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AUDIT AND METROLOGICAL TOOLS FOR ASSESSING THE QUALITY OF FOOD PRODUCTS IN PRODUCTION

The paper analyzes the metrological means of assessing the quality of food products of food production. Product quality is formed at the stage of product development and is accompanied by regulatory and technical documentation. In order to manufacture high-quality food products and supply them to the consumer, it is necessary to ensure the optimal level of technical, aesthetic and operational properties with minimal expenditure of funds for the creation, consumption and use of products. Therefore, the optimal level of product quality should be understood as such a combination of all properties, which would ensure the satisfaction of sufficient needs with minimal labor costs. To achieve optimal product quality, it is necessary to ensure the most favorable ratio of factors and conditions that determine product quality. These factors can be divided into subjective and objective. Subjective factors include a group of factors caused by human production activity. They depend on the qualifications and ability of people to perform production functions, which determine the quality of products through the quality of work. These include: professional skill, general education level, psychological makeup of a person, personal interest in the results of work. The objective factors should include: technical level of production, mechanization and automation of production, organization of production preparation for the release of new products, technology and means of measuring objective control, metrological support of the enterprise, technical level of the operational base, standardization, etc. From the conducted research, it can be concluded that one of the most important factors in the growth of production efficiency is the improvement of the quality of products or services. Increasing the quality of manufactured products is currently considered as a decisive condition for its competitiveness on the domestic and foreign markets. The competitiveness of products determines the country's prestige and is a decisive factor in increasing its national wealth. Product quality is one of the most important criteria for the company's operation in a relatively saturated market and prevailing price competition. Increasing the technical level and quality of products determines the pace of scientific and technical progress and increasing the efficiency of production as a whole. The expediency of using metrological tools is substantiated and ways to improve the quality of finished products in production are proposed.

Keywords: control; quality control; quality of finished products; standards; production; consumers; low-quality products; protection of consumer rights.

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АУДИТ І МЕТРОЛОГІЧНІ ЗАСОБИ ОЦІНЕННЯ ЯКОСТІ ХАРЧОВОЇ ПРОДУКЦІЇ НА ВИРОБНИЦТВІ

У роботі здійснено комплексний аналіз сучасних метрологічних засобів, що застосовуються для оцінювання якості харчової продукції на підприємствах харчової промисловості. Підкреслено, що формування якості продукції розпочинається ще на етапі її розроблення та проєктування і супроводжується відповідною нормативно-технічною документацією, яка визначає вимоги до сировини, технологічних процесів, умов виробництва та контролю. Для виготовлення конкурентоспроможних і безпечних продуктів харчування необхідно забезпечити оптимальний баланс технічних, технологічних, естетичних та експлуатаційних показників, що в сукупності визначають споживчу цінність продукції. Особлива

увага приділяється ролі метрологічного забезпечення у системі контролю якості, адже точність вимірювань, достовірність результатів аналізів та стабільність контрольних процедур є базовими передумовами підтвердження відповідності продукції встановленим стандартам.

У роботі наголошується, що підвищення якості харчової продукції є одним із ключових чинників забезпечення її конкурентоспроможності як на внутрішньому, так і на міжнародному ринках. Висока якість товарів формує позитивний імідж виробника, сприяє зміцненню престижу країни та впливає на зростання її національного багатства. У сучасних умовах насиченого ринку, де цінова конкуренція вже не є вирішальною, саме якість стає визначальним критерієм успіху підприємства. Підвищення технічного рівня виробництва та удосконалення систем контролю якості прискорює темпи науково-технічного прогресу, сприяє модернізації виробництва та підвищує його ефективність.

Обґрунтовано доцільність широкого впровадження сучасних метрологічних засобів — систем автоматизованого контролю, високоточних вимірювальних приладів, лабораторного обладнання та методів аналітичного контролю. Запропоновано напрями підвищення якості готової продукції, серед яких удосконалення метрологічного забезпечення, оптимізація технологічних процесів, впровадження стандартизованих методик контролю та підвищення кваліфікації персоналу.

Ключові слова: контроль; контроль якості; якість готової продукції; стандарти; виробництво; споживачі; неякісна продукція; захист прав споживачів.

STATEMENT OF THE PROBLEM IN A GENERAL FORM AND ITS CONNECTION WITH IMPORTANT SCIENTIFIC OR PRACTICAL TASKS

Quality products have high consumer properties, are in high demand and fully meet the requirements of current quality standards. Requirements for finished products may differ between undemanding consumers and those who are used to being meticulous about its quality. In addition to the requirement to create a safe product, consumers can also dictate ways to confirm the quality of finished products. One of the important elements of ensuring product quality control at the enterprise are production processes characterized by certain parameters. Therefore, in order to maintain the technological process in the specified operating mode and ensure the appropriate characteristics of the finished products, these parameters should change only within the specified limits. Accordingly, the main parameters of the technological process and quality indicators of semi-finished products and finished products should be measured and controlled at all stages of production. Therefore, ensuring the quality of products is impossible without metrological support of production, which will allow to determine with the necessary accuracy all properties and states at each stage of the production process.

ANALYSIS OF THE LATEST RESEARCH

Metrological support of production is a set of organizational and technical measures that ensures the determination with the required accuracy of the characteristics of products, assemblies, parts, materials and raw materials, parameters of technological processes and equipment and makes it possible to achieve a significant increase in product quality and a reduction in non-production costs for its development and production [4]. The rules relating to the quality of finished products are reflected in the quality management standards of DSTU ISO, namely 9000, 9001, etc. To date, there is also a significant share of standards for the retail trade of food products, which require the preservation of the declared quality of the product at the stage between its manufacture and delivery to the final consumer. In particular, the DSTU ISO 9000:2015 standard describes the fundamental concepts and principles of quality management, which are universal in application: by organizations that seek to achieve sustainable success through the introduction of a quality management system; customers who seek to gain confidence in the ability to produce and provide stable products and services that meet their requirements; organizations seeking to gain confidence that product and service requirements will be met in their supply chain; organizations and interested 33 parties who seek to improve the exchange of information through a common understanding of the terminology used in the field of quality management; organizations that carry out conformity assessment in accordance with the requirements of ISO 9001; providers of training, evaluation or consulting services in the field of quality management; developers of relevant standards. This standard establishes terms and definitions of concepts that apply to all quality management standards developed in ISO/TC 176 and to the quality management system [1].

Accordingly, DSTU ISO 9001:2015 is a standard that establishes requirements for a quality management system if the organization: a) must demonstrate its ability to consistently provide products and services that meet customer requirements and applicable statutory and regulatory requirements; b) aimed at increasing customer satisfaction thanks to the effective application of the system, in particular the processes of improving the system and ensuring compliance with the customer's requirements and applicable legislative and regulatory requirements. All the requirements of this standard are general and are intended to be applied by any organization, regardless of its type or size, as well as the products it supplies and the services it provides. What is quality? There are many definitions of quality, which can be as varied as: degree of perfection, conformity to requirements, freedom from defects, or consumer satisfaction and safety. It is known that operational quality management at the enterprise, which works according to the DSTU ISO 9000 models, is carried out using statistical methods presented in the relevant international and domestic standards.

The initial information for the operation of the procedures given in these standards are the results of measuring the production parameters that determine the quality of the final products. Measurements are performed at various stages of the production cycle and consolidated in the relevant databases of the enterprise management system

[2]. Statistical methods of information processing have been developed for a long time and are widely presented in special literature on mathematical statistics. These methods are reflected in relevant standards, both in our country and abroad. They have acquired special importance in the defense industry, where they have always paid close attention to the problem of quality. Ukraine has also developed a legislative framework aimed at protecting the domestic consumer from substandard and health-threatening products. These laws are: "On protection of consumer rights", "On product quality and safety", "On standardization", "On metrology and metrological activities", "On enterprises and their activities". Every year, the legislative framework of Ukraine is changed and supplemented. In 2018, the President of Ukraine adopted the Law No. 2042-VIII of 18.05.17 "On State Control of Compliance with the Legislation on Food Products, Fodder, Animal By-products, Animal Health and Welfare", to avoid and prevent the importation and manufacture low-quality products [3].

FORMULATION OF THE GOALS OF THE ARTICLE

The purpose of the work is the definition and analysis of metrological means and methods of assessing the quality of finished products of food production

PRESENTING MAIN MATERIAL

Product quality is formed at the stage of product development and is accompanied by regulatory and technical documentation. For the production of quality food products and their supply to the consumer, it is necessary to ensure the optimal level of technical, aesthetic and operational properties with minimal expenditure of funds for the creation, consumption and use of products. Therefore, the optimal level of product quality should be understood as such a combination of all properties, which would ensure the satisfaction of sufficient needs with minimal labor costs [6].

To achieve optimal product quality, it is necessary to ensure the most favorable ratio of factors and conditions that determine product quality. These factors can be divided into subjective and objective. Subjective factors include a group of factors caused by human production activity. They depend on the qualifications and ability of people to perform production functions, which determine the quality of products through the quality of work. These include: professional skill, general education level, psychological makeup of a person, personal interest in the results of work. Therefore, an important factor in improving the quality of products is, in particular, the training of personnel and their training at all levels. The objective factors should include: technical level of production, mechanization and automation of production, organization of production preparation for the release of new products, technology and means of measuring objective control, metrological support of the enterprise, technical level of the operational base, standardization, etc. The conditions affecting the quality of products also mean the circumstances in which the specified factors operate. They can also include the organization of labor and technological processes, etc.

High production discipline, moral and material interest, a favorable production environment significantly affect the most complete manifestation of these factors and are the determining conditions for ensuring the optimal level of quality. Therefore, to manage all activities and ensure the unity of measurements in Ukraine, a metrological service was created, consisting of the State Service, headed by the State Committee for Standardization (State Standard of Ukraine), the Department for the Protection of Consumer Rights, territorial centers of standardization, metrology and certification. Thus, the quality assessment will be based on predetermined requirements or standards previously established by the enterprise. In the context of pre-shipment quality control, any product or unit of product that does not meet the minimum standards must be recycled, disposed of or treated by the relevant company instead of being shipped to the end user.

For many businesses, quality control is often missed, resulting in returns, damaged products, losses and customer dissatisfaction. In the long run, all these problems are negative for the business as a whole. Another sad reality is that businesses intentionally do not perform quality control or, even when they do, they do it haphazardly in favor of fast shipping. Implementation of quality control at various stages most often consists of the following checks:

- inspection upon receipt of raw materials and parts that will be used in production, or finished products that will be presented to the final consumer;
- inspection before production. Typically, a trial sample of the final product is produced, and if it passes inspection, the production cycle continues;
- verification in progress. Such checks will be carried out at intervals during the production process;
- inspection after production. For many, this is considered the stage of final inspection and testing. A sample or 100% finished product will be inspected and tested;
- inspection before delivery. Orders placed by the customer will be inspected and will not be shipped until the final inspector approves them.

Quality control aims to increase the efficiency of the entire production logistics system by performing procedures to detect the presence or absence of defects in products. Products with defects or other indicators of failure are returned to correct defects or improve manufacturing processes to ensure that consumers are protected from the disappointment that results from defective products [7].

A final pre-shipment quality control check is performed primarily to ensure delivery accuracy. This is especially true if the production has its own quality control system that operates at almost every stage of the production

and distribution process. However, if this is not the case, there is nothing wrong with inspecting the product before shipping. This reduces the costs associated with shipment errors, as well as the costs that will be incurred by both the consumer and the business in handling any returns due to defective or inaccurately delivered products. It will also ensure the protection of the brand, the name of the company and its reputation. Many businesses have suffered due to defective or poor quality products, inaccurate orders and even delayed deliveries. Dealing with consumer complaints takes a lot of company resources. It's also not easy for employees.

Loss control is not something businesses want to deal with all the time, even if they have a pretty strong customer service system. The fewer complaints received from consumers due to poor quality and inappropriate products, the better it will be for the morale of the company's employees. For quality control, questionnaires and quality control letters are most often used.

One of the advantages of questionnaires is its simplicity, ease of use and understanding by both users and analysts. They are flexible and can be used in a wide range of settings. Checklist worksheets. Just like questionnaires, they contain items that need to be checked only depending on the results of the check. Most often, they consist of questions, the answers to which are: "YES", "NO" and "PART".

A quality control sheet is a tool that is particularly useful when testing products that have many technical specifications, such as food, spare parts, and even fabrics. Quality control letters are perfectly concise and focus only on specific issues. Performing quality checks at all stages, not just before shipment, will help manufacturers monitor their products and processes and make important decisions that will improve their production system. In a sense, this is one way of collecting data to improve efficiency. The ability to identify problems and shortcomings in a timely manner will allow you to quickly correct these errors and eliminate them in future activities. Quality control adds value to production products. Often, businesses that maintain high quality control standards end up using this as an excuse to raise their product prices. After all, the implementation of quality control before the delivery of the product and at any other stage of the business process, even before delivery and distribution, will contribute to the reduction of costs and risks of losses, shortening the execution time and facilitating the timely delivery of products to the recipients.

At the enterprise level, product quality control can be organized by dividing functions and tasks between divisions and employees or by creating a special quality management department. The organizational structure may include units that coordinate quality management work. The distribution of quality management functions between divisions depends on the scope and nature of the enterprise's activities. In any case, the head of the enterprise, who is responsible for all its activities and economic results, which cannot be high with poor product quality, must perform general management of the quality management system. The metrological service is an extremely important link of quality assurance in production. Quality management is impossible without metrological support for measurements, which is characterized by unique opportunities for obtaining quantitative information about material or energy resources, the quality of materials and raw materials, about the state of the environment, safety and health protection of people and, accordingly, about the quality of technological processes and products [5].

One of the most important stages of product quality assurance is quality management of technological production processes. Ensuring product quality during the technological process is based on the monitoring procedure. The formation of product quality occurs during a certain period and depends on the conditions created by the technological operations of the entire production cycle. The control of parameters affecting the quality of final products is especially important. Control of technological processes and product quality is an integral part of quality management processes in production. This allows you to determine the suitability and level of quality of products, the possibility of their further use. Depending on the degree of influence on the technological process or production control, it is divided into active and passive [8-10]. With active control, there is an opportunity to improve organizational forms or technical means of obtaining quality products. In addition to the main factors and conditions of production that affect the quality of products, there are also many random, local and subjective factors. In order to maintain the appropriate level of quality and influence the main factors, a management system is needed, that is, a set of measures of continuous influence on the process of product creation.

CONCLUSIONS FROM THIS RESEARCH AND PROSPECTS FOR FURTHER RESEARCH IN THIS DIRECTION

From the conducted research, it can be concluded that one of the most important factors in the growth of production efficiency is the improvement of the quality of products or services. Increasing the quality of manufactured products is currently considered as a decisive condition for its competitiveness on the domestic and foreign markets. The competitiveness of products determines the country's prestige and is a decisive factor in increasing its national wealth. Product quality is one of the most important criteria for the company's operation in a relatively saturated market and prevailing price competition. Increasing the technical level and quality of products determines the pace of scientific and technical progress and increasing the efficiency of production as a whole.

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