

## REVIEW

**official reviewer Tyshchenko Vasyl Ivanovych**, Candidate of Agricultural Sciences, Associate Professor of the Department of Technology and Food Safety, Sumy National Agrarian University

for the dissertation work of post-graduate student Shang Feifei on the topic "**Development of the production technology of cooked sausages with the use of plant raw materials**", submitted for obtaining the degree of Doctor of Philosophy in specialty 181 "Food technologies", branch of knowledge 18 - "Production and technologies"

### **1. Relevance of the research topic.**

Knowledge of the basics of food combinatorics allows you to create multicomponent food products of a new generation that correspond to the priority directions of nutricology. Enrichment of emulsion meat products involves adding to them any essential nutrients and minor components: vitamins, macro- and microelements, dietary fibers, polyunsaturated fatty acids, phospholipids and other biologically active substances of natural origin, in order to preserve or improve nutritional value. The choice and justification of the use of plant ingredients, which are included in the composition of combined food products, depend mainly on their chemical composition and indicators of the biological value of the protein component.

In the doctoral thesis of Shang Feifei, one of the main tasks of the research was to determine the possibility of adding natural vegetable raw materials (taro paste and wheat bran) and biologically valuable combined vegetable oil to replace animal proteins and fats. This determined the theoretical and practical significance of the topic of the dissertation research and corresponds to the main principles of innovative technologies of food products, and is relevant.

### **2. Connection of work with scientific programs, plans, topics.**

The work was carried out in accordance with the main directions of scientific research of the Department of Technology and Food Safety of Sumy National Agrarian University (Ukraine) and the School of Food Sciences of Hezhou University of Science and Technology (China), within the framework of the state budget theme "Innovative technological solutions in the production of food products" (0119U101237).

### **3. The degree of validity of the scientific statements, conclusions and recommendations formulated in the dissertation.**

The purpose of the dissertation research is to develop a scientifically based technology for the production of cooked sausages from various types of meat enriched with vegetable raw materials.

The work consists of an abstract, an introduction, six chapters, conclusions, a list of used sources and appendices. The structure of the dissertation allowed the author to fully cover the subject of the dissertation research. Systematic use of special literary sources by the acquirer makes a positive impression, which indicates a thoughtful and thorough study of the researched problem, as well as a high level of professional training of the acquirer and his scientific maturity. The work contains the necessary theoretical, methodological, methodical and analytical studies, properly

covered in the relevant sections.

Familiarization with the materials of the dissertation determined the following: the content of the dissertation corresponds to its topic and tasks, fully discloses the purpose of the work, aimed at substantiating and developing the technology of cooked sausages with vegetable raw materials.

The analysis of the submitted materials shows that the dissertation student has the ability to conduct a critical analysis of literary sources, formulate the goal and main tasks, determine the necessary research methods, organize these studies, objectively evaluate the results of research, and prepare them in publications. It should be noted a large amount of scientific literature, which was processed by the dissertation student, on the peculiarities of the nutritional value of poultry meat, vegetable raw materials, and modern processing technologies.

To solve this goal, the following tasks were set and successfully completed:

- an analysis of the current state of the raw material base of poultry meat and vegetable ingredients was carried out;
- developed and analyzed the food composition and processing technology of plant raw materials (normative and technical documentation for the production of products from the Areca taro root crop was developed);
- the functional and technological characteristics of boiled pork sausages with taro paste were investigated;
- the rational amount of duck meat for boiled sausages with vegetable raw materials was selected and substantiated according to physico-chemical, structural-mechanical and organoleptic indicators;
- the temperature-time parameters of the production of cooked sausages with vegetable raw materials were studied according to quality characteristics;
- a recipe for cooked sausages from different types of poultry meat was developed according to quality indicators;
- the rational amount of dyes, antioxidants and animal fat substitutes is selected according to sensory characteristics and oxidation indices (acid number, TBARS, DPPH).

#### **4. Practical significance of the obtained results.**

Based on the results of theoretical and experimental studies, the technology of cooked sausages, made from various types of meat enriched with vegetable raw materials, was developed and tested in industrial conditions, and the socio-economic effect of the introduction of this technology was determined.

It has been proven that the introduction of taro paste and wheat bran into the sausage recipe made it possible to increase the amount of bound moisture and improve the nutritional value of the product, thanks to the content of dietary fiber and the mixing of taro paste and wheat bran, which contributed to their synergistic effect.

The possibility of using natural plant raw materials, namely, taro paste (obtained from the Areca taro root) in the recipes of cooked sausages from pork and from various types of poultry, has been theoretically substantiated and proven by experimental confirmation. It is also proven that the use of oil-gelatin emulsion increases the quality of sausage and reduces the amount of animal fat.

**5. The completeness of the presentation of scientific provisions, conclusions and recommendations in scientific publications, included according to the topic of the dissertation.**

The main scientific propositions, results and conclusions of Shang Feifei's dissertation have scientific novelty, a sufficient degree of validity, the authenticity of which has been proven by the author.

The author of the dissertation developed and approved regulatory and technical documentation - TU U 10.3-04718013-008:2022 "Concentrated and dried taro products. Technical conditions" (Ukraine). The results of the work were tested at factories in China and Ukraine.

The scientific principles and results of the research are presented in 17 scientific works of the recipient, of which 4 articles are in scientific specialized publications of Ukraine, 4 - an article in a scientific publication included in the international scientometric databases Scopus and/or Web of Science Core Collection, 1 article in a scientific publication of another state, 8 theses of scientific reports.

**6. Academic integrity.**

The dissertation is an independently written qualifying scientific work with scientifically based conclusions and recommendations, which are presented by the author for public defense. The use of ideas, results and texts of other authors are linked to the relevant sources. There is no appropriation of other people's ideas, results or words in the work without proper citation. The work does not contain signs of plagiarism and is finished.

**7. Questions for discussion and shortcomings of the dissertation regarding its content and design:**

1. In chapter 2 "Objects and methods of conducting experimental research", the author of the work gives the methods and techniques of experimental research, but does not specify the methods used to determine the technological indicators referred to in table 3.18 (loss of mass during cooking, loss of moisture and fat, etc.).

2. It is known that antioxidants are used to avoid the oxidation of finished products, but it is not specified according to which criteria ginger and onion juice and sodium isoscorbate were chosen.

3. The dissertation in table 3.17 shows the recipe for sausages, which includes 3% of an ingredient of unknown origin called "other". It should be specified which one.

4. The analysis of the work showed that the numbering of test samples is complicated (Chapters 3, p. 3.2.2, p. 3.2.3; Chapter 4, p. 4.1, p. 4.3, p. 4.4.2, p. 4.4, p. 4.5 ).

5. The work contains a number of stylistic and spelling mistakes, unfortunate expressions, which at the same time do not change the scientific content of the dissertation.

6. Also, it should be more specifically highlighted the issue due to which the mass share of protein in sausage products increased from 18.68% to 24.16%.

However, the given remarks are not fundamental, they do not reduce the scientific importance of the work performed and do not change the overall positive

assessment of the dissertation.

The design of the dissertation in terms of structure, language and presentation style meets the requirements for the design of the dissertation.

#### **8. Evaluation of the language and style of the dissertation.**

The dissertation work of the winner Shang Feifei is written in competent English, has meaningful integrity, consistency and completeness. The style of presentation of the material corresponds to that accepted in the scientific literature.

#### **9. General conclusion.**

The dissertation work of post-graduate student **Shang Feifei** on the topic "Development of the production technology of cooked sausages with the use of plant raw materials", submitted for the degree of Doctor of Philosophy in the specialty 181 "Food Technologies" on the basis of scientific novelty, theoretical and practical significance of the obtained results, fully meets the requirements of the "Order awarding the degree of Doctor of Philosophy and canceling the decision of the one-time specialized academic council of the institution of higher education, scientific institution on awarding the degree of Doctor of Philosophy", approved by the Resolution of the Cabinet of Ministers of Ukraine dated January 12, 2022 No. 44 and the direction of scientific research of the educational and scientific program of the Sumy National Agrarian University.

And its author deserves to be awarded the degree of Doctor of Philosophy in the field of knowledge 18 "Production and technologies" in specialty 181 "Food technologies".

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