processed by shungite at different technological parameters, when compared to control sample, they were not identified at all. The quantity of bacteria in juice processed at 60°C and with adsorbent concentration of 2.0% mass, decreases from $1.1 \cdot 10^3$ to $0.4 \cdot 10^3$ and to $1.7 \cdot 10^1$ units when duration of processing constitutes 20 min and 40 min respectively. Under the same conditions and with duration of juice processing of 60 minutes, bacteria are completely adsorbed by shungite.

Under the studied technological parameters of processing apple juice by shungite, the quantity of fungi decreases in 1.5 ... 2.5 times, compared with control sample, and with adsorbent concentration of 2% mass, fungi are completely removed from the juice.

Yeast was not identified in samples, processed by shungite with concentration of 1.0, 1.5, 2.0 % mass and with duration of 60 minutes. In juice, processed by adsorbent for 40 min, small quantity of yeast was identified. As control sample apple juice, stiller under the experiment conditions without being processed by shungite, was used.

When processing apple juice by shungite, simultaneously with the adsorption of harmful microorganisms, colloidal substances are also adsorbed, and that in turn promotes clarification of juice.

This work proves the expediency of adsorptive processing of apple juice by shungite with fraction of 1 ... 3 mm. Rational parameters of apple juice processing, under which the maximum reduction of microbial insemination is reached, are the following: shungite concentration of - 1.5 ... 2% mass., temperature - 60°C, duration - 60 min.

KEYWORDS: apple juices, shungite, the adsorption of harmful microorganisms

PHYTALBUMIN. ALTERNATIVE TO THE MEAT PRODUCTS

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In Ukraine obvious deficit both feed and food squirrel. For majority of population of our country inherent carbohydrate type of feed (bread, potato), at that though the sufficient amount of calories comes in an organism, but at the same time there is an albuminous deficit. He will be liquidated due to the products of animal origin - meat, milk, eggs.

An alternative source of reduction of albuminous deficit is grain of leguminous cultures, that after chemical composition near to the meat and milk products. The food value of seed of kidney bean consists not only in high maintenance squirrel (24 - 28 %) but also in rich amino acid composition. It is known that the albumen of grain-crops (wheat, barley, corn) is poor on such irreplaceable amino acids, as a lysin, tryptophane, threonine. Use of kidney bean as food stuff diminishes this defect just and.

On the department of technology of feed and restaurant business, together with the specialists of department of technology of storage and processing of grain of NYET researches are conducted with the products of processing of kidney bean and other leguminous cultures with the aim of creation of perspective new products with an increase food value

Expansion of assortment of foodstuffs of enriched will allow to do certain payment the products of processing of leguminous in the decision of this problem.

The relative cheapness of production vegetable will assist it squirrel of leguminous, him biological full value, high перетравлюваність and kind comprehensibility.

Optimization of composition of feedstock and technological modes of treatment allows to carry out the correction of composition of the prepared products after scarce nutrients, to make products taking into account the age-old features of population, especially children, in that absence or insufficient amount in the ration of irreplaceable amino acids, vitamins, mineral substances causes irreversible changes in an organism and results in a rejection in physical and intellectual development.

Attempts to use a extrusion flour for preparation of bread, biscuits, cakes, cookie and other flour wares showed perspective of this direction. Finish goods made in laboratory terms, estimated on organoleptic and physical and chemical indexes in obedience to operating documentation. Indexes that investigated, advantageously differed from rationed.

KEY WORDS: lengthening of shelf life, modified starches, biscuit, confectioneries

COMBINED CONSECUTIVE MASS-TRANSFER PROCESS «DISTILLATION - MEMBRANE SEPARATION» FOR SEPARATION OF LIQUID MIXES

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SUMMARY The specified scheme of continuous rectification of a binary liquid mix allows to receive almost pure target component

Supply of the traditional technological scheme of continuous rectification by a pervaporation device established on an input in the refrigerator of distillate and (or) distillation residue allows to separate an azeotropic solutions (Fig. 1). The specified scheme of continuous rectification of a binary liquid mix, except two traditional streams allows to receive almost pure LBC and HBC. For example, in case of division of a mix "ethanol-water", it is possible to receive not only rectificate (distillate with a mass fraction of spirit to 95.6 %), but also almost pure (absolute) spirit. If necessary established in the scheme a membrane device (or devices) can be disconnected simply.

The initial mix which is subject to separation from the collection 1 arrives in a heater 2 where it heats up to boiling temperature. Steam formed at boiling of a bottom liquid in a boiler 12 it is consecutive from a plate to a plate rises on a column. Sated LBC steam leaving the top part of a column, after condensation in the dephlegmator 4, in a divider of a condensate 5 shares on two streams: the first in a phlegm kind irrigates the top part of a column 3, and second (distillate) gets in the pervaporation membrane device 6. From the bottom part of a column it is continuously taken away the distillation residue arriving in the pervaporation device 11. In the pervaporation devices 6 and 11 owing to selective properties of membranes one of components of a divided liquid mix gets through their walls and is taken away from the device practically in the pure state. After passage of the membrane devices distillate and the distillation residue reduce the temperature in refrigerators 7 and 10 and collect in storage tanks 8 and 9.

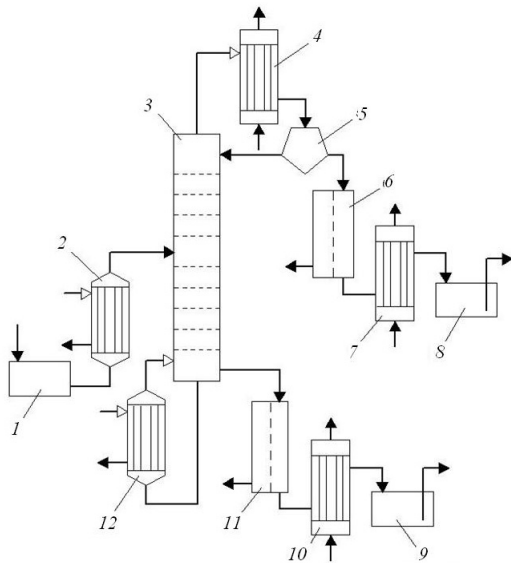


Fig. 1. The combined rectification installation (pat. 34223 Ukraine)

KEY WORDS: combined mass-transfer processes; liquid mixes; separation.

THE SYSTEM OF CONTINUOUS INFORMATION SUPPORT EQUIPMENT FOR FOOD AND CHEMICAL INDUSTRY

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SUMMARY development and testing of systems, continuous information support equipment for food and chemical industry

Difficult conditions of operation of machines and equipment for food and chemical industry, the failure of which entails not only great financial losses and significant costs for recovery and repair, but can also cause significant damage to the environment and human health, significantly tightened the requirements for the establishment new and improvement of existing equipment of the food and chemical industries to provide the necessary conditions for the implementation of chemical processes. The main causes of equipment failure experts say, first of all, the appearance and accumulation of defects, and only then - a deviation from the technological standards of operation and human factors. Statistics machine failure the food and chemical industry shows that more than 94% of failures are due to the development of defects and cracks.

For this reason, the actual issue is the development of new methods of research, calculation and design of machines and equipment for food and chemical industry with the evolutionary processes of accumulation and distribution of defects and cracks to improve the performance of their reliability and durability. In this regard, the Department of HPSM NTU "KPI" developed and tested system of continuous information support equipment for food and chemical industries.

The results of numerical simulation of evolutionary processes in equipment reliability parameters are shown in the examples of the life-cycle of the reactor food concentrate and bimetallic distillation columns. Studies have shown that the results for the distillation columns differ from the actual destruction of the schemes by no more than 10% of the largest residual disclosure of the main crack. The developed system can be easily adapted to other objects in the food and chemical industries to monitor their reliability and durability.

KEY WORDS: reliability, durability, design, specification, bimetallic, a distillation column

ADSORPTIVE PURIFICATION OF ETHER-ALDEHYDE FRACTION BY NATURAL ADSORBENTS

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Ester-aldehyde fraction (EAF) is a mixture of ethanol with concentration of 94 ... 98% and 2% ... 6 of main impurities (ethers, aldehydes, diacetyl, methanol, nitrates and sulfates).

Existing methods of purifying EAF through using acceleration column, with which a distillation unit is equipped, or through the use of activated carbon, treated prior with hydrogen peroxide or nitric acid, require significant energy input, additional equipment, expensive active carbon, activated by chemical reagents, which are poisonous.

The authors proposed an effective method of processing EAF by using cheap local adsorbents: palygorskite and hydromica, which have high adsorptive properties, could be re-generated and recycled, and deposits of which are developed in Ukraine.

For research the authors took palygorskite and hydromica with fraction of 1 ... 2 mm, subjected them to thermo-activation at $t = 100\text{ }^{\circ}\text{C}$ for 60 min. Cooled sorbents were put into adsorber, and EAF was passed through layer of minerals. The purified solution was analyzed by chromatograph. For comparison, EAF solution, not processed by sorbents, was used.

As shown by the obtained results, palygorskite absorbs diethyl ether, methyl acetate, reducing their initial contents twofold and threefold respectively. Palygorskite also effectively absorbs ethyl acetate, acetaldehyde, acetone and acetic acid.

Hydromica adsorbs acetaldehyde, reducing its initial concentration threefold.

Larger adsorptive capacity of palygorskite, when compared to hydromica, can be explained by various structural composition of the studied minerals. For instance, the edges of palygorskite crystals, which are charged with homogeneous OH-groups, will actively form hydrogen connections with negatively charged large molecules. Significant part of the palygorskite surface contains zeolite-like channels, available for adsorption of small molecules.

Hydromica is characterized by having only external adsorptive surface, and its porosity is caused by cracks between contacting particles. Since hydromica effectively absorbs acetaldehyde, and palygorskite adsorbs also other impurities, it could be recommended to use combined sorbents with different ratios of palygorskite and hydromica to purify EAF.

It was established that to purify 1000 decaliters of EAF it is sufficient to use 400 ... 420 kg of palygorskite or hydromica. Low cost of the studied sorbents, their developed deposits in Ukraine, high adsorptive capacity prove the economic feasibility of their use for purifying EAF.

KEY WORDS: natural adsorbents, palygorskite, hydromica, ether-aldehyde fraction

INVESTIGATION OF LACTOSERUM SEPARATION BY MEANS OF MEMBRANE DISTILLATION

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The results of experimental researches of whey separation by membrane distillation are presented in this paper. The dependences of flux of MFFK-3 (JSC STC "Vladipor", Russia) on the quantity of dry matters have been got and compared with model solutions of lactose and whey, purified from proteins. The influence of natural convection on the flux of used membrane has been studied. Liquid entry pressure of water (LEP_w) and liquid entry pressure of whey (LEP_{whey}) have been stated. The laboratory plant has been developed and critical pressure under condition that transmembrane pressure $\Delta P = 0$ has been stated. Whey solutions with 58 % amount of dry matter have been got that creates some prerequisites for the membrane distillation application on industry scale. It has been stated that the dependence of the flux of the membranes MFFK-3 on the concentration of solids of whey is linear in the range of 5-58 % solids. In the horizontal location of the membrane-3 MFFK their flux increases on average to 12 % if the direction of mass transfer and natural convection are the same. However, with the increase of viscosity when the amount of dry matter is 35-40 %, the effect of mutual direction of mass transfer and natural convection disappears. In other words it is not important where the "hot" chamber is under the membrane or over it. Membrane distillation set up with membranes MFFK-3 for the separation of whey will have better performance if the membrane is placed horizontally. Excessive pressure in the working chambers of membrane distillation units separating whey and using membrane MFFK-3, $\Delta P = 0$ must be lower than 0.6 MPa, and if $\Delta P > 0$, the trans-membrane pressure must not exceed 0.05 MPa.

KEY WORDS: membrane distillation, whey, lactose, LEP_w

ALTERNATIVE PRODUCTION OF SURIMI IN UKRAINE

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Surimi is one of the major fish meat transformations. Basically, surimi is a wet concentrate of high-quality myofibrillar proteins from raw minced fish flesh. Surimi is obtained from mechanically deboned fresh fish flesh, usually from white-muscle fish. Catches from freshwater fisheries have increased quickly due to the development of aquaculture in Ukraine. However, the commercial value of these species is low, and therefore they could be used for surimi production.

Freshwater fish is known to be considerable dark muscle. Another problem is the texture characteristics of this surimi after heating. All of these factors could reduce the quality of the resultant surimi. These problems demonstrate the need to identify suitable processing conditions and alternative procedures to the traditional technique for the production of surimi, so that retained protein and protein combinations improve the quality of carp-surimi to a level comparable to that of commercially available surimi.

The purpose of this research was the surimi, gels modori and suwari, obtained from minced carp by washing with plumbing water and electroactivated water systems comparative assessment. The suwari and modori gels from minced carp, washed by plumbing water, catholyte with pH 12 and anolyte with pH 3,5 properties comparative studies results are presented.

Fish gels prepared from carp mince washed at pH 3.5 showed the highest L* values and whiteness index.

Effects of setting at 30 °C on textural properties and cross-linking of myofibrillar proteins in surimi produced from carp were investigated. The relationships between gel properties and the secondary structures of carp myosin were investigated at pH 3.5–12 using dynamic rheological measurement and scanning electron microscopy. As pH increased, the gelation rate and gel strength decreased, and the water-holding capacity (WHC) showed an increasing trend followed by a plateau.

Fish gels suwari and modori critical shearing stretch depends on applied electroactivated system type and varies by sodium chloride addition to surimi. It was found that catholyte and anolyte application in washed minced carp technology is more effective than water usage.

KEY WORDS: surimi, freshwater fish, catholyte, anolyte, properties

TECHNOLOGY OF SHELF LIFE BREAD EXTENDING

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The problem of bread staling is of great social and economic importance. Using of food additives and non-traditional raw materials is an effective way to prolong shelf life of bread and to increase its nutritional value. The influence of rye-malt extract and enzyme preparation Novamyl on biochemical and microbiological processes in dough, its structural-mechanical characteristics, influence of additives on bread staling has been analyzed.

The estimation of physical and chemical properties of crumb on the degree of its compression on automated penetrometer of AP 4/1 just after baking and during 11 days of bread storage has been conducted. Research of moisture connection forms in bread-crumbs and change of their correlation in the process of storage was conducted by the method of differential-thermal analysis on the device «Derivatograf Q-1000» in the range of $t = 0 \dots 250^\circ\text{C}$. Samples of 1 g mass were heated at a speed of $1,25^\circ\text{C} \cdot \text{min}^{-1}$. The change of moisture connection forms in bread in 3, 72, 109 hours and 12 days was studied.

The content of CPLD water in bread with extract and enzyme preparation Novamyl is more than in control samples. It can be explained that bread with additives has plenty of dextrans which were partly brought in with rye-malt extract, and partly appeared in the starch hydrolysis process under the enzyme preparation Novamyl.

Adding rye malt extract and enzyme preparation Novamyl to the dough results in formation of more plastic crumb. This pattern is true for bread storage.

The amount of CPLD water in bread with RSE goes down in less degree than in bread without additives due to water holding ability of dextrans, that allows to prolong rye-wheat bread shelf-life.

The usage of rye-malt extract and enzyme preparation Novamyl in dough increases total contents of dextrans in bread so prolong bread shelf-life.

Making of rye – wheat bread with addition of 5% rye – malt extract and 0,04% of enzyme preparation Novamyl allows to prolong time of bread storage by 10 days.

KEY WORDS: bread, malt extract, enzymes, staling process.

PROSPECTS FOR THE USE OF SEA KELP IN TECHNOLOGY OF PASTRY PRODUCTS

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Lack of basic components in the diet of the Ukrainian, especially iodine, leads to various pathologies and diseases (thyroid dysfunction, which causes delayed mental and physical development of children, neurological cretinism, blurred vision, deaf, hypothyroidism, infertility, miscarriages, mortinatality, increased infant mortality, atherosclerosis, arrhythmia, increased pressure of mental function in children and adults, increased sensitivity to radiation exposure).

One of the ways to improve the nation's health is the use of functional nutrition products, including pastry products (cakes) as a part of daily intake.

To enrich pastry products use different iodine supplements of organic and inorganic origin are used today.

The objects of study is selected additives - *Fucus vesiculosus* and *Ascophyllum nodosum* - refined sea kelp with average particle sizes - 0.5 mm from the basin of the White Sea (Solovetsky Islands) production SevPYNRO, Arkhangelsk (Russia).

Dosage carriers are performed at the rate of 30% of the daily requirement of iodine (45 mg) in 100 g fortified cake (1 pc) according to the level of iodine uptake of these products and the loss of basic element of the technological process of manufacturing products.

Kelp powder with average particle size - 0.5 mm, hydrated for 10 ± 5 minutes at a temperature of 40 ± 5 °C was taken for research.

The effect of selected additives on biochemical and structural and mechanical processes in the semifinished product, organoleptic and physico-chemical parameters of quality, nutritional value and hardening of finished products were studied.

It was investigated that the addition of marine brown kelp *Fucus vesiculosus* and *Ascophyllum nodosum* to cupcakes does not affect the quality of finished products and can improve micronutrient composition and extend the shelf life of muffins.

So, on the basis of studies prescribed dosage processing products seaweeds supplements *Fucus vesiculosus* and *Ascophyllum nodosum*, that allow to get high quality pastry, extended shelf life and a guaranteed content of organic iodine (45mkg/100 g product).

KEY WORDS: pastry products, by-products seaweeds, optimal dosage, loss of iodine quality.

CURRENT APPROACHES TO THE TECHNOLOGY OF BAKERY PRODUCTS MADE FROM FROZEN PREPARED FOOD

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In recent years the technology of bakery products that uses freezing is developing rapidly in most developed countries, including Western European and Northern American ones. New technology of using frozen bakery production allows responding to market needs in supplying fresh products in a wide range to the population, and managing the quality and safety of frozen dough products on the stage of their preparation.

There are different versions of this technology, depending on what stage of bakery products preparation their freezing carried.

It can be divided into 3 main areas:

- Freezing of formed dough pieces;
- Freezing of partially baked products;
- Freezing of the finished product.

A key challenge in the technology of frozen dough preparations is stabilization of biotechnological and enzymatic properties of yeast cells.

For this purpose, researches are conducted to find out the impact of low temperature treating on the livelihood of yeast in the dough with different content of sugar and fat.

It is found that strains of yeast in the dough with sugar and fat content of 10% by weight of flour provide high and stable quality of finished products concerning specific volume, porosity and its structure, shape stability.

The following studies were carried out to select and detect cryoprotective properties of sunflower oil, egg yolk, oleic acid, lecithin, glycerol, and emulsifiers.

It is established that the use of these additives leads to stabilization of yeast cells vital functions, as confirmed by the release of carbon dioxide during maturation dough preparations.

However, the effectiveness of their action is manifested in different ways. The most pronounced effect is made by egg yolk and lecithin.

KEY WORDS: freezing, dough, yeast cells, sugar, oil, egg yolk, lecithin.

USING WILD PLANT MATERIAL IN PASTRIES

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The stage of development institutions restaurants priority remains the creation of a special food trend at the present time. Among the wide range of restaurants significant share the pastry. Moreover, their chemical composition is characterized by a high content of carbohydrates, fats and is unbalanced by amino acids composition.

Solving this problem is possible by making the recipe of natural ingredients with alternative raw fruits and berries, which are rich in vitamins, dietary fibers and polyunsaturated fatty acids. Alternative materials have a wide range of functional properties that will affect the properties of flour foods, technological process, adjust the properties of the structural components of the raw material in the desired direction, improve physical and chemical organoleptic characteristics of products, provide new quality indicators to improve the nutritional value and adjust their chemical composition.

Promising additives for confectioneries find powders with fruit. Fruit powders are the dry concentrate fruit pulp and juice, which contains proteins, cell protoplasm, pectin, minerals, and monosaccharides. The main component of fruit powders and carbohydrates are represented mainly in the form of glucose and fructose.

The studies about powders from apples, pineapples, bananas, black currant and sea buckthorn are known today. But there are only a few studies about powders from wild herbs.

Flour confectionery products technology is used by recycling ash red and blueberries, which are mainly selected powder and paste. This commodity form from wild fruits and berries raw materials contributed to the prescription compositions yeast and biscuit type dough.

Innovative products are characterized by increased food and biological value, organoleptic quality, improved by structural and mechanical properties.

Prospects for further research are the documentation developing and innovations implementation in production.

KEY WORDS: technological process

CONFECTIONERY TECHNOLOGY FOR PATIENTS WITH DIABETES AND CELIAC DISEASE

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According to the World Association of Gastroenterology, currently 1% of the world population are suffering from celiac disease. Celiac disease is a chronic, systematic disease characterized by mucosa damage of the small intestine by gluten, which is a component of the wheat, rye and oats gluten complex. Celiac disease is often accompanied by diabetes.

At the National University of Food Technologies it is conducted the research aimed at the development of pastry (cakes, muffins, biscuits) for patients with diabetes and celiac disease. As a sugar substitute there were used polyols of a new generation (isomalt, maltitol, lactitol, erytritol) and their mixtures with fructose. As a gluten-free flour rice, corn, buckwheat, soy flour were used. The effect of sugar substitutes on the structural and mechanical characteristics of the test masses of cakes, muffins, biscuits made on celiac and gluten-free flour was examined. The mechanism of heat treatment and the optimal parameters of cakes, muffins, biscuits baking on a gluten-free flour and sugar substitutes was determined.

The sorption properties of baking (cakes, muffins, biscuits) made on sweeteners such as isomalt, maltitol, lactitol, erytritol on gluten and gluten-free flour were determined. Developed innovative technologies of confectionery for celiac disease and diabetes are suggested to consider as a big technology system, which is divided into subsystems (kneading, baking, storage). The optimal parameters for each subsystem and recipe were determined. The food, the biological and the energy value and also glycemic were identified in the new pastry products. According to the developed mathematical model the assessment of the new types of flour products quality was calculated. It was done on the versatility indicator of three levels of properties which indicate the percentage availability of chemicals from the daily needs of the human diet. New technologies are developed and approved by the regulatory documents.

KEY WORDS: celiac disease, diabetes, muffins, cakes, biscuits.

FLOUR CONFECTIONERY PRODUCTS FOR PEOPLE SUFFERING FROM COELIAC DISEASE AND DIABETES

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Human's contemporary life pace results in such risks as permanent stress, negative environmental influence, and deficient diet. This leads to immunity decrease and spread of non-communicable diseases which are connected, first of all, with metabolism disorder and, as a result, with food intolerance or inability of human organism to digest certain products or their compounds. It's worth mentioning that among such diseases the most spread are diabetes and coeliac disease. The number of people suffering from coeliac disease during the last 50 years has increased by ten times. People with this disease can not eat foods contaminated with gluten (wheat protein, rye, barley, oats). An alternative is the use of rice, buckwheat and corn.

Analysing recent researches, the most popular with the population are bakery and flour confectionery products (FCP). In order to create FCP for the defined population category, two components, namely white sugar and wheat flour, should be replaced. Fructose was chosen as a white sugar substitute, because of all the sweeteners the only fructose is a natural substance that is easily digested. Under organoleptic analysis of rice and buckwheat flour, rice flour was chosen for further study because it has more neutral taste. After determination of rice flour physico-chemical properties, there were added skimmed milk, as a source of protein (due to its content in rice flour), and dried apricot, as a source of food fibers and macro- microelements, the calculation of a new FCP recipe composition.

KEY WORDS: wheat protein, rye, barley, oats, rice, buckwheat, corn, coeliac disease, diabetes, skimmed milk, dried apricot

IMPROVEMENT OF THE EGG MACARONI PRODUCTS QUALITY

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Traditionally egg products were used for the increasing of macaroni product's food value. As the result the color of macaroni products is improving but the quality of macaroni with egg products is decreasing concerning glassiness, strength and cooking properties. The content of fat in eggs causes such result. The using of wheat flour in macaroni production defines a question more clearly. With the aim of the egg macaroni quality improvement the authors have been researched the lypolitic additive Noopazyme ("Novozymes", Denmark).

Macaroni products were made from what flour in the form of short noodles. The quality has been estimated by the complex index that includes sensory and physical- chemical indexes and cooking properties. Noopazyme have been dosed in quantity of 0,0016 ... 0, 016 % to the weight of flour that refers to 6... 48 lypase activity units per 1 kg of flour. Noopazyme was added in dough in water solution with temperature 40 °C, native eggs – in water enriched mixture with the same temperature. Egg macaroni products with 15,2 % eggs were used as the control sample.

It has been observed that Noopazyme showed the best positive effect in quantity of 0,008 %: egg products obtain more strength, glassiness, color after cooking and they do not agglutinate. Noopazyme promotes decreasing of solids pass in cooking water that could be the result in firmer structure of products. Acidity of macaroni products increases by 0,1 ... 0,5 degree but it is within the limits of regulations.

KEY WORDS: egg macaroni products, color, strength.

BAKERY TECHNOLOGY FOR CHILDREN WITH VITAMIN D DEFICIENT STATES

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Meaningfulness of osteoporosis problem is difficult to underestimate through enormous prevalence in the whole world, heavy consequences of disease, caused by the breaks of vertebrae and bones of peripheral skeleton. Since 1976, when children rheumatology was distinguished as independent specialty, up to present times, researchers have engaged actively in the study of children secondary osteoporosis, development of the newest methods of diagnostics and treatment.

The basis for the formation of health and necessary condition for the harmonious growth, physical and neuropsychological development, good training is complete balanced nutrition. Food has significant impact on health, performance and child lifespan. Most kids eat cheap products with low biological value, but with high energy value. In addition, Ukrainian children have so-called "hidden hunger" due to micronutrient deficiency in their diets: vitamins, especially vitamins A, E, C, D, macro- and micronutrients (iodine, iron, calcium, magnesium, fluoride, selenium).

Assortment analysis of bakery products for children of preschool and school age has shown, that nowadays it is not sufficient. For expansion of the range it is important to include natural products in the formula of bun goods and not to use synthetic ingredients such as flavorings, preservatives and antioxidants. Such scientific solutions can reduce the risk of allergic reactions in children and give an opportunity to increase the absorption of nutrients. The creation of bakery technologies for preschool and school age children on the basis of natural dressers, provide them with high quality and nutritional value, is an urgent task and has practical value.

For realization of this goal it is necessary to solve the following tasks:

- justify scientifically the selection of calcium-containing natural raw materials and vitamin D for the enrichment of bakery products;
- explore the production technological aspects of new products, the quality of finished products and their microbiological stability.

KEY WORDS: macro- and micronutrients, vitamins, meaningfulness of osteoporosis problem

LUPINE FLOUR USING IN TECHNOLOGY OF RESTAURANT INDUSTRY ESTABLISHMENTS PRODUCTION

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In many countries of the world, including Ukraine, there is insufficient provision of population with the protein foodstuffs. Thus, the deficiency of protein in the diet of the Ukrainians is not less than 25%. Therefore the attention of researchers, developers of new food technologies and medical epidemiologists is more and more focusing on the use of protein containing raw materials of plant origin that have a valuable chemical composition, not for feed but for nutritional purposes.

Scientists have proved that dietary lupine is an alternative to soybeans and soybeans products used in recent decades, so far as due to the content and biological value of protein lupine does not yield to soybeans, and the level of protein digestion is even higher. In addition, seeds of dietary lupine are characterized by a high level of fat (10 ... 14%), rich in oleic acid and β -tocopherol, a significant amount of dietary fiber (28%), mineral elements and it practically does not contain antinutrient substances.

However, the volume of this culture use in Ukraine, as raw materials for food industry does not correspond the potential abilities that is connected with the absence of certain traditions in nutrition and insufficient development of processing technologies of lupine seeds.

Second courses and sweet dishes from cereals grains (cutlets, rissoles, baked puddings on the basis of wheat, barley, rice, buckwheat, corn groats) are widely use and accessible dishes, primarily in the system of catering at schools, kindergartens and educational institutions in which children repeatedly throughout the day get food services. However, cereal dishes are characterized by unbalanced chemical composition in which easily digestible carbohydrates and starches are dominated.

With the aim of improving the nutritional value and widening of assortment of dishes of restaurant industry establishments, the flour, of white dietary lupine was included to culinary dishes: such as pancakes, dumplings. While elaborating recipes of dough for flour culinary dishes, the flour of dietary lupine was injected together with wheat flour, reducing the equivalent amount of wheat flour.

During the studies of finished products, it was determined the change of organoleptic and physical and chemical quality.

KEY WORDS: food lupine, protein, nutritive value, chemical composition, meal, restaurant management, restaurant industry

EXTRUSION TECHNOLOGY FOR VEGETABLE PROTEIN PRODUCTION

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The problem of vegetable and feed protein – has got one of the greatest priorities in the world. It is resolved differently in dependence on the climatic conditions. On the American continent the basis of a protein pyramid is soybean, in dry conditions of India - chickpeas, Europe grows up peas, soybeans, beans.

In our opinion, very promising crop for the creation of new food products can be beans, which seeds contain up to 28% (some sorts even more) of enough complete protein.

The department of technology of grain storage and processing together with experts of the Department of Food Technology and restaurant business NUFT conduct research on baking properties of flour mixtures with food processing beans and other legumes to create high-qualitative new products with specified properties and high nutritional value.

Extrusion technology food products are especially popular with children. Lack or insufficient quantity of essential amino acids, vitamins, minerals in children's ration causes irreversible changes in an organism, and that leads to deviations in physical and intellectual development.

An optimal solution we consider in improving the resource base of extrudates that would provide adjustment of the traditional products' composition for scarce nutrients. The world's primary source of vegetable proteins in food production is the legumes: peas, soybeans, lentils and beans. Protein legumes is rich in amino acids, is biologically valuable, is characterized by high digestibility and good assimilation. It is also important that plant proteins can be used to increase protein compound in food and replace a part of expensive basic raw materials, reduce energetic value. But in the native state, they differ by low functional and consumer properties. That is why, for food and feed needs all legumes require prior technological processing

So thanks to intelligent combination of carbohydrate and protein plant foods one can completely balance diet of different age groups.

This technology makes it possible to influence the composition and properties of raw materials that are processed and to receive more than 100 different kinds of food products that are easily digested, have better flavor properties, require minor cooking or completely ready to consumption, are in great demand among the population.

Additional opportunities to create new food products with a high content of biologically active substances of legumes are provided by methods of extrusion processing of multicomponent mixtures.

KEY WORDS: lengthening of shelf life, modified starches, biscuit, confectioneries

USING NATURAL SORBENTS FOR GLUCOSE SYRUPS DECOLORATION

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Starch and syrup production in Ukraine has been in stagnation for last ten years. During this time starch and starch products manufacturing has decreased nearly four times. At the same time, foreign technology has changed: new enzymes, new sorbents and new types of products are applied every year. The past decades have seen a shift from the acid hydrolysis of starch to the use of starch-converting enzymes in the production of maltodextrin, modified starches, or glucose and fructose syrups. Thus it is necessary to improve the starch and syrup technology for manufacturing competitive products. This study is devoted to improve the key position in technology of glucose syrups obtaining. Decoloration of hydrolises is one the most important process in this technology. Researches have studied decoloration effect of glucose syrups by using natural sorbents (type paligorskit) and activated charcoal. Glucose syrup was obtained by way of starch-converting with enzymes. Researches have been done using as separate reagents and their mixtures in various compositions. It was established, that the highest decoloration effect in glucose syrups is achieved with application of mixtures (natural sorbent and activated charcoal) in proportion 2:1. The main conditions for the best results were injecting reagents in glucose solution gradually during 18-22 min (natural sorbent) and 8-12 min (activated charcoal) and temperature near 55-60 C.

KEY WORDS: natural sorbents, decoloration, glucose syrup

IMPROVEMENT OF PREVIOUS LIME-CARBONATATION PROCESS

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The optimum temperature for carrying out of stepped pre-lime-carbonatation process of diffusion juice was established, which is 65-75 C and duration about 10-15 min. In this case the highest settling and filtering properties of sludge and the little colour and anionic acids increasing have been achieved.

It was established, that the way of diffusion juice purification with pre-liming sludge separation before main liming, does not give a possibility for gasing main-limed juice to the second carbonatation target alkalinity without intermediate filtration.

Using the method of juice purification with separation pre-liming sludge before main liming and stepped alkalinity decreasing during the first carbonatation a great purification effect - thin juice purity increases on 1,1% and the calculation of the percent of non-sugars eliminated is near 39,68 % has promoted.

KEY WORDS: diffusion juice, purification, lime-carbonatation

THE DIFFERENT YEASTS FERMENTATION OF THE WORT EFFECT RESERCHES AND THE FINISHED BEER QUALITY

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The results of the 11% wort fermentation studies prepared from the light wheat mixture and barley with LOD, three races of Danish and German brewers yeasts, and dried German yeasts race Saf Lager W34/70 leading in the article..

The main fermentation of the mash in a microbrewery "Pivarum" carried out during 7 days with the temperature 8...9 °C. After the end of maine fermentation young beer was decanted from the thick sediment of yeast and puted on the afterfermentation during 28 days with the temperature 1...2 °C.

Every day the main fermentation and in the end of afterfermentation pH, alcohol content, visible and real extracts were controlled. Then visible, real and final attenuations were calculated. Regardless of race of used yeasts beer race derived fully met the standart requirements for a light beer, but the best physical, chemical and organoleptic properties had a beer, which was made with the using of the Danish and the German yeasts races. Beer, cooked with dry yeast Saf Lager W34/70, has a lower quality. In this case it did not feel a pronounced characteristic aroma and taste characteristics were not stable.

Dry yeast Saf Lager W34/70 is not recommended for the using in the dry form, as it is accepted in most microbrewery now. For the improving of the dry yeast efficiency they must be activated.

KEY WORDS: liquid and dry yeast, malt, fermentation

USING OF SHUNGITE FOR CLEANING SUGAR SYRUPS

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Syrups containing solid phase adsorbents clean - activated carbon grade ACS, ion exchangers AV-17-2P, calcium carbonate. This removes part of the organic and inorganic non-sugars.

Shungite - is an effective adsorbent, which besides organic and mineral substances absorbs heavy metals and has bactericidal properties. In its composition, it contains about 60 % carbon and 40 % of rock-forming elements. Density of shungite - 2100...2400 kg/m³, compressive strength - 1000...1200 kg/cm³.

This mineral at first glance resembles coal. Its main field is located in Karelia. Unique properties of shungite caused quite a complex chemical composition, including the presence of fullerenes - specific molecular compounds, which are relatively newly discovered allotropic modification of carbon, which, as you know, is the basis of all life on Earth. Modern medicine is increasingly using products based on fullerenes and holds on them high hopes.

We have carried out comparative studies of color reduction of syrup and syrup with klerovka processing shungite, birch activated carbon BAU-A, granular carbon AGS-4. Syrups used at the concentration of 52,4 % solids, which contain color substances. The duration of experiments was 25 minutes at 85 ° C of syrup.

The processing of experimental data showed the possibility of shungite for cleaning of sugar syrups. However, the number of schungite for cleaning syrup was 1,57 %, while the number of coal BAU-A was 1,36 %. Advantages of shungite compared with other adsorbents are its lower cost, facilitate of filtration after processing syrup, reduction of bacterial contamination of the product.

KEY WORDS: adsorbent, shungite, syrup

HOW TO EVALUATE THE QUALITY OF "PUFFED" BUCKWHEAT?

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Quality assessment is the first and main stage of quality management system. Difficulties with realization of many kinds of products are due to inability to assess properly its quality at different stages: specification, detail design, prototype, and finally serial production. How to determine and assess correctly the quality of the food product, which includes dozens of different indicators? What is of key importance for food product: organoleptic characteristics that attract potential consumers, or nutritive value, which is not at all of minor interest for Ukrainians today? Answers to these and many other questions are given the science of qualimetry. Complex quality index development allows to account and digitalize any fluctuations in food quality.

We have examined the quality of the new product - "puffed" buckwheat. Composite quality index and individual indicators assessment scales were developed. The individual indicators assessment scales are needed in order to translate different physical units, in which they are measured, into single dimensionless scale.

The first step in developing a composite index was to determine the quality hierarchical structure and individual quality indicators that shape it. On the first level there were three groups of parameters selected for "light" buckwheat grains: physico-chemical, organoleptic, nutritional value. On the second level these quality indexes consisted of a number of individual parameters: moisture, bulk density, pH, dextrin content, the number unshelled grains, passing solids in the water, swelling degree, as well as appearance, color, odor, taste; also protein content, fats content, carbohydrate content and energy value.

The second step defined an importance of each quality index by an expert assessments method. Coefficient and complex quality index mathematical model were obtained upon processing of the statistics.

KEY WORDS: composite quality index, "puffed" buckwheat, qualimetry

TECHNOLOGY DEVELOPING OF FLAX SEEDS DRINK

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The formulation technology task creation process for preparing a drink with flax seed, which has a comprehensive therapeutic effect, giving it new consumer properties and exclusion danger enzyme inhibitors.

Famous is valuable properties of food base of flax, which represents a mucus mass obtained after extraction of flax seed and has anti-inflammatory and antioxidant effect.

Flaxseed reduces total cholesterol and glycerides, reduce blood clotting time, which reduces the probability of various diseases.

Flax seeds contain up to 800 times more lignin than all known plant foods, and the presence of dietary fiber and alpha-linolenic acid is the basis for the fight against cancer.

The task is solved by the following process: washing the seeds, soaking, grinding materials with water, extraction, cooling, filtration through polyester fabric and spinning liquid phase.

Research has established that for optimal hydrothermal treatment is necessary to soak the seeds in water for a specified time at the optimum temperature, which is associated with the completion of swelling Macromolecular using low-temperature regimes to preserve the nutritional value of flax seed.

In order to avoid the need for extraction and blanching asked to extraction at elevated temperature under pressure up to 0.5 MPa for a preset time. Established technological modes allow production of linen beverage for any values of feedstock while compliance with sanitary norms to prevent the development of pathogenic organisms.

Options to cool the suspension to a temperature 30 ... 35 ° C into account speed flow heat transfer in different climates, and filtration through polyester fabric with a mesh size of 250 ... 300 microns allows you to split a two-component system with a maximum yield drink different concentrations.

Technical result is the development of a method for producing flax drink using flax seeds, which gives it a new organoleptic properties, eliminates the danger of consumption of enzyme inhibitors and provides comprehensive therapeutic effect.

KEY WORDS: flax seed, flax drink, extractory.

THE INVESTIGATION OF TECHNOLOGICAL CONDITIONS OF PECTIN WITHDRAWAL FROM POTATO AND STUDY OF ITS STRUCTUREHanna Pastuh¹, Olena Hrabovska¹

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Pectin is one of the most common polysaccharides that can be found in plantstuff, such as fruits, vegetables, roots and tubers. A large amount of plantstuff after food processing makes waste, but it could serve as source of pectin substance. The ways of pectin withdrawal from potato are well known. However, after potato processing to make starch, a small amount of raw potato septum is left. It contains a large amount of biologically active substance, including pectin (contents 2-5,4 % according to raw substance amount), so the research of technological conditions of potato pectin withdrawal has great novelty.

The aim of our work is to define optimal technological conditions of pectin withdrawal from potato septum and investigate its properties.

Withdrawal of pectin is done with the help of consistent acid hydrolysis, extraction, separation of pectin, pectin deposition, drying and grinding of received pectin.

For conducting experiment we chose a three phases plan. Such changeable factors as temperature, duration of hydrolysis and contents hydrolyzing reagent (% HCl) were chosen. The effectiveness of process was controlled by amount of pectin output (%).

Pectin output and analytical characteristics of received pectin showed presence of methoxy, and free carboxyl groups and uronid component were determined by titration method.

Received samples of pectin were different depending various conditions of hydrolyzing: some of them during ethanol deposition floated on the surface, and others settled to the bottom in the form of flakes. This fact suggests a different molecular weight of the samples.

To study the structure of pectin isolated from potato septum, infrared spectroscopy was used. IR septum of potato pectin confirms the existence of functional (carboxyl, hydroxyl and ethereal-forming) groups in the molecules of the polysaccharide.

KEY WORDS: pectin, potato septum, hydrolyzing, carboxyl and acetyl groups

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| HOTEL INTELLIGENT BUILDING MANAGEMENT SYSTEM |
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Integrating various building management systems creates an intelligent Building Management System, which helps hotels improve guest, staff, and visitor safety; protect hotel property; lower operating costs through energy efficiency; and improve guest delight.

Implementation of the Intelligent Management System will provide the following competitive advantages of the hotel:

1. Increase guest satisfaction and loyalty with consistent satisfaction.
2. Reduce carbon footprint and lower operating costs as energy prices continue to rise.
3. Manage modern buildings' technology and regulations.
4. Protect guests with non-intrusive security measures.
5. Secure brand and reputation around the globe.

Intelligent Management System secures further control for the following procedures and tasks:

1. Illumination of the function rooms, restaurants, facades of the buildings.
2. Comprehensive all-in-one-box solution for the hotel rooms to manage room light, conditioner, room access, and automatic curtains and media system.
3. Wallpaper music in the restaurants, audio multi-room for the different hotel premises.
4. All types of media-systems for video distribution.

Therefore Intelligent Management System provides complete automation of the hotel room. Intelligent hotel room is equipped with the following devices: magnetic key holder, bedside unit installed to operate air quality system (conditioner), motorized curtains/louvers, audio-video systems and to change the display image icons of the doorbell staying in bed.

Energy supply management module of the room will switch off all the electric devices when the guest leaves the room. This will save electricity by turning off unnecessarily working electric means.

Thus, having studied the issue of the Intelligent Management System the following conclusion for the advantages of the one may be drawn:

- Saves up to 30% on operating expenses by reducing energy usage and ongoing life cycle costs;
- Improves guest delight with intelligent and convenient guest rooms;
- Improves guest safety with integrated security solutions.

KEY WORDS: hotel, intelligent building, automation.

PROSPECTIVE TRENDS OF GASTRONOMIC EVENT-TOUR

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In the last years around the world as alternative of usual holiday starting to gain particular popularity a gastronomic tourism.

Gastronomic tourism - kind of tourism, whose main purpose is to familiarize the kitchen of a country. In the classification of gastronomic tour feature should be not only geographic characteristics (urban, rural), but the goal of the tour. It is advisable to classify gastronomic tours based on its software. It is reasonable classify gastronomic tours based on the tour program. For example, the combination of gastronomic and event elements evident during such festive events like Christmas, Maslenitsa, Easter and more. In developing gastronomic tours, tour operators should take account of events regional features. Advisable to consider gastronomical programs where you can enjoy classic Christmas dishes of the world. For example, countries such as the U.S., France, Germany, Great Britain typical Christmas dish is turkey. At Eastern Europe in order to happiness is not flying on the wings of birds, the Christmas traditions should be presented baked fish. For the Nordic countries traditionally considered red meat - pig or venison. For Ukraine, the typical Christmas dish have long considered kutya - wheat or barley porridge with honey, nuts, sugar, raisins. In Belarus in the evening festivities prepared "sochivo", in Russia "sated".

Special attention tourist enterprises in developing gastronomic event-tour should be paid at Maslyana. Maslyana ethnographic event resource in many countries. For example, in Western Europe have long accepted celebrate on the eve of the Great Catholic Lent before Easter cakes - Mardi Gras, in the Czech Republic – Masopust, in Scandinavia - Fastelavn, even in the United States reflected a tradition on the eve of of Great Lent cooking pancakes at the International Pancake Day. In Ukraine, Russia, Belarus have long celebrated Maslenitsa - funny seeing off Winter, illuminated joyful anticipation of near heat, of spring renewal of nature. Even pancakes, an indispensable attribute Maslenitsa had ritual significance: round, rosy, hot, they were a symbol of the sun, which is brighter shine, extending the days.

Gastronomic tourism could become another facet attractiveness of Ukraine with regard to ethnographic event resources of our country.

KEY WORDS: gastronomic, event-tour, tourism resources, tourism program

WINERY AS A TOURIST RESOURCE IN HUNGARY

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Hungary is in the first 25 wine producing countries. The country produces 4 million hectoliters of wine in the year. There are 22 wine regions in Hungary today.

Badacsony wine region. The viticulture has been prospering for several thousand years in this land. Climatic conditions are favorable and moderate. The temperature hardly ever remains below freezing point throughout the day. About 99% of white grapes are cultivated in the land. The «Olaszrizling» makes about 70% of wines, which are able to satisfy the most exquisite tastes.

Balatonfüred-Csopak wine region is situated in the northwest coast of Lake Balaton in the slopes of the hills that descend to the lake shore, from Alshoersh to Zánka. The white grape varieties are cultivated here: «Olaszrizling», «Chardonnay», «Ottonei muskotály», «Rizlingszilván», «Szürkebarát», «Juhfark», «Rajnai rizling», «Pinø Blanc », «Sauvignon», «Tramini» , «Zenit». Since joining the land area Tihany opportunities for growing red grape varieties have been increased: « Cabernet Franc», «Cabernet Sauvignon», «Kékfrankos», «Merlot» and «Zweigelt». Wines from this region are soft and have a nice kind of flavour.

Balatonboglár region climatic conditions are moderated by its location in the South shore of Lake Balaton. White grapes are grown in this region, but microclimate and soil conditions are favorable for growing red varieties too. Varieties number of red wines is negligible, but they don't yield to the white wines for its taste and aromatic qualities. The wines with fruit aromas and flavors have particularly characteristics. Most of them have the high-quality varieties: «Balatonboglári Kékfrankos», «Cabernet Sauvignon» and «Merlot». In the region is acting "Wine Route" Program. The South Balaton Wine Route has been opened as a result, which is owned by 27 licensed receiving stations at 11-settlements winemaking region (from Keszthely to Siófok-Kiliti).

The most famous wine region in the country is Tokay, located in the northeast. Wine Tokay was Hungarian hallmark worldwide. The main feature of this dessert wine is rich in flavor, the resulting formation on grapes noble mild. It occurs on the vine as a result of actions unique to this region climatic condition.

KEY WORDS: wine tourism, Hungary, the wine road.

ENOGASTRONOMIC TOURISM AS A MARKETING TOOL OF DOMESTIC MANUFACTURER

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Enogastronomic tourism is a kind of thematic tourism associated with exploring and tasting national cuisine and wine traditions of the world. Combining cultural, industrial, environmental and social aspects, enogastronomic tourism involves familiarization with the original technologies of local food producing, food and beverage and traditions of their consumption, mastering skills of culinary arts, participation in festivals and themed cultural events, familiarity with the original food technologies and wine production.

Enogastronomic tourism is a powerful marketing tool for the promotion of domestic food markets of the Commonwealth of Independent States and the European Union, the promotion of Ukrainian wine and gastronomy, and creating the appropriate brands.

Realizing the marketing potential enogastronomic tourism requires the preplanning of sustainable regional development, state and municipal support for creating a favorable organizational, legal and economic environment for the development of agriculture and food processing industry, the creation of regional and national wine and gastronomic routes, within which the creation of specialized touristic facilities must be envisaged such as ethno restaurant, tasting rooms, gastronomic museums, ethnic villages and towns as well as thematic sideshows events and touristic excursion routes that will help to create a competitive local tourism, improvement of touristic attractions in the region.

To promote national culinary traditions with the support of the State Service for Tourism and Resorts of Ukraine and professional trade associations it is essential to launch a national project "Ukrainian Wine Routes" in order to improve the culture of wine consumption, to acquaint with a high quality of the natural products of the local manufacturers, to review historical and cultural heritage of Ukrainian winemaking that has a worldwide recognition. Within the project it should be concluded the National Register of Objects of wine and gastronomic tourism, wine - gastronomic guide of the Ukrainian regions, the calendar of festivals, seminars and conferences, as well as a content site on the Internet.

KEY WORDS: enogastronomi, national culinary, tourism.

THE COMPETITIVENESS OF TYPE HOP PELLETS 90 OF THE DOMESTIC PRODUCTION

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Analysis of the current state of the hops application methods in brewing has a clear tendency of using hop products like pellets, ethanol extracts, carbon dioxide extracts and isomerized extracts, which help greatly to reduce losses of bitter substances and essential oils. The best way to use bitter substances with the providing of high quality of beer is the usage of type pellets 90, which contain the full range of valuable hop substances.

Ukraine has established the production of hop products based upon the improved technology by the authors. There have been analyzed the biochemical characteristics of type pellets 90 produced from aroma and bitter hop varieties of domestic and foreign origin determining the number and composition of bitter substances, essential oils and their brewing value has been determined. There has been made a comparative analysis of pellets quality after 12- and 18-month of storage in vacuum packing under unregulated temperature conditions and in the refrigerator.

It was found that the optimal conditions for storage of hop pellets are low temperatures, airtight packaging and inert gas environment; pellets of bitter hops varieties store better than pellets of aroma varieties.

Based on comparative biochemical and technological assessment, there has been graded the competitiveness of domestically produced pellets. Hop pellets from varieties Clone 18 and Zlato Polissya correspond to the characteristics of pellets from the Czech variety Zhatetsky (Zaats, mid-early Chervenyyak). Hop pellets from Polessky variety correspond to pellets of the English Northern Brewer variety, and pellets from varieties Slavianka and Zagrava varieties far exceed the world analogues by the composition and quality of bitter substances and essential oils.

KEY WORDS: competitiveness, pellet hops, bitter substances, brewing quality.

SCENARIOS AS A CORPORATE EFFICIENCY MANAGEMENT TOOL IN COMPETITIVE ENVIRONMENT

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A scenario is a description of a future situation consisting of agreed, logically interrelated events and successive steps, with a certain probability leading to a forecasted final state (vision of a company's future).

Development scenarios are based on assumptions concerning outcomes of impact of a combination of the company's strengths and weaknesses and environmental hazards on its future condition.

The main intended purpose of scenarios is development of structured and logical development options for future situations enabling adjustment of strategic plans and ensuring their adaptability to the competitive business environment.

A scenario as a product of scenario forecasting is merely information obtained and presented in a certain manner, used during implementation of the company's development strategy. Several methods for developing the basic logic of scenarios have been distinguished. They can be divided into deductive and inductive. Deductive methods include elaboration of scenario matrices. The most renowned inductive methods are that of landmark events and specified future modification.

Scenario matrices may be elaborated in various interpretations. The simplest and the most popular are the GBU and BEAR method. The first implies that scenarios are focused on the best (good), undesirable (bad) and dangerous (ugly) developments. The BEAR method concentrates upon levels of changes in events concerned: low, medium and high. The existing scenario planning methods, GBU and BEAR, require integration of qualitative and quantitative characteristics of the research object in the process of scenario development.

The landmark events method implies searching for answers to the following questions: which important events may affect production? What are possible consequences of these events? What possible circumstances may cause such events? Answers to these questions enable managers to elaborate maps, description of future happenings, schemes to determine companies' strategic development.

The specified future technique implies singling out the most important components from official plans and programs, internal reports and forecasts. They serve as a source for formal interpretation of advantages and uncertainties.

KEY WORDS: development scenarios, forecasting, scenario matrices.

FOOD LABELLING CHANGES IN EC AND ITS IMPLEMENTATIONS INTO THE NATIONAL LEGISLATION

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Nowadays a lot of efforts in Ukraine are taken for the harmonization and accommodation of national legislation with EC requirements. These activities will accelerate our country recognition, improve local food products competition on the EC market and eventually promote integration into the Community. Significant steps in this direction has been done with the adoption of EC Directives 2000/13/EC and 2008/5/EC to the Laws of Ukraine on safety and quality of food products (last revision 17 Dec. 2009) and on consumers' rights protection (02 Dec. 2012) and especially Technical regulation on food labeling rules (25 Feb. 2011).

Considering increasing foodstuff movements around the globe, introduction of new food technologies and spreading food allergy among consumers it has been proposed to implement additional labeling rules. The main purposes of the implementation is the achievement of high levels of health protection for consumers and to guarantee their right to information, also it should be ensured that consumers are appropriately informed as regards the food they consume. New Regulation EU 1169/2011 amends and replaces several previous EC rules regarding the information provision to consumers, labeling, presentation and advertising of foodstuffs, content and presentation of nutrition information, informing consumers about the composition of foods, compulsory indication on the labeling of certain foodstuffs, novel foods and ingredients etc.

Thus from the part of Ukraine it would be reasonable to initiate elaborating and adopting new provisions of Regulation EU 1169/2011 into our national legislation. Modern rules implementation will be favorable for better consumers information on the content and composition of products in order to protect their health, guarantee foodstuff safe usage and allow consumers to exercise real choice.

KEY WORDS: food labeling, legislation, competitiveness.

PROBLEMS OF PROVIDING HIGH-QUALITY RAW MATERIALS OF THE BAKERY ENTERPRISES

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Permanent demand on products of the bakery enterprises predetermines the necessity of the daily and continuous providing population of bread. The quality of bread and bakery products plays an important role in the competitive conditions. The microbiological safety and the short storage time acquire an important value, such because main characteristic features of bakery are rapid spoilage of products, loss of taste, original appearance etc.

It is important to have high-quality raw materials in sufficient amount for providing the activity of bakeries and satisfaction of consumers.

Great impact on development of bakeries makes the producers of flour: in the pattern of consumption of flour about 85-88 % is for bakery industry. Actual acts and laws do not satisfy the producers of bread, so they are set too low a necessary level for producers and consumers. At the state level Agrarian fund provides the bread producers with flour. Quality of its raw materials is insufficient for the bakeries enterprises and a price exceeds commercial suggestions. In the conditions of government control of profitability of the bakery enterprises force to buy a flour in the states.

The necessity of increasing volumes of flour's sale and low level of profitability of its realization at the Ukrainian market compelled large producers to increase the sales volumes to the foreign markets.

The necessity of development of the bakery enterprises requires to provide the producers of flour by high-quality grain; to pass to the free pricing on the markets of bread and bakery products that will assist to the development of competition on the food markets of grain and flour.

KEY WORDS: quality, bakery enterprises, flour.

PROBLEMS AND PROSPECTS OF SMALL FRUIT MARKET IN UKRAINE

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An important role in providing population with fruits and vegetables belongs to small fruit crops. Food properties and economic efficiency of to small fruit crops are different, but all of them are essential for the balanced nutrition. The Ministry of Health of Ukraine calculated the rational norm of to small fruit crops consumption in Ukraine is 84 kg per person a year. In 2011 an actual consumption of small fruits was 52.6 kg that is 4.6 kg more than in 2010. In 2011 there was 42% reduction of actual consumption of to small fruits from a rational norm. The capacity of domestic market of small fruit crops in 2011 was 2405.0 thousand tons, that is 9.2% more than in 2010 and dependence of import in 2011 decreased by 3% comparatively with 2010 that shows the positive dynamics of small fruit market development on the whole. Large areas of land, both of industrial and private farms are allocated for strawberry, raspberry, and gooseberry, black and red currants. Unconventional small fruits, such as a honeysuckle, arrowwood, blackberry, actinidia, great bilberry, juneberry.

The market of small fruits in Ukraine is specific, as all markets of growing crops. The strongest risk factor is weather conditions which have great influence on the market. The complex analysis of the domestic small fruit production allowed also to distinguish and specify agricultural, ecological, economic, scientific and informative problems of small fruit market in Ukraine.

We consider that successful, high-effective production of small fruits which allows to satisfy population needs is possible only in case of development of industrial small fruit production at specialized entities at maximum optimization of the integral system of interconnected factors which influence efficiency of production.

KEY WORDS: market of small fruit crops, production, consumption, food stuffs

IMPLEMENTATION OF MANAGEMENT INNOVATION AS A FACTOR ENHANCING ENTERPRISE COMPETITIVENESS

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In the modern conditions of globalization a new paradigm of the world economy development is forming on an innovative basis. At this time, along with product, technological, market and organizational innovation, an important role belongs to innovative methods of management.

Intensification of competition specifies necessity of enterprises' adaptation to constant changes of market conditions. To keep existing and new developed competitive positions companies need to develop and implement new methods and forms of governance that is to make innovation.

Management innovation is a combination of organizational decisions as to change of the system, procedures and management methods or management approaches, which are used at enterprises for the first time.

Administrative innovations are related to different areas of business, including the system of management, organizational structure, economic activities, marketing policy, legal services and they can be used for creating and improving management information systems, implementing new methods and forms of accounting, formatting an effective quality management system, improving business planning, strategic planning, developing new motivational mechanism, reforming system of training and retarding specialists and using new forms of personnel management so on.

There are several groups of principles on which managerial innovations are based. They are the principles of managerial innovations status at the enterprise (the principle of the General Manager, collegiality, personification responsibility, authorship, innovation continuity, current and innovation activity balance), the principles of administrative innovations design (the principle of systematic, scientific, feasibility, practical usefulness, uniqueness of enterprise, continuity, regulatory), rules of managerial innovations implementation ("narrow gate" rule, "climbing stairs" rule, "repetition" rule, rule of "pre-heating", "tired but happy" rule, rule of "happy sevens" and "feedback").

Unlike technical (technological) innovation the management innovations have specific characteristics. They have more vast scope. Innovation is introduced without intermediate stages of materialization (commercialization) of the innovation process. The development and introduction of managerial innovations do not require significant investment. The introduction of technical innovation requires appropriate management changes unlike administrative innovations do not always require new hardware. Managerial innovation can't be patented unlike technical. At the same time managerial innovation is market commodity which is used by consulting firms, business schools, training centers, associations of firms etc.

KEY WORDS: innovation, management innovation, competitiveness.

MANAGEMENT SYSTEM OF BUSINESS COMPETITIVENESS

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Management of business competitiveness (MBC) is a relatively new activity for Ukrainian companies. Formation of market economy in Ukraine causes changes in business management system which adapts to external competitive environment. MBC, as a management object, is a set of interrelated elements aimed at providing strong competitive positions, maintaining existing and developing new competitive advantages.

MBC systems have a lot in common at different enterprises but there are national differences. Leaders in MBC are the USA, Japanese and Western European corporations. Thus, a number of specialized strategic MBC improvement programs are used in the United States which control MBC at all stages of the product life cycle, and it has not only control but also analytical function. A lot of attention is paid to costs related to product development with high MBC and a characteristic feature is regular assessment of MBC systems to improve their efficiency. MBC of most Japanese products is the highest in the world due to the following features of MBC systems in Japan: focus on the production of higher quality products as compared to other countries which is caused by the lack of raw materials and energy resources that should be imported; embracing all company activities with integrated MBC control system; focus on preventing faults rather than their detection and elimination, and the predominance of the control MBC technologies and technological processes over the control of MBC production; taking into account the achievements of other countries (the U.S., UK, Germany, Italy, France etc.) in MBC; efficient actions of company management and specialists who implemented the principles of integrated MBC more successfully than in other countries.

Analysis of peculiarities of MBC at enterprises showed that a modern enterprise which operates in market conditions, should use systematic strategic MBC as one of the basic mechanisms of its existence, the essence of which is in developing strategies and a long-term program of action to achieve goals and implement tasks in maintaining / improving MBC using a limited amount of resources in a specific market situation.

KEY WORDS: competition, competitive, management of business competitiveness.

SOCIAL AND ECONOMIC POLICY OF UKRAINE IN SOLVING THE PROBLEMS OF FOOD SECURITY

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The main national interest is sustainable economic development and welfare of the citizens of Ukraine. To provide national and economic security is the most important function of the state, and their implementation strengthens the position of Ukraine in international community. The economic security of Ukraine as a state of protection of vital interests of the individual, society and state against internal and external threats is a necessary condition to preserve and enhance spiritual and material values.

Ukrainian intentions to European integration and harmonization of Ukrainian legislation with the norms and regulations of the European Union require to use European system of food safety management.

The process of reorganizing in the state system of control and supervision of the safety and quality of food started in Ukraine. Reform requires highly skilled quality control and safety specialists, control of all stages of the technological process, sanitary control of production and quality control of food products, including special, dietetic and children's food.

The high level of food security for population must always be a top priority of agro-industrial policy. However, in recent years, Ukraine undergoes a very dangerous situation – there is a real threat to food and economic security. The economy as a whole and especially its main component - the economy of the agricultural sector - were prone to deformation, in the result the volume of agricultural production declined by more than three times. The threat to food security of Ukraine and its regions, has drawn great attention of scientists and practitioners to the need of radical transformation of ownership for land and property, change of management system, improvement of state regulation.

In these circumstances, public administration governments must develop and implement scientifically balanced and effective agricultural policy, the strategy and tactics of domestic agricultural complex development for present and future prospects.

KEY WORDS: food, economic, security, European, policy.

MANAGEMENT MECHANISM OF DEVELOPMENT OF INNOVATIVE POTENTIAL ON THE BASIS OF INTEGRATION INTERACTION

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Functioning of the enterprise under conditions of the market dictates the necessity of constant product renewal, introduction of new management methods, technologies, sources of raw materials and energy. Academic and applied researches urge all companies to introduce innovations.

The statistics shows that enterprises display succession in their own return to investments in innovation. Moreover, the profit from investment in innovation of the best enterprises is two times higher comparing to the average in a branch and ten times better than the worst enterprises have. In general, the effectiveness of innovations does not depend on the size of enterprise or total rate of innovations in R&D. As a rule, the best innovators have relatively small budget.

The most effective enterprises (are those that receive from new products the highest profit spent on R&D unit funds) spend on R&D 4,8% from sales volume, and the least effective – an average of 5,9%.

Successful innovations are the expression of well-organized value chain.

The ability of the enterprise for innovation development is defined by innovative potential of enterprise, in other words, its capacity to implement innovations within selected strategic direction of development. The elements of innovative potential of enterprise are its material and technical, financial, organizational and human capabilities (which include social-psychological factors of personnel) that allow the enterprise to be engaged in innovative activity.

The most important constituent of innovative potential of enterprise is its resource, first of all, financial provision. This factor, in our opinion, is crucial in choosing the strategy of innovative enterprise development.

This takes into account not only the possibility of risky investments implementation in innovative activity, but also the possibility of their rapid mobilization to implement innovative programs.

Strategy implementation related to self-realization of innovation requires the mobilization of all resources of the enterprise to achieve strategic objectives.

KEY WORDS: innovation, integration, new technologies, strategy, innovative potential.

THEORETICAL ASPECTS OF ENSURING OF COMPETITIVENESS AGRICULTURAL SECTOR

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The problems of ensuring the food security of the country and satisfying needs of the population in food, as well as the globalization of the world economy highlight the task for increasing the competitiveness of the domestic agricultural sector and the development of domestic food market.

Food market is considered as a set of commodity-money relations between market participants in order to satisfy needs of different income population groups in food products, differentiated by quality, price, and quantity of nutrients, characterized by numerous segments, stability and inelastic demand in general.

Competitiveness of the food market depends on the degree of food independence, balance in supply and demand of domestic food market, rapid technological and investment reproduction, improving the quality of agricultural products, social stability and the growth of living standards.

Food-production sector of any national economy is a sphere of the state's strategic interests, which requires special attention and protection. Nowadays the risk to lose the food independence increases due to the socio-economic and political instability, adverse climatic changes.

Availability of food is one of the most pressing problems of global importance. This includes both the physical availability of food for all social groups and, above all, for the low-income, and the quality and amount of consumed food.

Under the influence of globalization Ukrainian food market has acquired a number of specific properties: an export specialization (cereals, etc.) and import dependence (meat, fruit, etc.) have been formed, import has been diversified and presented by products with higher added value.

The main factors of competitiveness of agriculture complex and providing food security are defined. Among them: long-term strategic plans of reforming agriculture and food security, public agriculture support which aims are the direct stimulation of producers in the subsidies forms, easing of credit, taxation, and increasing efficiency by promoting agricultural science comprehensive, assistance in implementation of advanced technologies of agribusiness in production process, ensuring the high quality of life for people engaged in the agricultural production, rural development priorities and social and economic infrastructure, export promotion and assistance in promoting products on the world market.

KEY WORDS: food market competitiveness, globalization of the world economy, country's food security.

INNOVATIVE FACTOR OF GLOBALIZATION PROCESSES DEVELOPMENT

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The world market functioning faces a number of global problems. The problem of providing population with foodstuffs is one of them. The global food problem originated not only in population upsurge but also in unreadiness of market participants to satisfy new requirements which appear pursuant to the times.

Nowadays, the world market is rather segmented and saturated by a large quantity of substitute goods. However, in spite of it, solving of nutrition problem is still actual. That's why the role of non-productive sector becomes more significant as it's oriented to support productive sector development. It provides a basis for forming new priorities of economic activity.

The base of such transformation processes is innovation activity. Innovations make it possible not only to strengthen current market positions, but also to create and occupying new niches, which appear in innovation activity of market participants.

Innovation activity in the world has mostly a regional character and particularly depends on the level of economic development of the country initiator, its foreign economic policy, innovation clusters concentration and global trends of economy's development on the whole.

Innovative activity is reflected in particular innovative activity of enterprises. The difficult predictability and unforeseen expected results (they are formed in the process of development of qualitative brand-new product to satisfy covert consumer needs) are determiners of innovative activity. But just these characteristics give an opportunity to make discoveries and investigations, generate new ideas and inventions, and stimulate potential customers to buy, identify new local state of economic equilibrium and form a basis for further economic development.

Taking into account innovation focus on identifying new needs, as well as methods and ways of their satisfaction, they can be a key of globalization processes development. Such aspect determines that innovation creates an opportunity for qualitative breakthrough, creates the environment of priority development and contributes to the maintenance of economic development trends in accordance with globalization's aims and tasks.

Innovative activity is a stimulus to close cooperation between countries. It facilitates identification, monitoring and proper solving of global problems and is a logical continuation and superstructure of global integration processes which makes a direct impact on globalization intensification.

KEY WORDS: innovation, globalization, cluster, development, trends.

DETERMINANTS OF TURNOVER ASSETS MANAGEMENT ON BAKERY ENTERPRISES

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Demand

Some product can be easily sold by enterprises, in that business; you need small amount of turnover assets because your earned money from sale can easily fulfill the shortage of turnover assets. But, if demand is very less, it is required that you have to invest large amount of turnover assets.

Credit Policy

If company purchases all goods on credit and sells on cash basis or advance basis, then it is certainly company need very low amount of turnover assets. But if in company, goods are purchased on cash basis, and sold on credit basis, it means, our earned money will receive after sometime and we require large amount of turnover assets for continuing our business.

Turnover assets Cycle

Turnover assets cycle shows all steps which starts from cash purchasing of raw materials and then this converted into finished product, after this it is converted into sale, if it is credit sale, debtors will also the part of turnover assets cycle and when we gets money from our debtors, it is the final part of turnover assets cycle. If we receive costs from our debtors faster, we need small amount turnover assets. Otherwise, for purchasing new raw materials, we need more amount of turnover assets.

Price Level Changes

If there is increasing trend of products prices, we need to store high amount of turnover assets, because next time, it is precisely that we have to pay more for purchasing raw materials or other service expenses. Inflation and deflation are two major factors which decide the next level of turnover assets in business.

Effect of External Business Environmental Factors

There are many external business environmental factors which affect the need of turnover assets like fiscal policy, monetary policy, bank policies etc.

KEY WORDS: turnover assets, turnover assets management, raw materials.

FINANCIAL FACTORS OF ENTERPRISES'S COMPETITIVENESS

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The positive dynamics of investment resources, strengthening M&A market in Ukraine in recent years needs to improve approaches to investment decision-making criteria. One of the main factors that contribute to investment decision is the high competitiveness of the company, which is maintained at a sufficient level for a long period.

Competitiveness of the enterprise is an economic category which describes the ability of the enterprise to produce competitive products better than the competitor's ones. The ability of the enterprise to promptly and adequately respond to changes in consumer behavior, their tastes and preferences is particularly important.

Assessment of competitiveness of enterprises in a particular market or segment is based on careful analysis of technological, industrial, financial and marketing capabilities of the enterprise. It is used to identify businesses potential and activities that can ensure a competitive position in a particular market. Such an analysis is possible only due to the use of internal information.

Even though the conclusions about sufficient or high competitiveness of the company may be drawn based on the data available in financial statements, researchers of enterprise's competitiveness stress that the basic financial criterion indicating high or sufficient competitiveness is profit or profitability. The realities of the Ukrainian market and the food industry in particular show that many of the leaders of various sectors of the food industry are demonstrating the loss ratio for one or more statement periods, and despite that maintain or even improve their competitive position. Although we note that the loss-making performance for more than 3 years usually affects the future level of sales, and as a result affects the competitiveness. Therefore, the profitability of the company cannot directly indicate the competitiveness.

We believe that the key financial factor of the competitiveness is growing revenue from product sales for a long period of time. Moreover, income flows should consistently show high rates of growth. It does not matter what caused the income growth either an increase in prices or an increase in sales volumes. Stable growth of any of these components directly indicates achievement or retention of a high competitive position in the market.

KEY WORDS: competitiveness, competitive factors, revenue, sales.

FEATURES OF COMPETITIVENESS OF AN ENTERPRISE IN MODERN CONDITIONS

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Enterprise efficiency and competitiveness is becoming popular nowadays. It is of high importance to master clearly essential characteristics, efficiency assessment, and competitiveness of an enterprise. For profitability of an enterprise, it is important to know how to corner new markets right and to be a monopolist in a certain area. In order to characterize a competitive environment it is significant to determine an effect, efficiency, economic efficiency, efficiency indexes, and competitiveness of an enterprise appropriately. It is currently topical to be able to define general methodology of how to determine enterprise efficiency, to know its classification characteristics, criteria, and areas of competitiveness assessment to take an advantageous position in the market.

Economic situation can be discussed and analyzed a lot in terms of its urgency, as setting of goals and lines of activity while establishing an enterprise depends on it.

As it can be seen from the experience of foreign countries, high level of efficiency indexes can be gained only at highly productive enterprises equipped with state-of-the-art technologies.

It is important to note that for the last decades there have been significant changes in the sphere of theoretical considerations on definite processes in economics, and their practical execution, where special attention was given to the solution of problems which contribute to improvement of economic area efficiency and its competitiveness.

Therefore, competitiveness of an enterprise is its ability to be singled out by a consumer among other competitors.

Competitiveness is defined through benchmarking against other competing products. The basis of this benchmarking is the level of meeting customers' demands, their individual requirements to the product according to price indicators and purchases' value (operating costs or commercial use of products). In total, this amounts to the price of consumption.

Product competitiveness can be assessed through group examination made by high-qualified experts, customer opinion polls in order to organize relevant presentations, exhibitions, seminars, and trade fairs

KEY WORDS: efficiency, competitiveness, enterprise, profitability, quality.

DECISION OF PROBLEMS IN THE FUEL AND ENERGY COMPLEX OF UKRAINE

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The fuel and energy complex of Ukraine is characterized by the growing deficiency of domestic primary energy resources; increase in their cost in the global market and external supply problems; low use efficiency of the available fuel and energy resources, actual absence of diversification of fuel supply sources, all of which poses threat for the national security of Ukraine.

Consumption of primary energy in Ukraine gradually reduces. In 2010 118 tons have been consumed which is the half of 1987 level, and 2% lower than in 2000. Another observation is the reduction in the number of oil equivalent kilogram per one dollar of which in 2010 was 0,39. It is almost three times less than in 1987 and 2000.

Ukraine has elaborated the Economic reform program of Ukraine for 2010-2014 which sets out that Ukraine's energy sector has unique spare capacity for power generation however a number of problems limit the capability to sustainably provide the economy with power energy:

- obsolescence and depreciation of key assets of power sector enterprises (about 80% fixed assets of thermal power plants, and 60% of fixed assets of power distribution companies are used-up) as a result of lack of budget funds and unattractiveness of the industry for private investments;

- low efficiency and power production and transmission (power resource consumption in the generation is 35%, and expenditure level at transportation is two times higher than in the OECD countries;

- critical financial and economic condition of thermal generating and power distributing companies, high indebtedness rate among energy market players.

Problems in the fuel and energy complex of Ukraine could be solved only with the help of comprehensive measures, in particular due to the use of environmentally sound renewable energy sources, of which the most wide spread and accessible for Ukraine are geothermal energy and ambient energy of the biomass and small rivers. Energy saving due to the use of renewable sources has become and vital necessity of the time, as it furthers solving of not only energy supply problems, but also many environmental and economic problems to ensure national income growth.

KEY WORDS: fuel and energy complex.

FOOD SAFETY IN THE GLOBAL DIMENSION

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Solving the problem of providing the population with food has always been one of the most vital tasks. This problem has not lost relevance today.

In December 1974, the General Assembly of the UNITED NATIONS in accordance with the proposals of experts of the food and Agriculture Organization (FAO) declared the so-called "International commitments to ensure food security in the world." According to this document, world food security is to maintain stability in the markets of food products from the availability of basic food for all countries.

The problem of hunger can be called one of the global problems of mankind. About 1.5 billion people in the world suffer from malnutrition, and about 0.5 billion people are starving. Major states which are food manufacturers are unable to provide some countries in Asia, Latin America, and equatorial Africa with their own products. In addition, periodic financial crises lead to the decrease in the already low purchasing power of the poor population.

Solving the problem of food security in these countries is possible only in the international format, as fertile soils, pastures, water resources are distributed very unevenly in the world. Moreover, the global food security is closely connected with the national food security of each country-manufacturer. The main components of the national food security are the physical and economic availability of food, relative independence from imports of raw materials and food stability, safety, ability to minimize the impact of emergencies and adverse climatic conditions. The State plays the main role in the effective support of the farmers carrying out an effective tax, credit, insurance, price policy, as well as in addressing the issues of quotas, certification, dumping. The use of modern agricultural techniques and achievements in the field of biotechnology and genetic engineering of new varieties of plants and breeds of animals, creating favorable conditions for growing, harvesting, processing and storage of agricultural products, the application of high culture and land reclamation is vital.

KEY WORDS: food security, food problem, resources.

MEAT PROCESSING INDUSTRY CONDITION AND FOOD SAFETY

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The development of meat industry is associated with strengthening of competitiveness. To reach this purpose it is necessary to take into account consumer requirements, development of supply infrastructure and sales market, scientific and technological progress. It requires analyzing of conditions and unresolved problems of meat industry enterprises in the food safety context.

There are many causes of crisis in meat industry. They are the lack of quality raw materials because of the agricultural crisis; the absence of appropriate government support; the prices for finished goods; the raw materials, fuel and energy costs; the increased transport costs for raw materials and finished products transportation; the reduction of demand; taxes, the dependence on imported materials, semi-finished products, packaging etc.

The current meat processing industry state is characterized by complex socio-economical, organizational, industrial, technical, technological and environmental problems. The solutions of these problems are the main directions of meat processing industry development.

The main task of meat processing industry today is to overcome financial crises consequences in operating, innovation, environmental and social areas. The necessary measures are attraction of new markets investment, effective usage of enterprises productive capacity, state standards development and implementation, international standards ISO 9000 "Quality Management System" and the ISO 22000 series of "Safety management system of food" certificates implementation, updating of logistics, the introduction of innovative technologies and equipment, the waste and low-waste technology using, improving of raw materials utilization, implementation of environment management in accordance with international standards EMS, ISO 14000/BS 7750 and programs of the European Community - EMAS.

KEY WORDS: company, condition, development, food safety, meat industry.

OUTSOURCING AS A WAY TO INCREASE EFFICIENCY OF ERP SYSTEMS

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Companies that adopted enterprise resource planning (ERP) software prior to the current economic downturn now face a serious dilemma: How can their organizations increase ERP functionality simultaneously reducing operating costs and even number of staff?

As margins shrink and competition increases, decision makers apply to their ERP systems in order to ensure their enterprises an advantage. However, the internal IT departments which are in charge of these ERP systems face budget reduction. The reality is that companies must learn how to generate better results from their ERP software packages with fewer resources.

Outsourcing of IT services (implementation of the system, system support and hosting) can be a solution. On-demand support partners can offer capabilities far beyond support. A trusted support partner can function as a one-stop shop for ERP break/fix, continuous improvement, part-time projects and optimization. This diverse capability does not only drive the value on its own, but also allows internal resources to be focused on their core competencies, which result to an ever-increasingly streamlined ERP solution.

Utilizing a shared services approach to ERP support gives companies the necessary flexibility to drive value through enterprise software while adhering to unforgiving budgets assumes that the company chooses available partners wisely. Support services providers can differ greatly in regards to the requirements for team-member experience; payment models; and other aspects that can ultimately impact on client-side performance.

In the condition of the economic downturn, companies begin to think of value, rather than costs. This same thinking prompted companies to invest in ERP systems mainly, in order to streamline business processes, optimize core efficiencies and eliminate all non-value-adding elements throughout the entire enterprise.

Companies now face the challenge of enhancing their ERP capabilities in order to gain a competitive advantage while working within tight budgets. That's why these companies are trying to find ERP partners, because a continued commitment to value provides the first step toward wise investment.

KEY WORDS: outsourcing, enterprise.

DEVELOPMENT OF VERTICALLY-INTEGRATED STRUCTURES IN THE AGRO-INDUSTRIAL COMPLEX

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In context of development of agricultural potential of Ukraine, special research is required for integration processes in agricultural sector which results in creation and development of vertically integrated structures. Agroholdings and their expansion to international financial markets made foreign investors pay attention to Ukrainian agro-industrial complex.

The most substantial restraining factor of development of agroholdings in Ukraine is insufficiency of land legislation, i.e. absence of land market and land cadastre. Furthermore, an important barrier in development of agroholdings is lack of interest of national banks in crediting of such structures. Ukrainian banks do not consider granting credits with construction in progress or future yields as a pledge and are ready to credit solely with operating capacity as a pledge. In turn, this situation bears substantive financial risks for agroholdings. In order to solve the problem, agroholdings have to attract credits from foreign banks and place their securities on international stock market.

It should be noted that internal problems of agro-industrial structures include difficulties in managing agroholdings, shortage of qualified employees, low level of economic efficiency and technical facilities. Experts suppose that Ukraine uses about 40-50% of all opportunities for improvement of agriculture management. For example, considering the fact that management is often not ready to implement new technologies, average technical effectiveness totals only to 60% from 100%.

In the nearest perspective the process of concentration of agricultural lands in such structures will continue through usage of lease and insolvency of inefficient agricultural enterprises in Ukraine. However, it is likely that in the long-term perspective agroholdings will have to reduce scales of land usage and reorganize in other legal structures of agro business. This will depend both on policy implemented by government in development of agro business as well as the condition of world financial system. Nowadays, government has to percept agroholdings as objective reality and through progressive agro policy directs their activities in line with governmental strategy, in particular, to the development of agricultural territories. Primarily this is attributable to the taxation system which has to be improved evolve in the context of general tax reform.

KEY WORDS: development, agroholdings, enterprises.

RIGHT TO FOOD AND GROWTH OF POPULATION: INTERNATIONAL DEMENTION

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Right to food is one of the essential rights that allow people to exist and live on. But at the same time humanity have to face new challenges in case of recent climate changes and increasingly growing population. In this case we have to face this problem in such known and predetermined dimensions as availability, adequacy and accessibility. All of these so-called "dimensions" corresponds to special obligations that could be fulfilled by states' governments or societies (influential groups or groups possessing adequate powers to interfere).

We can mention such common states' obligations corresponding to the right to food as "to respect", "to protect" and "to fulfill". Nowadays we can see those obligations endorsed by many states of the world and put into action. This case also shows that in current situation the new measures should be developed.

As it is seen different countries should cooperate in the global perspective so to maintain current state of agricultural resources and to increase opportunities of producing food. Such initiative should be provided by the UN as one of the necessary aspects of surviving of humanity and current civilization. Also it seems necessary to develop a special system to calculate the world population, needs in food for different time periods and at the same time there should be developed special research institutions to control existing agricultural resources providing up-to-time information. Also we should consider using new technologies to produce food in conditions that are not common nowadays such as improving sea farms and producing sea food in appropriate regions. All of that should be done as the one global system.

Producing of food is likely to become one of the key issues of surviving of humanity and this is the main reason to improve state cooperation at current conditions.

KEY WORDS: right to food, climate changes, human rights, food production.

TO BUILD ENTERPRISE'S IMAGE AS AN IMPORTANT INSTRUMENT IN MARKET COMPETITION

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Advertising manager can use different methods of product positioning. The first method is to disclose product characteristics or consumer's benefits. The second one is the simplest and the most important at the same time. It refers to positioning of a product in correlation of two characteristics as a price and quality. The third method makes an influence on consumer by creation of pleasant associations when product is associated with celebrities, which use this product. The fourth method shows usage of a product so that the consumer may understand more the practical need in this product. According to another method the firm's product must be associated with the symbols of culture, such as cultural attractions, historical places and so on. Next method is to compare a firm's product with a product of the firm's competitors. It doesn't mean disqualification of competitor's products. On the contrary, the firm compares its product with a product of leaders. The aim of such comparing is to show that the firm's product is of the same quality as a product of a firm-leader.

But advertising is not a single instrument of firm's image building. The managers of the firm must take into account such elements as a firm's color, slogan, block, complex of prints, logotype, trade mark and others. All these elements together form the firm's style, which is one of the main instruments of firm's image building. So, in spite of it isn't cheap to form firm's style, it will be repaid by consumers' loyalty to the brand. As a result of such loyalty the firm gets more profit, and a part of net profit may be used for investing in supporting firm's image, it's developing and even forming such instrument as goodwill. So, the firms and enterprises must always work on the firm's image in order to survive and win in market competition.

KEY WORDS: enterprise's image, publicity, firm style, trade mark, firm logotype.

THE INSURANCE OF ENTERPRISE'S COMPETITION ABILITY BY THE EFFECTIVE MANAGE OF CHANGES

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The presence of competition superiority during every moment of time is available only on condition that the changes take place constantly. It is mainly explained by the changeability of surroundings and also by the non-stability and unbalanced state of the producing system (the factors of internal surrounding).

It is well-known that the changes in enterprise's processes may take place in different ways. The main approaches to such changes are the business process reengineering (BPR) and the social-technical construction. In fact, there are used different combinations of these methods of change making.

In contrast to reengineering, which is the rapid, risky and exciting method, the social-technical construction assumes the preliminary realizing, planning, and the growth up character of changes. This method is more well-considered and "tender", because much attention is paid to the psychological needs of labor power. In contrast to BPR, which is the revolutionary method, social-technical construction is the evolutionary method of approach. It considers the following succession of activities: the elementary investigation, the distinguishing of production process, the distinguishing of discrepancy in system, the analysis of social systems, the understanding by the workers their roles, the cleaning up of the systems of support and delivery, the distinguishing of corporative surrounding and the working out of changes propositions.

The combination of two methods (BPR and social-technical construction) in practice gives the new combined approach: "the methodology of progress". This approach combines the principles of social-technical construction with the technological orientation and the accent on the effectiveness of reengineering.

It is also suggested to use 'preventing business transformation of the enterprise' in order to assure its competitiveness. The later is based upon the diversity of business and is to support "arising" of new changes in the former surrounding and promote "dying off" of non-competitive production factors.

KEY WORDS: enterprise's changes, business process reengineering, social-technical construction, business activity, strategic net of process changes.

IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT CONCEPT ON POLISH AND UKRAINIAN MARKETS

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In "Implementation of sustainable development concept on Polish and Ukrainian markets", we present the research results which were aimed at finding out whether there are differences in the level of commitment to pursue sustainable business development among companies with different economic background, companies from two countries: Poland and Ukraine.

The results of research study examining the degree and the extent of the implementation of sustainable development concept on the Polish and Ukrainian markets. The research was focused on the three aspects of sustainable development, i.e. responsibility to the community and society, employee rights and working conditions, and environmental protection. We first explain the design of the questionnaire, the sampling procedure and the most important characteristics of the sample. Then the findings of the research conducted among enterprises on the market of Poland and Ukraine are analysed and discussed across three sustainable dimensions. Thus, there are three sections related to each dimension of sustainable development. At the beginning of each section, the overall importance of the particular dimension of sustainable development is discussed. Then, in order to get a clear picture about the difference in the level of importance of some sustainable development elements across countries, average perceptions of different aspects of sustainable development are investigated and compared. As corporations today face the daunting challenges of achieving superior business performance, as well as meeting the expectations of the social, economic and environmental dimensions the linkage between sustainable development dimensions and business performance is presented, at the end of those sections of presentation.

KEY WORDS: sustainable development, responsibility, working conditions, Poland, Ukraine.

Section YOUNG FOOD SCIENTISTS - VISION OF THE FUTURE

BIOCONVERSION OF INDUSTRIAL WASTE IN MICROBIAL SURFACE-ACTIVE AGENTS

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Microbial surface active substances (surfactants) are able to reduce surface and interfacial tension, absorb heavy metals, and increase the efficiency of remediation of oil polluted ecosystems, exhibit antimicrobial and antiadhesive effects against pathogenic microorganisms. Due to the unique properties of microbial surfactants they can be used in various industries. The feasibility of their practical application depends on the economic efficiency of production. One of the ways to reduce the cost of microbial surfactant technology is to use the cheap growth substrates, such as wastes from other industries.

The oil-oxidizing bacteria were isolated from the oil-polluted samples of soil and identified as *Acinetobacter calcoaceticus* IMV B-7241 and *Nocardia vaccinii* IMV B-7405. The ability of these strains to synthesize the metabolites with surface-active and emulsifying properties during the cultivation on traditional hydrophobic and hydrophilic substrates was determined.

The aim of present work was to study the possibility of using various industrial waste as a cheap growth substrates for surfactant synthesis by *A. calcoaceticus* IMV B-7241 and *N. vaccinii* IMV B-7405.

It was shown that maximal indexes of surfactant synthesis by strain IMV B-7241 and IMV B-7405 were observed when oil containing substrates (fried and refined oil) used as a carbon source. Under such cultivation conditions the amount of synthesized surfactants increased by 2 folds compared to the cultivation in ethanol- or glycerol-containing medium. The using as a substrate molasses (waste of sugar industry) was accompanied increasing surfactants synthesis by 1,2–1,5 folds.

Thus the possibility of utilization of food industry waste with synthesis metabolites with surface active properties by *A. calcoaceticus* IMB B-7241 and *N. vaccinii* IMV B-7405 was established.

KEY WORDS: biosurfactants, bioutilization of wastes

DEVELOPMENT OF TECHNOLOGY OF SURFACTANTS *RHODOCOCCLUS ERYTHROPOLIS* EK-1 WITH THE USE OF INDUSTRIAL WASTES

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Surfactants synthesized by microorganisms are used in various fields of industry, but their rational use depends primarily on economic efficiency. One of the ways to reduce the cost of surfactant technology is the use of cheap growth substrates, such as waste from other industries.

The possibility of replacing of high-cost substrates (*n*-hexadecane and ethanol) for the surfactant biosynthesis by *R. erythropolis* EK-1 with industrial waste (oil and fat industry, fried sunflower oil, liquid paraffin) was established.

The stimulation of surfactants synthesis by strain EK-1 by introducing of copper cations (0,01–0,1 mM) into a medium with hydrophilic (ethanol) and hydrophobic (*n*-hexadecane, liquid paraffin, fried sunflower oil) substrates in the middle of the exponential growth phase was shown. Intensification of surfactants synthesis on hydrocarbons in the presence of Cu²⁺ was caused by activation of alkane hydroxylase of *R. erythropolis* EK-1.

The technology of surfactant biosynthesis by *R. erythropolis* EK-1 was worked out and include: 1) the use of fried sunflower oil as carbon and energy source (2 %); 2) use of inoculum grown on molasses 3) addition of glucose (0.1 %) at the beginning of cultivation and 0.1 mM Cu²⁺ in the middle of the exponential growth phase into the medium with oil. Implementation of this technology

possible increasing the concentration of extracellular surfactant by 4–4,5 folds compared to previous technologies with *n*-hexadecane and ethanol.

It was found that the use of low concentrations (5 %) of surfactants *R. erythropolis* EK-1 led to the 75–95 % degradation of oil in water (2.6 g/dm³) in the presence of Cu²⁺ (0.01–0.05 mM). The highest degree of degradation (92–99 %) of the complex pollutions with heavy metals and oil in the soil was in the presence of surfactant preparations (200–300 cm³/kg of soil) and copper cations (0.1 mM).

KEY WORDS: Rhodococcus erythropolis EK-1, surfactants, fried sunflower oil, biosynthesis intensification.

DEVELOPMENT OF TECHNOLOGY OF SURFACE-ACTIVE SUBSTANCES OF *NOCARDIA VACCINII* IMV B-7405

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In recent years, microbial surface-active substances (SAS) are the subject of intense theoretical and applied research, because of their possible practical use in various industries, as well as for the remediation of environment. The advantages of microbial surfactants compared to chemical analogs are the biodegradability, non-toxicity, stability of physical and chemical properties over a wide range of pH and temperature.

The strain of oil oxidizing bacteria, identified as *Nocardia vaccinii* IMV B-7405 from was isolated from oily soil samples earlier. The ability of *N. vaccinii* IMV B-7405 to the synthesize surfactants on a various hydrophobic (hexadecane, liquid paraffin) and hydrophilic (ethanol, glucose, glycerol) substrates was determined.

The nutrient medium for cultivating *N. vaccinii* IMV B-7405 was optimized using mathematical methods of experiment planning and concentration of SAS synthesized on glycerol by strain IMV B-7405 increased by 2–4 folds (to 12.6 g/L) as a result compared to the SAS quantity before optimization.

It was determined that the chemical composition of exocellular surface-active substances of strain IMV B-7405 was a complex of neutral, amino- and glycolipids. The possibility of an increase of conditional SAS concentration by 40 % after introducing 0.1 % fumarate (precursor of gluconeogenesis) and 0.1 % citrate (regulator of lipid synthesis) into the medium with glycerol in the early stationary growth phase of *N. vaccinii* IMV B-7405 was shown.

The maximal oil destruction degree in polluted water (2.6 g/L) and soil (20 g/kg) was 87–98 % and was achieved after treatment with *N. vaccinii* IMV B-7405 cells suspension and SAS containing preparations (post fermentative cultural liquid).

The possibility of use of *N. vaccinii* IMV B-7405 exocellular metabolites as antimicrobial agents to combat bacterioses of agricultural crops was shown, and it means promising use for the development of environmentally saved products to control the number of phytopathogen microorganisms.

KEY WORDS: bacteria of *Nocardia* genus, surface-active substances, biosynthesis intensification.

DETECTION OF MAIZE DNA IN THERMALLY TREATED PRODUCTS

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Maize (*Zea mays* L.) is an important food crop worldwide and it is extensively used as both raw material and an ingredient in modern food production. Moreover, maize (corn) belongs to the most distributed genetically modified (GM) plants as well as to common allergens. Therefore, reliable detection of maize in processed foodstuffs is urgently necessary for food authentication, quality and safety monitoring. The aim of this study was to select suitable reliable methods for maize identification in heated products. Thermal treatment is extensively applied during food processing. Thermal degradation of maize DNA was investigated using DNA-based polymerase chain reaction (PCR) that is a preferred reference method for analysis of processed foods. Seeds of maize were subjected to heat processing such as boiling in water at 100°C during 5 hours. Samples were taken in 1 hour interval. Genomic DNA was extracted from each sample by cetyltrimethylammonium bromide (CTAB) method. DNA degradation was assessed by agarose gel electrophoresis and PCR amplification. PCR analysis was performed using plant specific and maize-specific primers generating amplicons of different length, in particular 550 bp, 226 bp, 140 bp and 102 bp. The results obtained exhibited that DNA degradation is increased relatively to the growing duration of thermal exposure. Comparison of amplification results revealed that thermal treatment did not influence on the production of 102 bp amplicons during 5 hours, however amplification of 140 bp and 226 bp PCR fragments was decreased after 3 hour exposure while 550 bp amplicons were reduced after 2 hours. The outcomes achieved are useful for monitoring of thermally treated food products.

KEY WORDS: Maize identification, thermal degradation of DNA, polymerase chain reaction

NEAR INFRARED REFLECTANCE SPECTRUM OF RAPE SEED AS A TOOL FOR ERUCIC ACID DETECTION

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The objective of this study was to analyze of reflectance spectrum in near-infrared region of rape seed with different erucic acid content and to choose the most informative wavelength for development of calibration equation. Near-infrared reflectance spectra at 1330-2370 nm were measured for rape seed with high (47.5 %) and low (1.3 %) erucic acid content. The fatty acid composition of seed oil were determined by gas-liquid chromatography.

We have detected that absorbance level of rape seed at 1330-2370 nm considerably depends on the moisture of seeds, but at the same time we have observed that absorbance of seed in this spectrum region was high enough after drying. Evidently the highest overtones and combinations of fundamental vibrations of —CH group of such component of oil seed as oil, proteins and fibers contribute to this absorbance too.

We have measured and analyzed reflectance spectrum of rape seed with different content of erucic acid. We have observed some difference in absorbance level between low and high erucic acid seeds in the range of 1700-1860 and 1930-2370 nm.

In order to get more information from absorbance spectra we have analyzed the first derivatives of these spectra. The most evident difference between first derivatives was detected in the range 1930-2270 nm. We suppose that they can be caused by different fatty acid composition of low and high erucic acid rape seed. We can suppose that this range is an informative for the development of fatty acid composition calibration equation. The wavelength set are proposing for development of calibration equation of erucic acid content in rape seed.

Our data could be used for determination of erucic acid content in rape seed by near-infrared reflectance spectroscopy.

KEY WORDS: near infrared reflectance, rape, erucic acid.

ANTIVIRAL ACTIVITY OF A MOLECULAR COMPLEX CONTAINING RNA AND TILORONE AGAINST EXPERIMENTAL HERPES SIMPLEX VIRUS INFECTION

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Antiherpetic activity a molecular complex containing RNA and tilorone (MC) non-dependent on the IFN system effect has been demonstrated in *in vitro* conditions in *Vero* cell culture. The MC chemiotherapeutic index in HSV-1 infected *Vero* cell culture is 324 – a fact permitting to research this complex as a promising antiherpetic drug.

This compound demonstrate a marked antiviral activity *in vivo* on a model of experimental murine herpetic encephalomyelitis. The MC is shown to decrease the lethality level of infected animals by 80 %. The defense coefficient of the MC for experimental herpetic meningoencephalomyelitis is 5, the affectivity index heaving been reached up to 80.

The author has detected the MC ability to influence on the characteristics of cytokine status of infected animals. The MC used led to the increase of different types of interferons (IFNs) levels, serum IFN having been reached 3200 u/ml, concentrations of spontaneous IFN and α -IFN having become 320 and 640 u/ml, respectively. γ -IFN having become 640 and 320 in blade and splenocytes, respectively. In this case the tumor necrosis factor levels have decrease up to intact animal levels (38 and 29 % in blade and splenocytes, respectively).

The MC use in experimental herpetic meningoencephalomyelitis has led to the activation of macrophagal immunity link: phagocytic macrophages quantity increases (PhI = 87%), their absorbing ability becomes higher (PhA = 15), bactericide macrophage functions increase (NTTs spontaneous – 64%, NTTs stimulated – 82%).

KEY WORDS: yeast RNA, tilorone, antiviral activity, herpes simplex virus type I, cytokines, interferon.

RATIONAL METHODS OF BREAD ENRICHMENT WITH SELENIUM

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Creating breads health-care purposes, fortified micronutrients, including selenium is topical direction in the development of the baking industry. There is important principle in developing functional foods according to which the total income micronutrients in the daily diet, including fortified foods should not exceed the upper safe levels of consumption. The daily consumption rate of selenium in different countries ranges from 40 to 220 µg, and it is 70 µg for men and 50 µg for women in Ukraine.

Technology for selenium enrichment of malt legumes by germination of seeds after the previous soaking it in aqueous solutions of inorganic salts of selenium. Based on conducted researches it was found that most of the accumulated selenium (65–68 %) was the part of intracellular protein fraction, which guarantees the safety of biological selenium containing malt and a high degree of preservation of selenium during thermal processing. The aim of this work was the choice of rational methods of bakery products enrichment with selenium during the preparation of semi-finished bakery production, technology of which involves the accumulation of biomass and increased activity of fermentation microflora.

Thus, the use of selenium enriched liquid rye leaven in the preparation of rye-wheat breads will increase the selenium content in finished products and improve their qualitative indicators. The use of such bread in an average number (277 g/day) will provide about 40 % of daily need for selenium, will improve balance diet, and have a positive impact on health, efficiency and life expectancy of Ukraine's population.

KEY WORDS: selenium, bakery products, selenium-enriched yeasts, malt.

TECHNOLOGY OF PRODUCTION OF INTERFERON I TYPE PREPARATIONS USING INDUCTOR SYSTEM REUSABLE ACTION

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Genetic engineering products such as recombinant preparations (reclFNs) are widely use as the therapeutic products. At the same time, natural a/b-IFNs are still important because of their unique valuable properties having favorable influence on human and animal organisms.

A key stage of the IFN synthesis is its extracellular activation – IFN induction. The IFN type I inducers used now are some viruses and also some natural and synthetic double-stranded RNAs. However, these inducers are rather expensive and their use as viral inducers needs additional labor-consuming purification stages of IFN preparations.

The study is related to development of technology for the interferon I type preparations' production using synthetic inductor constructions as an interferongene factor. Inductor systems are molecular complexes of yeasts RNA which is covalent associated to insoluble granular matrix, and tyron hydrochloride (IMMC).

It was established character of IMMC synthesis and its physical-chemical characteristics. It was shown that concentration of immobilized rybopolinucleotides in IMMC'preparations was 30 mg/ml, and value of ζ-potentials of inductor systems was -3,9 mV to -5,2 mV. Principal opportunity of production of interferon I type preparations using IMMC as an inductor was shown experimentally. Value and time parameters of interferon synthesis by producer in suspension and monolayer culture contacting to IMMC granules were established.

Reusable action of IMMC as an inductor of interferon synthesis was shown and method of regeneration of IMMC particles was developed. Equipment for interferon production in vitro using monolayer and suspension cell cultures inducted by IMMC was designed and developed.

Evaluation of interferon genesis' efficiency by both types of producers' cultures using IMMC in different technological conditions was done. Optimization of interferon biosynthesis parameters on laboratory equipment as a prototype of industrial apparatus was performed. Apparatus-technological scheme of interferon I type production using immobilized reusable inductor system was designed.

KEY WORDS: interferon, inductor, yeasts RNA, tyron, spheron.

DISPOSAL OF CHICKEN MANURE BY METHANE FERMENTATION

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Chickens badly absorb energy of plant feed. Most of it goes in the manure. Therefore, it can be used as a source of renewable energy in the production of biogas, which is one of the ways of its utilization.

Chicken manure contains uric acid and undigested proteins, which are two main forms of nitrogen. The ratio C / N is less than optimal. Anaerobic decomposition of these substances in chicken manure resulted in the production of high amounts of ammonia, which under certain concentration leads to inhibition of the process. However, it has been repeatedly shown that methanogens can adapt to increased concentrations of ammonia nitrogen.

Number of researchers have reported the successful operation of digestion systems for poultry manure. Most of these systems were designed to operate in the mesophilic range.

Given the wide margin of variation of parameters by different researchers of the process, the aim of our study was to establish the optimal parameters of anaerobic digestion of chicken manure.

Methane fermentation of chicken manure was carried out in the mesophilic temperature regime at the temperature of about 35 °C. The fermentation was carried out in periodic regime. The investigation was carried out at four different manure moisture levels (80 %, 85 %, 90 %, 95 %) and three different doses of inoculum (5 %, 10 %, 15 % of the volume).

It has been found out that with the increase of manure moisture the biogas yield from one unit of dry substance and correspondingly dry organic substances also increases, but from one unit of digester volume — decreases. The optimal parameters for carrying out anaerobic digestion of chicken manure are: moisture of substrate at the level of 85 %, amount of inoculum — 5 %, duration of the process — from 13 to 20 days.

KEY WORDS: Chicken manure, methane fermentation, biogas.

BIOSAFETY OF CANNED FRUIT AND VEGETABLES

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Contamination of food by microorganisms occurs in the course of its processing and transportation. The source of microorganisms can be equipment, staff, air, water and auxiliary materials. Some types of microorganisms cause deterioration in the quality and reduce the stability of the products during storage. Content of proteins, carbohydrates, vitamins and other nutrients in food promotes proliferation of a range of microorganisms. In order to assess food safety different hazards are combined in several groups. Risk assessment in each group includes 3 main criteria: severity, how often it occurs, and the timing of a negative effect formation.

In the canning industry in Ukraine there is a problem of food security in the course of the quality products manufacturing, which involves the application of state support for domestic manufacturers. The condition of agriculture complex directly affects the level of food security in Ukraine.

Analysis of canned fruit and vegetables (pickled and natural) of a number of domestic manufacturers has shown a significant excess of overall contamination of canned fruit, which, in its turn, may indicate the non-compliance with sanitary norms of production and the possibility of presence both of pathogenic forms of bacteria and dangerous metabolites (antibiotics, myco- and bacterial toxins).

Thus, the study of existing extraneous microflora in canned fruit and vegetables and prevention of the filamentous fungi development at all stages of the preparation, preferably by drying or using antifungal drugs, is the best way to limit the contamination of food by mycotoxins, in order to ensure biosafety of canning production and safekeeping of the nation's health.

KEY WORDS: biosafety, food, canned fruit and vegetables, microflora.

MODELLING OF HEAT TRANSFER BETWEEN THE LARGER AND SMALLER CELLS IN THE SUCROSE RECRYSTALLIZATION PROCESS IN THEIR CONTACT AREAS WITH SUPERHEATED SOLUTION DURING SUGAR MASSECUITE BOILING

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This work is devoted to the deepening of the crystals growth and dissolution processes theory, namely of recrystallization over the vibrational mechanism issue by mathematical modeling of recrystallization process using numerical methods. This theory was put forward by researchers I.Bazhal and O.Kurylenko from NUFT because none of recrystallization theories existing then was unable to explain the totality of accumulated research data. The modeling was based on the using of dispersed phase collective growth and dissolution of cellular model. In this case, the authors consider following questions:

Creating method of *superheated sucrose solution - larger sucrose solution cell - smaller sucrose solution cell* model. Each of these cells, in turn, is surrounded by larger and smaller sucrose crystals respectively. These cells simultaneously contact with each other at the perfect heat transfer law. Calculations were carried into software FlowVision;

The numerical calculations results of heat exchange process between the larger and smaller cells of massecuite sucrose solution are into software FlowVision. Each of these cells surrounds larger and smaller sucrose crystals respectively. The heat exchange process is considered at simultaneously contact of cells with the surrounding solution. Surround solution is considered into superheated solution zone of vacuum pan working volume. Modeling was carried out for the case of three-dimensional regions contacting with each other at the perfect heat transfer law.

There were obtained the results confirming the key tenets of the recrystallization process theory over the vibrational mechanism by modeling of heat transfer between the larger and smaller massecuite sucrose solution cells with the surrounding solution, at conditions of their coming into superheated solution zone of vacuum pan working volume. Namely, one of the necessary conditions of recrystallization process is periodic fluctuations in temperature or disperse medium concentration. The recrystallization mechanism is reduced to the asymmetric impact of crystals linear size (mass) on linear (mass) rate of growth or dissolution.

KEY WORDS: Recrystallization, heat transfer, cell, massecuite sucrose syrup

COLLAGENOLITIC ENZYME FROM BASIDIOMYCETES MUSHROOM FOR MEAT PROCESSING INDUSTRY.

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The meat processing industry enterprises are characterized by substantial amounts of little or unclaimed byproducts: the heads, legs, stomach, heart, liver, etc. Formerly byproducts of second category were not used because of their stiffness due to the presence of collagen fibers, but now there are ways to soften the raw materials with proteolytic enzymes.

Collagenase has proteolytic activity and selectively acts on collagen - the main component of connective tissue, causing its destruction. At present we know quite a lot of enzyme preparations with collagenolytic activity. Collagenases have been found in leeches, various insects, shrimps and a variety of crabs. However, not all of them are used. This is often due to limited source material, so screening for new, innovative sources of collagenases is important.

We have found highly active collagenolytic protease from native liquid of cultivation of Basidiomycetes fungi. In order to optimize the culture conditions and improve the yield of the enzyme the effect of C: N ratio in the glucose-peptone medium was studied. Submerged cultures were grown for 7 days, after which the native solution was separated from the biomass. From the 3rd to 7th day of cultivation native liquid samples were taken for analysis of protein content and activity determination. Collagenolytic activity showed the highest culture of the fungus Coprinus sp. on the medium with the ratio C: N 1,5:1 on the 5th day of cultivation.

KEY WORDS: Collagenase, fungi, protease activity.

ANTIMICROBIAL AND ANTIADHESIVE PROPERTIES OF *RHODOCOCCUS ERYTHROPOLIS* IMV AC-5017 AND *NOCARDIA VACCINII* IMV B-7405 EXTRACELLULAR SURFACTANTS

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According to the latest research a lot of efforts have been directed to avoid microbial contamination, such as studies of changing the superficial properties of contact surfaces by conditioning surface-active substances (SAS) of microbial origin. They have several advantages over synthetic surfactants, because of their biodegradability, reduced toxicity, biocompatibility, the effectiveness at extreme temperature, pH, salinity, emulsifying ability, antimicrobial and antiadhesive properties.

In the previous studies the oil-oxidizing bacteria identified as *Rhodococcus erythropolis* EK-1 and *Nocardia vaccinii* K-8 were isolated from oil-contaminated soil samples. The strains EK-1 and K-8 were deposited in the Depository of microorganisms of the Institute of Microbiology and Virology of National Academy of Sciences of Ukraine at the numbers of IMV Ac-5017 and IMV B-7405 respectively.

The aim of this work was to study the antimicrobial and antiadhesive activity of *R. erythropolis* IMV Ac-5017 and *N. vaccinii* IMV B-7405 extracellular surfactants.

It was established that *R. erythropolis* IMV Ac-5017 surfactants preparations of (0.61–2.1 mg/ml) in a form of cultural liquid supernatant showed antimicrobial effect in respect of *Bacillus subtilis* BT-2, *Candida tropicalis* BT-5, *Candida albicans* D-6, *Candida utilis* BVC-65 cells survival was 2–45%.

It was determined that *R. erythropolis* IMV Ac-5017 and *N. vaccinii* IMV B-7405 surfactants decreased attachment to abiotic surfaces (steel, plastic, ceramic and linoleum) of *C. albicans* D-6, *B. subtilis* BT-2 and *Escherichia coli* IEM-1 cells. The highest reduction of adhesion (60–80%) of tested microorganisms was observed for the cell-free supernatant (SAS concentration (0.13 mg/ml) of *R. erythropolis* IMV Ac-5017 and solution of purified SAS (0.01 mg/ml) of *N. vaccinii* IMV B-7405

Thus, as a result of the work it was stated that *R. erythropolis* IMV Ac-5017 and *N. vaccinii* IMV B-7405 surfactants are promising for use as antimicrobial and antiadhesive agents in food industry.

KEY WORDS: surfactants, antimicrobial and antiadhesive properties

RHEODYNAMICAL SIMULATION OF MECHANICAL SYSTEMS

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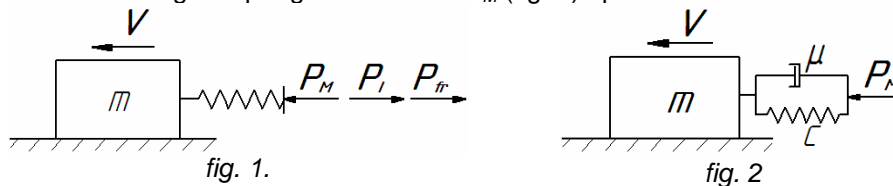
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Mechanical systems at the influence of motive forces change the sizes and the shape. It is possible to consider components of these systems ideally hard. Elements of connections, as a rule, show visco-elastic, that is, are rheodynamical systems.

At projection the equipment is not considered change of speed and a direction of movement of a weight at deformation. Loading on end-effectors can be cyclic.

Examples of simulation difficult rheological systems.

On a body in mass m through a spring motive force P_M (fig. 1) operates.



The differential equation of movement of a body, without an elastic component: $m \frac{d^2 x}{dt^2} + F_{fr} = P_M$, F_{fr} - force of a friction.

At entry conditions $t = 0 \Rightarrow \dot{x}(0) = V_0; \frac{dx}{dt} = V_0 \Rightarrow x(t) = V_0 t + x_0 - \frac{1}{2} \frac{t^2 F_{fr}}{m} + \frac{1}{2} \frac{t^2 P_M}{m}$

Condition of shift of a body: $P_M = \left[x(t) + \frac{1}{2} \frac{t^2 F_{fr}}{m} \right] m \cdot 2 \cdot \frac{1}{t^2} = 2m \frac{x(t)}{t^2} + F_{fr}$

In a start of motion, when $V_0 \Rightarrow \min; X_0 \Rightarrow \min$: $-P_M = \frac{2mx(t)}{t^2} + F_{fr}$

In actual practice no elastic system works instantly, there is a visco-elastic strain (fig. 2)

For the approximate calculations we use the equation of $P_p = cl = cV_1 t$ (V_1 - speed of deformation).

Under the influence of force of F_M the system is deformed: $cl_1 + \mu \frac{dl_1}{dt_1} = P_M$

At entry conditions: $F_M = \text{const}, t = 0 \Rightarrow l = 0$ $l_1 = \frac{P_M}{c} (1 - e^{-\frac{c}{\mu} t_1}) \Rightarrow P_M = l_1 c \frac{1}{1 - e^{-\frac{c}{\mu} t_1}}$

For deducing and the decision of more difficult models it is necessary to integrate experts of different scientific directions who own methods of computer mathematics, have experience of projection of the new process equipment, know problems of modern food techniques, know how to analyze them.

KEY WORDS: Mechanical system, rheodynamic, food, equipment.

ADDITIONAL PROGRAMME

OPTIMISATION OF VACUUM IMPREGNATION TREATMENTS FOR HIGH QUALITY MINIMALLY PROCESSED APPLES

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Vacuum impregnation (VI) is a process aimed to exchange the internal gas or liquid occluded in open pores for an external liquid phase due to the action of hydrodynamics mechanism (HDM) promoted by pressure changes (Zhao and Xie, 2004). In the fresh cut fruits processing, this technique could offer interesting applications in order to quickly change the composition by allowing the enrichment of the matrix with desired solutes and/or bioactive components that could improve the quality characteristics and/or stabilize the processed products. However, process conditions have to be optimised in order to favour the penetration of the compounds of interest in the proper concentration while limiting eventual damages induced by the pressure change.

Aim of this study is the use of VI treatments to obtain high quality fresh cut apples. To this purpose, a preliminary optimization of the main process parameters (time and pressure) using water alone as impregnant agent was carried out in order to evaluate the mechanical damages induced by the pressure change on the vegetable tissue with undesirable changes in colour and food composition. The single and combined effect of different solutes (sucrose, ascorbic acid, citric acid and maltodextrines) was then investigated in order to improve the sensory characteristics of the product and to increase its shelf life.

Methodology

Fresh cut apples (Golden Delicious; 1 cm³) were VI treated in water for times and pressures ranging from 10 and 1000 sec and 857 to 50 mbar respectively. VI treatments at 857, 738 and 619 mbar for 10 sec were also carried out using sucrose (15% w/w), maltodextrine (15% w/w), ascorbic acid (0.5% w/w) and citric acid (0.5% w/w), singularly or in combination. The following analysis were carried out: mass balance, pH, °Brix, titrated acidity, texture analysis, colour, sensory analysis, total polyphenols content.

Results and Discussion

In water processed samples, an increase in water gain and solid loss, texture loss, colour changes and polyphenols extraction (taken as index of the tissue damage) was observed at increasing the pressure change and treatment time due to the HDM promotion.

The enrichment of the apple tissue by optimised VI process conditions with different sugars and acids had a positive effect on the quality of the fresh cut apples by increasing the mechanical properties, limiting the mass transfer and the loss of solutes and stabilizing the colour thanks to the enzymatic browning reactions inhibition.

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Zhao Y., Xie J. (2004). Practical applications of vacuum impregnation in fruit and vegetable processing. *Trends in Food Science & Technology*, 15 (9), 434-451.

KEY WORD: Vacuum Impregnation, apple, texture, colour, polyphenols

NANOSTRUCTURE AND BUTTER FUNCTIONAL PROPERTIES WITH ADDITIVES OF VEGETABLE POWDERS

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Vital task of present-day food industry is the development of nutrition with functional properties. Such food plays a huge role in health maintenance and diseases prevention. To make traditional food have functional properties use bioactive compounds. In recent years, great attention is paid to plant raw materials. We developed technology and assortment of butter with freeze and cold spray drying powders of red beet, blackcurrant buds, and carrot. Powders have a large number of functional properties and reconcilability with butter. An integrated exploration showed powder additive has a multi-functional action on butter: increase its organoleptic evaluation, indicators of the structure and consistency, storage ability, retard microbiological and oxidative processes of butter spoilage. We first studied butter nanostructure using scanning electron microscope. It has been found butter is nanocrystall heterogeneous system. The powder additives have a great impact on nanostructure formation of butter. Nanostructure elements decrease by 5-25 times with sizes in nanometr range (1-100nm). The nature and properties of powders have a great impact on morphology, architecture and nanoelement structure. Cellular nanostructure is formed in butter with red beet additive (mesh size of 60-100 nm). The mechanism of its formation was proposed. Its beginning is heterogeneous nucleation of aqueous nanodrops and nanoknolls. Crystalline aggregates and surface membranes are formed from rounded and tabular nanocrystals in butter with black current additives. For the first time it has been revealed the nanostructure impact on retard of microbiological and oxidative processes. It has been proposed complex mechanism of oxidation activity inhibition in butter fat phase. It is caused by antioxidative properties of powder supplements and butter nanostructure: absorption and emission processes of powder compounds on internal free surface of fat phase nanopores, which have maked complication for oxygen access and increased butter oxidation resistance. It has been proposed a nanoelement classification of butter nanostructure. According to the results of biomedical testing and Public Health Ministry conclusions the developed butter is recommended to use in dietary and prophylactic nutrition. Developed scientific basis of nanostructure formation of functional butter with vegetable powders is used for butter nanostructure and physical and chemical properties regulation, and also for butter nanotechnology creation with the desired properties.

KEY WORDS: Nanostructure, butter, vegetable powders, nanotechnology, functional properties.

SELF-ORGANIZATION OF BUTTER NANOCRYSTAL HETEROGENEOUS SYSTEM

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In recent years, developed countries scientists pay great attention to the development of nanoscience and nanotechnology of food industry. The creation of functional foods is associated with nanotechnology. Butter a dietary product, plays a significant role in nutrition of the Ukrainian population. Dairy butter is a part of the diet of health and children's institutions. All this testifies to the relevance of the butter creation with functional properties. We have created functional butter with multifunctional supplements from plant raw materials – polysaccharides and cryopowders. According to the results of differential scanning calorimetry, X-ray diffraction, scanning electron microscopy and Raman spectroscopy the studies of butter crystalline fat phase showed that butter is complex nanocrystal heterogeneous system. It is based on the glyceride phase conversions - crystallization, recrystallization, fractionation and polymorphic transformations during butter production and storage. Butter fat phase consists of the fat globules dispersed in a continuous emulsion plasma/fat. It consists of glyceride crystal layers of crystalline aggregates and nanoblocks, nanocrystals and nanograins. Crystalline layers are formed of glyceride monomolecular layers. Crystalline layers dominate in the structure of a freshly made butter. During its storage process aggregates and nanoblocks are formed from crystalline layers, which connect with phase transformation and differentiation of glycerides in crystallization process. It is more pronounced upon prolonged butter storage at -18°C . It has been found that the vegetable food additive introduction reduces interglobular nanostructure elements by 5-25 times, which takes place at the nanoscale. According to aggregate state layers are divided into amorphous, amorphous-crystalline, crystalline, and liquid crystal. By morphology it has been identified the following crystalline layer nanostructures: lamellar, dendrite, filamentous, fibrillar, cellular and globular. The nature and properties of powders have a great impact on morphology, architecture and nanoelement structure. Self-assembly mechanism is based on phase transformation in butter fat phase. It has been proposed a model of the supramolecular butter nanostructure self-assembly and mechanisms of self-assembly of its elements, the hierarchy of butter nanostructures self-assembly and element classification, featured in the hierarchy and physical characteristics - shape, size and morphology of the structural nanoelements. The theoretical basis of self-organization nanostructure of butter functional kinds was developed which will be used for creation food nanotechnologies of functional products with the desired properties, butter, in particular.

KEY WORDS: Nanostructure, butter, vegetable powders, nanotechnology, functional properties.

USING MOLECULAR DYNAMICS FOR STUDY BUTTER

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Atoms are elements that creating are all materials in our world: stone, wood, salt and of course dairy butter. Scientists of our university have been studing nanostructure of butter for a long period. In particular, the functional food supplements impact on quality and nanostructure of butter. For better understanding process taking place in butter we began to study butter structure at atomic level. Large number of structure components makes it very difficult to research. We need a computer help. We have used molecular dynamic method, program ChemBioOffice2012 in particular. These methods are now routinely used to investigate the structure, dynamics and thermodynamics of biological molecules and their complexes. According to the research of our university it is well-known that inulin addition in butter formes strong inulin-lipid membranes of shell on milk fat globules. We trying to study what inner processes are working. With the help of program ChemBioUltra3D, the process of interaction between inulin polysaccharide and phosphatidylcholine (a type of phospholipid in lecithin) has been simulated. Lecithin is one of the components of protein- phospholipid membrane of milk fat globules. Molecular structure of inulin and phosphatidylcholine were taken from international Protein Data Bank. PDB is a source of proteins and nucleic acid 3-D structure, well-known among scientist all over the world. And we have used information from biochemistry books. We have received the 3-D model and tracked changes in the spatial structure of the compound in a time interval of 10 fs. This method can be used to study the properties of butter with vegetable food additives at the atomic level.

KEY WORDS: Butter, inulin, lecithine, molecular dynamics, phosphatidylcholine.

BUTTER PASTE DEVELOPMENT WITH BIOACTIVE NUTRIENTS

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Given the dominance of food factor in the pathogenesis of diseases the most pressing social problem is the development of new domestic functional food technologies, aimed at protecting and maintaining health of the population. This suggests the feasibility of the development of functional product types. In recent years, it has developed new direction – micronutrientology, the use of plant-based supplements with health and medical-preventive properties. Micronutrient deficiency can lead to some serious health problems. Therapeutic and prophylactic properties of product are micronutrient complex interaction. In developed countries, special attention is paid to the consumption of foods with a reduced fat content with high level of bioactive micronutrients. We developed butter paste assortment with 42-48 % fat content. This product is butter analogue. A selection criterion of micronutrients is therapeutic and prophylactic properties and ability combined with butter components. For providing butter paste basis use butter, dry buttermilk and plant raw materials (inulin, flaxseeds). Inulin reduces blood sugar, cholesterol, triglyceride level. Inulin is recommended to be used in treatment of the following diseases: diabetes, obesity, atherosclerosis, coronary heart disease, osteochondrosis, kidney stone and gallstone disease, immunodeficiency, upon contact with radionuclides. Flaxseeds are valuable source of bioactive micronutrients: polyunsaturated fatty (PUFA) acids ω -3 and ω -6, vitamins (A, E, F), carbohydrates, microelements (P, Mg, K, Fe, Na, Cu, Mn, Zn). In recent years, PUFA ω -3 is refer to the basic micronutrients of health diet at diabetes mellitus, impaired brain deyatelnostib prevention of cardiovascular diseases and cancer and slows aging. We added chiccory and fructose in milk-plant basis for butter paste with antidiabetic properties; bee products (honey, pollen), linden flowers syrop with fructose, prepeared by cryogenic technique for butter paste “Medova”; carrot and banana powders for butter paste cardiovascular system prophylactic properties. Integrated exploration showed all butter pastes have delectable and ritzy flavour, plastic and heat-resisting consistency. Food additive complex aid to formation nanoscale structure elements, which lead to high physical-chemical rates of products.

KEY WORDS: Butter paste, PUFA, micronutrientology.

THE FUNCTIONAL BUTTER PASTE WITH ADDITIVES OF PLANT MICRONUTRIENTS

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The relevance of this work consists in the development of a new product, namely butter paste with plant micronutrients. We used inulin, flaxseeds and berries, also known as «arrowwood berry», «snowball berry», «guelder rose berry» or «highbush cranberry», also known as lat. *Viburnum opulus* L. This berry is used with sorbitol syrup, which is recommended for people with diabetes. *Viburnum opulus* L. contains polysaccharides, pectin, vitamins, organic acids, micro- and macronutrients, tannins and polyphenols. The high content of polyphenols, which also exhibit P-vitamin activity, allows us to consider this type of raw plant materials as a source of micronutrients for functional products. The butter paste composition also includes flaxseeds and polysaccharide inulin. Flaxseeds are very useful due to their oil, which contains the optimal ratio of essential polyunsaturated fatty acids of ω -3 and ω -6 family. Polyunsaturated fatty acids ω -3 are the most valuable, as participating in the construction of phospholipid layer of cell membranes and influencing their main function. When insufficient quantity of ω -3 enters the body with food, it may cause diabetes. Polysaccharide inulin improves lipid metabolism - cholesterol, triglycerides and phospholipids in the blood. Therefore, reducing the risk of cardiovascular diseases, softens its effects, and strengthens the immune system. It is also recommended for patients with diabetes, since it reduces the blood sugar level. As a result of research we developed a recipe, technology and technological scheme of butter paste production with vegetable micronutrients and we found that the selected components improve plasticity and consistency of the finished product and also thermostability, hardness and leakage of liquid fat.

KEY WORDS: Plant micronutrients, butter paste, functional properties, inulin, flaxseeds, *Viburnum opulus*.

BUTTER PASTE DEVELOPMENT WITH RED BEET POWDER

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In recent years, public health has deteriorated greatly in Ukraine. Cardiovascular disease, cancer and diabetes are becoming wide-spread. According to estimates of the World Health Organisation experts, 70% of your health relies on what you eat. Food should provide body with the necessary range of nutrients, which aid the prevention of disease. Food should be varied, tasty, safe and sensitive to national habits and traditions. Thus, the development of food products with prophylactic properties is very promising. These foods can be produced by adding natural supplements to traditional foods. This is why we have developed a butter paste with red beet powder. Functional properties and the harmonious blend of flavors serve as the criteria for the choice of additives. We added a mixture of flaxseeds and inulin to the milky base of the paste. Flaxseeds are a source of the polyunsaturated fatty acids omega-3 and omega-6. An absence or lack of these fatty-acids inhibits children growth, reduces the effectiveness of the reproductive system and has a negative effect on thrombosis. Inulin is recommended to help treat the following diseases: coronary heart disease, diabetes, obesity, atherosclerosis, cancer, osteochondrosis, infectious diseases and stress. According to sensory testing of the product, the butter paste has pleasant, creamy flavor, free from foreign odors and is light pink in color. From the analysis, we can see that the paste made with red beet powder has higher thermal stability than dairy butter and holds liquid fat better. The break down level of the material's structure is 75%, which indicates a prevalence of a coagulated structure. The paste made with red beet powder has a faster rate of repair than that of butter, during storage. Therefore, the paste made with beet powder, flaxseeds and inulin blends well with the building blocks of butter and give it nice taste and attractive appearance.

KEY WORDS: Red beet powder, butter paste

EXPLORING THE POSSIBILITY OF USING FLAX SEED IN TECHNOLOGY SWEETS

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Flax seed contains a number of functional food substances such as proteins with a full amino acid composition, essential polyunsaturated fatty acids (PUFAs), which are dominated by linolenic (ω -3) - 60% and linoleic (ω -6) - 20% acid. If you use 100 grams of flax seeds is satisfied by 93% the need for tryptophan, almost 80% - in phenylalanine and tyrosine and 72% - in valine. The amount of essential amino acids in a protein complex flax seed is 75.4%.

Flax seed contains calcium (8.6 mg / kg), phosphorus (19.9), thiamine (8.8), riboflavin (0.004), niacin (0.101), pantothenic acid (0.031) and choline (4.9 mg / kg). A feature of flax seed is the presence of 5-12% mucus in its composition.

Thus, the quantity and quality of flax seeds indicates the feasibility of its use to improve the biological value of food and confectionery.

Baklava - a traditional Turkish sweet which is prepared in many countries. It refers to the flour group. In addition to flour, baklava contains significant amount of fat, sugar, nuts and honey, which provide high food and energy value.

One of the drawbacks for most types of baklava is a small number of biologically active substances in its composition.

To study the possibility of using flax seed in technology of baklava, the laboratory test baking was conducted. Dough for baklava is used barmy, prepared in the straight dough procedure.

For maximum preservation of the chemical composition and biological value flax seed was pre-crushed and it was brought to the filling in of: sample № 1-5; № 2-10; № 3-15 and control - 0%.

As a result, the research found that the dosage of flax seed in quantities of 5 and 10% helps seal filling compared to control and improve the appearance of the finished products. With increasing dosage of flax seed over 10% the stratification and segregation of filling. We observed with 15% flax seed (sample number 3) there is much specific taste and smell of linseed.

So, optimum is adding flax seeds is optimal in the amount of 10%. This dosage can not only extend the range of confectionery products of this group, but also obtain a product with high nutritional and biological value and its organoleptic quality fully meets the requirements of regulatory documents.

KEY WORDS: Baklava, flax seed

METHOD OF FORMING PACKAGING EQUIPMENT BASED ON MECHATRONIC SYSTEMS MODULES

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The analysis of scientific works and literary sources concerning the mechatronic modules showed that the whole theory of their formation does not exist

In this case we keep in mind that the concept of theory is the integral systems of knowledge which reflects the objective reality and allows penetrate deeply into the essence of the phenomenon of the “mechatronic modules formation”. Towards developing such a theory the authors have solved the following problem: A set of terms, concepts and definitions of conceptual apparatus, were developed. Apparatus of sequence formation process of mechatronic modules packaging is developed and described; The relationships of the common objective laws of the formation of the mechatronic modules, were defined. The methods of coordination installing and connecting dimensions for the connection with other mechatronic modules to create complex technological system were developed. The techniques of the creation of parametric dimension-series mechatronic modules with one or several functional properties were developed. The methods of constructing optimal designs of mechatronic modules based on the selection of evaluation criteria of functional systems of group packaging.

The analysis of packing equipment for allows assert that the layout of equipment that would provide readjustment of the technological process, taking into account the configuration changes, the size and weight of packages uses restricted range of modules and their number depends on the chart formation.

New construction equipment can be developed on the basis of linear displacement, twining modules and modules gripping devices. According to the obtained results was have developed three main libraries of mechatronic module: linear displacement, rotation, and gripping devices.

KEY WORDS: mechatronic module, transport package, gripping devices

EVALUATION OF RADIOPROTECTIVE PROPERTIES OF ALFALFA EXTRACT

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One of the most promising areas in search of protection from radiation effects is to create drugs based on biologically active substances that can perform metabolic correction, resulting in increased radiation resistance of the body and having no side effects to the organism.

The purpose of work is to score thyroid histostructure in rats with radiation injury during their treatment with herbal remedies "Erakond" and "Erakond + Pectin."

Erakond is a dietary supplement which consists of amino acids, minerals, flavonoids, vitamins, and other substances representing together the complex of substances fully compatible with the human body.

The experiments have been conducted with 48 laboratory white rats (Wistar rats). The animals were divided into four groups of 12 pieces each: group 1 was a group of biological control, and the rats from groups 2, 3 and 4 simultaneously received a single dose of irradiation of 4 Gr. Within 10 days prior to irradiation the rats in group 3 and 4 were receiving daily a 40% solution of "Erakond" and "Erakond + Pectin" phytopreparations accordingly. Group 2 was on the standard diet. 30 days after the exposure the animals were taken out of the experiment by instant decapitating with further internal organs eviscerating.

Histological studies have shown that the thyroid gland in rats in groups 2, 3 and 4 had micromorphological transformations. The rats in group 2 had destructive and degenerative processes of the destruction of follicles and thyrocytes. However, part of the follicles (mostly on the periphery of the thyroid gland) retained functional activity and produced thyroglobulin. The animals in group 3 demonstrated a partial restoration of the functional activity of the thyroid gland. The thyroid gland in rats in group 4 was still in the stage of degradation, but the follicles at the periphery of the gland were gradually restoring its histostructure.

Thus, our research has shown the potentiality to use the phytocomplexes under study as radiation protectors in acute radiation disease.

KEY WORDS: alfalfa extract, acute radiation pathology, radioprotective properties, thyroid gland.

**TECHNOLOGY OF ENCAPSULATION OF IODINE-ORGANIC COMPOUNDS
INTO NANOSCALED BIOMATRIX**

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The work presents the results of experimental studies on the structure in the nanometer iodine biopolymer. The technologies of encapsulating of iodine-organic substances into biodegradable matrix have been elaborated.

Polymer systems are used to maintain the level of concentration of biologically active substances, to reduce side effects and to control the release of innovative inclusions. In particular, polysaccharides and a number of proteins are used for stabilization and organification of iodide - anions (J^-) in the iodine-containing dietary supplements [RF patent № 2265377, 2192150, 2380984]. A significant disadvantage of known compositions is that at complex formation of inorganic forms of iodine with the functional groups of casein, pectin and chitosan, the forces of interaction have predominantly physical nature of the relatively low stability constant (611 ± 3 l/mol). By comparing NMR spectrum of 1H and ^{13}C casein with iodine casein registered in the same solvent (DMSO-d₆), it is found that the changes showing the covalent binding of iodine to the protein casein is not happening. By laser nanostructural analysis it is revealed that the analyzed iodine biopolymers form relatively large particles in aqueous solutions: iodine casein has a diameter of 3.5-4.5 micro mm, iodine chitosan - 9-30 microns that are prone to precipitation. In aqueous solutions iodine pectin forms coarse dispersion of agglomerated coarse particles that are distributed over the volume of the dispersion in a non-uniform way. It makes it impossible to estimate the size of particles by laser nanostructural analysis. In order to improve the stability constants of iodine and to avoid sedimentation processes in iodine organic substances in liquid food products, the scientists in MSUTM Branch in Meleuz elaborated new technologies of iodine stabilization in low-molecular carbons and nucleic bases, encapsulated in nanoscaled biodegradable matrix [positive decision for granting a patent for the invention № 2011147656/13 from 23.11.2011].

References: Polymers in Biology and Medicine // Edited by Mike Jenkins. - Scientific World, 2011.- p. 256.

KEY WORDS: iodine biopolymers, nanostructural analysis, nucleic bases, nanoscaled matrix.

DOSIMETRIC CHARACTERIZATION OF A MULTIPURPOSE EXPERIMENTAL GAMMA CHAMBER

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Ionizing radiation is used as an industrial process for different purposes: sterilization, disinfestation, increase food products shelf life or for materials modification. Each industrial use is preceded by a validation process, to study the impact of the radiation on the product characteristics. At Nuclear and Technological Campus, Portugal, an experimental gamma chamber with four Co-60 sources, with a total activity of 4.79 kCi (in Nov. 2012) and four levels for irradiation, is used for different research studies in food irradiation, waste water treatment, polymerization and sterilization. Recently, in 2009, the experimental chamber was re-charged with new sources, and since then a continuous work has been done for the complete characterization of the different irradiation positions and levels. In the present study, the dose rate for each level and position was estimated using an Ionization Chamber (from IBA-dosimetry corporation). The estimated doses and a three dimensional dose mapping is presented for the four levels of the chamber. This dose mapping allows an enhanced optimization and implementation of irradiation processes, namely for food irradiation.

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KEY WORDS: dosimetry, gamma, food irradiation, dose mapping

**CURRENT ONGOING MONITORING AND PROSPECTS OF PREDICTION OF THE
CONFECTIONARY PRODUCTS STATE WITH NEW CAPACITIVE TRANSDUCERS**

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An appearance of highly sensitive and stable, high-precision three-contacts capacitive measuring devices for the first time allows us to pose the question of effective high-precision current monitoring of the composition and impurities in transported raw materials, which can be flour, sugar, water, etc. It becomes possible to control the structural changes of the finished product over time, for example, its drying, hardening, aging. It must be assumed that the possibility of designing of such transducers to predict the condition and changes of the quality of the material during its keeping over time becomes real.

It can be argued on the basis that such devices, based on the Lampard-Thomson theorem, are currently the most accurate and stable among all electrical devices, the most precision primary electrical standards of advanced countries are built on their basis.

In these converters electrical capacity for the first time does not practically depend on the presence of the moderate films of oxides and dirt, for example - rather heterogeneous residue on the electrodes previously controlled substances. Using the M.M.Horbov's effect in such systems with the cross-capacitances allows to control separately the amount and composition of matter for the first time – on the flat conveyor during transportation.

New design of cylindrical flow capacitive transducers allows to realize not only a precision control of the composition of substances, transported in the pipeline, but also to control grain size, or composition of the particles of impurities in it. The corresponding sensor does not distort the controlled flow of matter, as contains no electrodes inside, and mechanically, while controlling the composition of substances, is a part of the pipe in the form of three electrically isolated metal cylindrical electrodes of the same diameter as pipeline. Middle electrode, as the pipe in general, is electrically grounded and has a length equal to 0.3 of pipeline diameter. The other two measuring electrodes have the length equal to the diameter of the pipe.

KEY WORDS: Confectionary, monitoring, state and composition, measuring.