ABSTRACT

of the dissertation work by Kenzhekhanova Mereke Batyrkhanovna on the topic " Development of technology and regulatory framework for standardization and certification of the production of apple chips, using apples of various varieties, zoned in the Republic of Kazakhstan", submitted for the degree of Doctor of Philosophy (PhD) under the educational program "8D07501 – Standardization and certification (by industry)"

Relevance of the research topic.

One of the important segments of the agro-food market of Kazakhstan is the apple market, which is consumed both fresh and as raw material for processing into canned goods or dried types. Processing of apples is due to both the seasonality of their growth and the production of products with new consumer properties, such as jams, preserves, compotes, etc., which allow preserving some of the useful minerals and vitamins present in fresh raw materials.

The inclusion of functional food products in the diet with the components necessary for the body: sugars, vitamins, minerals and ballast substances, which include fruit snacks, have become widespread in recent years in the consumer market of foreign countries due to their high dietary and taste properties and the absence of restrictions on consumption for all age groups of the population. In the line of fruit snacks abroad, apple chips are becoming the most common, due to the availability of raw apples, both in volume and the prevalence of their cultivation in almost all regions of the world. Fruit chips, including apple, are considered a good alternative to potato chips, as they contain natural vitamins and microelements that affect the body faster and more gently than chemically synthesized vitamin and mineral complexes. The presence of essential components in a food product ensures normal functioning and development of the human body. However, it should be noted that human health is closely related to food safety, so it is important that their production is aimed at preventing the likely occurrence of hazards and risks to human health, both from raw materials, materials, auxiliary components, and other conditions at all stages of the life cycle of the technological process of manufacturing products. When developing a technology for the production of apple chips, it is necessary first of all to examine the initial apple raw material for safety indicators, the standards of which, for manufacturers of the Customs Union countries, are laid down in the technical regulations on food safety. As part of the dissertation research on the development of a regulatory framework for standardization and certification of the technology for the production of apple chips using as the main raw material, apples of various varieties zoned in the Republic of Kazakhstan, one of the urgent tasks is to use apples grown in Kazakhstan as raw materials, since the presence of our own raw material base allows us to reduce logistics costs, and the chemical and technological properties of apples zoned in the Republic of Kazakhstan and processed products obtained from them, in their nutritional properties will be closer to the physiology of the Kazakhstani consumer. Also, I would like to note that the production of new food

products should be accompanied by the development of regulatory and technical documentation, which includes both technological and technical documentation, as well as standards for finished products and testing methods. Without these documents, industrial production and confirmation of conformity for food products entering and circulating on the trade market is prohibited. In this regard, the development of a regulatory framework for standardization and certification of apple chip production technology is the second urgent task of such research.

The purpose of the dissertation research is to development of technology for the production of apple chips using as the main raw material, apples of various varieties, zoned in the Republic of Kazakhstan, by applying improved drying methods based on new operating parameters with the development of a regulatory framework for standardization and certification.

Research objectives:

– justify the choice of pomological varieties of apples growing in Kazakhstan using farms in the Turkestan region as the source material;

– justify the optimal composition of the blanching solution and the process parameters for processing apple slices;

– select the process parameters for drying the finished product;

– develop a technology for producing apple chips from apple varieties zoned in the Republic of Kazakhstan;

– develop regulatory documentation for apple chips;

– conduct pilot testing;

– calculate the economic efficiency of the technology for producing apple chips.

Substantiation of the novelty and practical significance of the results obtained.

Scientific novelty.

Apple varieties grown in farms of the Turkestan region have been selected, which, according to their functional and technological properties, are suitable as raw materials for the production of apple chips. It has been established that the pomological varieties Idared, Granny Smith, Nicole Granny, Fuji, Golden, Jeramin, Jonagold, zoned in the southern regions of our country according to weight, color, organoleptic, physicochemical and microbiological indicators, are the most suitable for the production of domestic apple chips. A complete absence of pesticides HCH (α, β, γ-isomers) was established in the studied samples of pomological apple varieties, the requirements for which are established by the technical regulations for the safety of fruit and vegetable products HCH - no more than 0.05 mg / kg and 0.1 μg/kg DDT and its metabolites, which indicates that the farm does not use pesticides in the technology of growing apple orchards. The presence of a number of microelements constituting the biological value of pomological varieties was confirmed. It was established that potassium, magnesium, phosphorus and sodium are present in all samples. Granny Smith and Fuji varieties are the richest in potassium content, 46.3 and 46.29 mg%, respectively, the Idared variety has the most magnesium - 2.19 mg%, phosphorus

is contained in all varieties, the largest amount is in Granny Smith and Idared varieties - 3.70 mg% and 3.44 mg%, respectively. Calcium is absent in the Fuji variety, the largest amount is contained in the Idared variety, sodium was found only in the Fuji, Nicole Granny (twice as much as in the others) and Idared varieties. Thus, the pomological Idared variety is the leader among the studied samples in all microelements significant for the body.

Testing of pilot batches of the developed technology was carried out in the production conditions of «InnovTexProduct» LLC.

Regulatory and technical documentation for apple chips has been developed.

Practical significance. Is to develop apple chips from domestic apple raw materials using a blanched solution that allows preserving the taste, mineral composition and biological value, taking into account the peculiarities of preparing apple slices and drying the final product. The research results have been implemented in the production of «InnovTexProduct» LLP with the receipt of prototypes.

A draft organization standard for apple chips has been developed.

Scientific novelty is confirmed by the patent of the Republic of Kazakhstan for utility model № 9110 dated 10.05.2024 "Method for preparing apple chips".

The author's personal contribution consists in the theoretical substantiation of the tasks of the dissertation research, in the selection of methods and conducting experimental studies, the development of technology and recipes for apple chips from domestic apple raw materials using a blanched solution that allows preserving the taste, mineral composition and biological value, the development of regulatory documentation for standardization, interpretation of the data obtained, conducting pilot tests to obtain experimental samples of the final product.

Scientific provisions submitted for protection:

– scientific and practical substantiation of the technology of production of apple chips from apple varieties zoned in the Republic of Kazakhstan

– regulatory and technical support of the technology of production of apple chips from apple varieties grown in the southern regions of Kazakhstan.

Approbation of the work.

The research results were reported at the annual International Scientific and Technical Conference "Industrial Technologies and Engineering": in 2020, 2023, the International Scientific and Practical Conference "Auezov Readings" in 2021 and 2022 (Shymkent), the XIII International Scientific Conference of Students and Postgraduates in the Republic of Belarus April 18-19, 2024, Mogilev, Belarusian State University of Food and Chemical Technologies.

Description of the doctoral student's contribution to the preparation of each publication: all the results and conclusions given in the dissertation work were obtained and formulated with the direct participation of the applicant in accordance with the individual research plans of the doctoral student. The doctoral student mastered the modern research methodology, took an active part in the discussion and publication of the results obtained, the preparation and design of scientific articles for publication in domestic and foreign scientific journals.

Publications. According to the research results, the number of scientific papers is 16, of which 2 articles are published in journals included in the Scopus database: "Journal of Food Process Engineering" (Q3. percentile 73) and "Food Science and Technology International" (Q2. percentile 74). 4 publications in journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan, 2 articles in scientific journals of the Republic of Kazakhstan - Reports of the National Academy of Sciences of the Republic of Kazakhstan (Almaty, 2021), Bulletin of Science of South Kazakhstan (Shymkent, 2021) and 7 publications at international conferences. 1 patent of the Republic of Kazakhstan for utility model No. 9110 "Method for making apple chips" was received.

The structure and scope of the dissertation. The dissertation work consists of 5 chapters, including an introduction, literature review, objects and methods of research, experimental part, results and discussion of the conducted research, conclusion and list of references. The main content is presented on 164 pages, includes 44 tables, 48 figures, 36 formulas and 160 sources of literature of domestic and foreign authors.