Section 2. EQUIPMENT OF FOOD PRODUCTION ENTERPRISES AND IMPROVEMENT OF PROCESSES AND APPARATUSES OF FOOD PRODUCTION ENTERPRISES

SUBSTANTIATION OF ECONOMIC EXPEDIENCY OF THE USE OF PROTEIN AND CARBOHYDRATE SEMI-FINISHED PRODUCTS

G. Deynichenko, I. Zolotukhina, K. Sefikhanova, K. Goncharova

An introduction of new technologies of goods production and expansion of a range of products at the enterprises (on this basis) is one of the directions of the reinforcement of competitive position of the enterprises in restaurant business at the market under current development of national economy. Alongside with significant advantages, the manufacture and realization of new products is accompanied with high risks of economic activity, which are caused by environmental instability and consumer demand.

From this point, the prior condition of practical realization of scientific development of the project is basic effectiveness of its implementation based on the indices of social and economical results.

The problem of the use of protein and carbohydrate raw milk is very important in the products popular among the customers.

In this connection, the authors have worked out the technology of preparation of semi-finished protein and carbohydrate raw milk products with the addition of vegetable raw materials. A number of preliminary investigations concerning rational composition of a semi-finished product and the procedure of technological process are carried out.

Scientific developments presented in the paper have both social and economic effect. The use of protein and carbohydrate semi-finished product with the addition of carrot and pumpkin puree allows people to obtain the product with new consumer properties and increased nutritional value. This fact proves the social significance of scientific developments. Introduction of the developed semi-finished product into practice assures flowing economic gain as the annual acceleration of profit that is indicative of economic effect of the scientific development. Correspondingly the implementation of the technology of protein and carbohydrate semi-finished product with the addition of carrot and pumpkin puree into production will allow a business entity to get the additional income at the rate of 968,0 and 959,0 UAH per each 100 g of products sold. On the basis of the presented
estimates it has been concluded that it is expedient to produce protein and carbohydrate semi-finished product with the addition of carrot and pumpkin puree and to use them to make culinary products in the restaurant business.

Keywords: protein and carbohydrate raw milk, semi-finished product, carrot, pumpkin, economic effect.

USING WATER-POLYMER JET CUTTING OF FROZEN FOOD PRODUCTS

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Complex studying of the process of hydro-cutting of frozen food products is carried out. It has given the chance to offer the most expedient ways for the intensification of the process of hydro-cutting of frozen food products. It is experimentally proved that using polyethyleneoxide water solutions as a working liquid while cutting frozen food products substantially increases efficiency of hydro-cutting process and quality of the cut surface.

The study of polyethyleneoxide concentration effect on cutting performance of food products frozen to -25°C and to the temperature of liquid nitrogen (-195.8°C) with hydro-polymer jet having outflow pressure of 100 MPa and a nozzle diameter of 0.35.10^-3 m showed that cutting speed grew with the increasing concentration of polyethyleneoxide in water and reached its maximum at some optimal value. The optimal concentration equaled 0.007% for polyethyleneoxide molecular weight 4.10^6. The experiments gave an increase of high speed water jet cutting ability due to polyethyleneoxide additives to it by the order of magnitude while cutting meat frozen to -25°C and by 5 times for meat frozen to -195.8°C.

Three-level scale of quality estimation for a cut surface in food products is offered: "fragmentary", "even qualitative" and "high-quality" cuts where quantitative criteria are connected with the roughness and undulation of cut surface in frozen food products.

In converging polymer solution flow macromolecules are forced by a hydrodynamic field to rather strong stretching that causes the field restructuring. The determined regularities of macromolecules behavior in the flow with longitudinal velocity gradient and manifested in this case effects of elastic deformations have paramount importance in understanding the mechanism of anomalously high cutting power of water-polymer jet processing of foodstuffs by cutting.
Understanding the nature of the increased cutting power of water-polymer jet will make it possible to develop recommendations for choosing regimes for water-polymer jet processing of foodstuffs by cutting.

**Keywords:** polymer solution, foodstuff, polyethyleneoxide, velocity, hydrodynamic field, velocity gradient, deformation effects.

ANALYTICAL CHARACTERISTICS OF MODERN PROCESSES WATER TREATMENT

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This article is devoted to the questions of the modern processes of water treatment and water purification in food industry. The analysis of theoretical researches concerning the main methods of water treatment and water purification for their further application in different sectors of food industry is presented. The characteristics of different methods of traditional and membrane preparation and purification of water for food industry are presented. The literature analysis demonstrated that for a primary processing of water used in the food industry sedimentation, coagulation, softening processes (membrane distillation, electro dialysis, thermal and ion exchange methods), and for decontamination – chlorination, ozonation, microfiltration, anodic oxidation and so on.

The special consideration the characteristics of the main types of the baromembrane methods and their application during the process of water treatment and water purification is devoted. Membrane processes (microfiltration, ultrafiltration, Nano filtration, reverse osmosis) allow improving the processes of treatment and purification of water for food industry without the application of reagent methods, and improving quality (physical-chemical, microbiological, etc.) indexes of water as a raw material in the technologies of different food products. Analysis of the article data relating to the characteristics of baromembrane processes of preparation and purification, allows us make the conclusion that during the use of membrane processes, compared to other conventional methods of water removed weighty substances, viruses, bacteria without losing additional energy. Application of membrane processes for the treatment and purification of different kinds of water resources is important for technical, ecological and social objectives of the food industry.

**Keywords:** water, process, membrane, filtration, treatment, purification.
ECONOMIC EFFICIENCY INTRODUCTION ULTRASONIC EQUIPMENT FOR SALTING FISH

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The results of economic efficiency calculations concerning the implementation of ultrasonic device for salting fish into practical activities of processing industry, as well as the sequence of the evaluation of economic efficiency of the implementation of technical measures with the use of comparative effectiveness indicators are presented in the article.

Theoretical and applied research concerning the efficiency of production and investment are mostly methodologically oriented, or illuminate the ways of solving specific problems defined by researchers. However, in many cases, the expediency and effectiveness of the implementation of certain means of production are not the solutions requiring special studies and calculations, due to their specific manifestations in the activity of enterprises, and expansion of practical recommendations for the improvement of their operation efficiency.

The purpose of the article is to substantiate the sequence of estimating economic efficiency of the ultrasonic device for salting fish and payments settlement that will provide the managers of food industry and catering, investors and other stakeholders with the information necessary for making decisions on the expediency of using newly developed equipment in practice.

Basic and new devices are compared on the grounds of the following factors: the price of the device, an integral indicator of technical level, efficiency, service life, annual operating costs.

The calculations suggest the conclusions on feasibility of the manufacture and implementation into practice of apparatus for salting fish with the use of ultrasonic treatment. A new device compared to the basic has significant advantages, namely higher technical level and lower price. This indicates a high level of competitiveness of the developed device for enterprises engaged in the production of equipment for the manufacture of food products.

Use of the new device will allow processing enterprises to receive additional profit of 23.8 thousand hryvnas per year.

Keywords: efficiency, cost-effectiveness, performance indicators, indicators of absolute efficiency, comparative effectiveness indicators.
THE USE OF MODERN ENGINEERING SOLUTIONS FOR THE DESIGN OF REFRIGERATION SYSTEMS AS A WAY OF ENERGY CONSERVATION AND EFFICIENCY

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The research paper is devoted to the problem of finding ways to save energy resources during the cooling equipment operation.

At present the preservation and saving of energy is the burning problem. Many industries such as steel industry, fuels and lubricants industry and others are powerful consumers of energy. Refrigeration systems are also powerful energy consumers. In this context the refrigeration industry is faced with the problem of finding ways to improve the efficiency and productivity of both components and the system as a whole.

Not only the designers and developers of refrigeration components which constantly improve and modernize existing equipment, but also operatives which improve algorithms and computer programs to develop integrated management systems in order to optimize work and increase efficiency depending on various modes of operation are involved in solving of this problem.

Three systems of supplying the coolant to consumers during the central cooling systems design are considered and analyzed.

The first scheme which is most often used in circuit solutions of central cooling systems is direct boiling of refrigerant in the evaporator of cooling devices of each consumer. However, such schemes have their drawbacks are problems with "allocation" and "accumulation" of oil and it is associated with long mains of coolant. Engineering solutions of this problem are complex systems of control and returning oil to the compressors.

The second scheme is cooling systems with pump supply of coolant. However, under using of such scheme a lot of nuances must be taken into account. It is not always very convenient and profitable.

The third scheme in our view is the simplest solution (especially for average temperature systems) it is the application of systems with intermediate coolant pump supply which eliminates the loss of compressors productivity. Supermarkets, large offices and hotel complexes often use such systems ("chiller - fencoil").

Thus, under solving of refrigeration systems energy consumption problems it is necessary to solve number of issues in total: the choice of highly efficient refrigerant and optimal coolant, the minimum amount of refrigerant in the system, specifics of transportation of coolant to
consumers. Solving of these problems allows always expecting of reduce both capital and operating costs.

**Keywords:** refrigerant, intermediate coolant, direct boiling, pump feeding, cooling system, engineering solutions.

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**EXPERIMENTAL RESEARCH OF THE INFLUENCE OF APPARATUSES WITH COUNTER SWIRLING FLOWS ON THE EFFICIENCY OF COLLECTION**

**M. Savchenko-Pererva**

In Sumy National Agrarian University, an experimental stand apparatus was mounted to study colliding with twisted threads. The stand complies with the requirements adopted for these "the only method" tests. The above method is available for use and allows you to get objective importance in determining the basic parameters of the tested devices, including devices with counter twisted threads.

The proposed pilot examines overall efficiency of vehicles colliding with twisted streams (AZZP) using software for image analysis. All experiments were performed 5 times. The disagreement results did not exceed more than 5%. For the next series of experiments, the stand was remounted in other experimental conditions. Therefore, using this stand, such experimental researches were carried out: determination of aerodynamic characteristics of dusty air streams; determination of the overall efficiency of vehicles colliding with twisted flows before and after improvement; determination of pressure losses in apparatuses. When the held five times experiments were over, the frequency for each unloading hopper AZZP was made, bringing the three samples obtained involved product. These samples were tested for particular composition using scanning electron microscope with low vacuum camera SEM-106 I. Before the study, a number of dry particles coated with a disposable adhesive on both sides, adhesive tape, and then stuck to the Petri dish. Then each film was sprayed with silver at the Institute of Applied Physics via VUP-5M (vacuum universal post), after which they were transferred to the SEM sample holder pre blurry Aquadag (carbohydrate pasta). It should be noted that during the treatment dry particles to form agglomerates sought, because of their large water absorption, because X-rays often generated inside the sample, which was 10 microns at the point of falling electron beam. In particular cases, for particles up to 10 microns, x-ray radiation...
caused fluorescence in the sample holder REM, which led to undesired radiation. The method of benchmarking units with counter flow curled to perfection even after the improvement. The minimum fraction captured dry product, which constituted 1.99 microns of trapped particles – after the improvement in AZZP (single cone).

**Keywords:** overall efficiency, apparatus with counter swirling flows, fraction, dry product.