

REVIEW

official reviewer Samilyk M.M., candidate of technical sciences, associate professor

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**", which is presented for obtaining the degree of Doctor of Philosophy in specialty 181 "Food technologies", field of knowledge 18 - production and technologies

1. The degree of relevance of the topic of the dissertation and its relationship with scientific programs, plans, topics

Meat products, namely cooked sausages, stand out among other meat products with their aroma and taste, delicate texture, high biological and energy value, moderate price, and therefore are in demand among the population.

Recently, the use of vegetable ingredients, which are the source of the main chemical components, namely carbohydrates and proteins, has become widespread in the technology of meat products. Plant ingredients not only affect the quality of finished products, but also have a positive effect on the health of consumers. The use of new raw materials requires detailed research. One of the ways to solve these issues is to develop the technology of cooked sausages using vegetable raw materials, which takes into account the above-mentioned characteristics.

Shang Feifei's dissertation clearly outlines the purpose of the research - scientific substantiation and development of technology for the production of cooked sausages from various types of meat enriched with vegetable raw materials. The author correctly chose the directions of research and methods of solving specific tasks. The relevance and timeliness of this important task for the meat industry is beyond doubt.

Research work was carried out according to thematic directions: 0119U101237 "Innovative technological solutions in the production of food products" - Sumy National Agrarian University (Ukraine) and the School of Food Sciences of the Henan Institute of Science and Technology (China).

2. The degree of validity of the scientific statements, conclusions and recommendations formulated in the dissertation

The dissertation is characterized by a systematic approach to the subject of research. The work consists of an abstract, an introduction, six chapters, conclusions, a list of used sources and appendices. The structure fully corresponds to the purpose and tasks of the dissertation research, allows to consistently consider all outlined problems. The validity of the provisions formulated in the dissertation is confirmed by a critical analysis of scientific sources, domestic and international legislation. The work was carried out taking into account the requirements for meat products and on the basis of modern trends in the development of nutrition science. The dissertation student, Shang Feifei, provided comprehensive data on physico-chemical, microbiological, structural-mechanical, biochemical transformations of meat raw materials during the production of cooked sausages from various types of meat raw materials and plant components. In the dissertation study, based on an analytical review of specialized literary sources, the role of nutrients of functional and technological components on the quality characteristics of finished sausage products is formulated and proved. Their optimal concentrations were

selected, aimed at the organization of the production of meat products with a low content of animal fats. The synergistic effect of the ingredients on obtaining products of guaranteed quality has been determined.

The work contains the necessary theoretical, methodological, methodical and analytical studies, properly covered in the relevant sections.

The main provisions of the novelty of the obtained results are as follows:

- for the first time, natural vegetable raw materials (taro paste), obtained from the root crop "Areca taro", scientifically substantiated and introduced into the recipes of cooked sausages from pork and from various types of poultry meat;

- it was determined for the first time that combined vegetable oil mixes with granules of hot melted gelatin and forms a white emulsion, hiding the unpleasant smell of gelatin;

- it has been proven that the use of oil-gelatin emulsion increases the quality characteristics of cooked sausages and reduces the amount of animal fat.

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.

3. Significance of the obtained results for science and practice and recommendations for their possible use

The author of the dissertation has developed new recipes and technology for sausage products enriched with vegetable ingredients due to: the addition of taro paste, wheat bran, beetroot powder and oil-gelatin emulsion, which contributes to the saturation of cooked sausages with protein and dietary fibers and reduces the amount of animal fats in the modern human diet.

Regulatory and technical documentation was approved - TU U 10.3-04718013-008:2022 "Concentrated and dried taro products. Technical conditions" (Ukraine) and two standards for "Poultry sausage with taro paste" Q/PLD-004S-1 and Q/ZFA-0001S-2022 (China) were approved. The results of the work were used at the industrial level in production conditions at the FOP "Klymenko L.O." and FOP "Filon A.M." (city of Sumy), Guangxi Zhifu Agricultural Development Co., Ltd and Guilin PLANT Biotechnology Co., Ltd (Guangxi Province, China).

4. The completeness of the presentation of scientific provisions, conclusions and recommendations in scientific publications included in the thesis topic

The main provisions and results of the dissertation research are presented in 17 scientific works, of which 4 articles are in scientific publications of Ukraine, 4 - articles in scientific publications included in the international scientometric databases Scopus and Web of Science Core Collection, 1 article in a scientific publication of another country, 8 theses of scientific reports. These publications fully cover the main scientific provisions of the dissertation research.

5. Analysis of the style of presentation of the material and design of the dissertation work

The dissertation is written in Ukrainian, the style of presentation of the dissertation material is competent, logical, consistent, which ensures ease of understanding the presented material.

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 analysis of the plagiarism check report of the dissertation on the topic "Development of the production technology of cooked sausages with the use of plant raw materials" proves that the work does not contain elements of plagiarism. Thus, there are no violations of academic integrity in Shang Feifei's dissertation research.

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

Along with the positive assessment of the dissertation work, it can be noted that some statements are debatable or need to be revised:

1. The author states that taro powder was obtained using a spray dryer. However, it is not shown how the root crops were pre-prepared?

2. The air temperature at the entrance to the dryer is 180 °C. This is a fairly high temperature for processing vegetable raw materials. How did this temperature affect the biological value of the powders? Have you considered other drying methods?

3. In section 3.1.2.5, it is noted that the highest starch digestibility (59.4%) is observed at a temperature of 110°C. However, Table 3.7 shows that the highest content of easily digestible RDS starch is observed at 120 °C (64%). It is worth explaining the presented results.

4. Why does the recipe for duck meat sausages use wheat bran as an additive instead of powders or taro paste?

5. In section 4.3. it is proposed to add ginger-onion juice to the recipe as an antioxidant. Table 4.7 of the same section shows another raw material (rice wine). The purpose of adding it?

6. What equipment is proposed to be used for taro root steaming and kneading in the production of paste?

At the same time, the stated comments are mainly of a debatable nature and do not significantly affect the positive evaluation of the dissertation. They are caused by the interest in this research, the novelty and relevance of the issues outlined in the dissertation and testify to the creative nature of the work and attempts to solve theoretically complex and practically important problems that are of significant

importance for the food industry.

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

8. General conclusion

The general analysis of the work testifies to the independence and integrity of the conducted research, its relevance and scientific level, theoretical and practical significance. The scientific provisions, conclusions and recommendations formulated in the work are sufficiently fully set forth in the scientific publications published by the acquirer. There are no violations of academic integrity in Shang Feifei's dissertation research.

The dissertation on the topic: "Development of the production technology of cooked sausages with the use of plant raw materials" meets the requirements of the order of the Ministry of Education and Culture of Ukraine No. 40 of January 12, 2017 "On the approval of the Requirements for the preparation of a dissertation" and the Procedure for awarding the degree of Doctor of Philosophy and canceling the decision of the one-time specialized academic council of the higher institution of education, scientific institution on awarding the degree of Doctor of Philosophy, approved by Resolution No. 44 of the Cabinet of Ministers of Ukraine dated January 12, 2022, and its author Shang Feifei deserves the award of the degree of Doctor of Philosophy in the field of knowledge 18 "Production and Technologies" in the specialty 181 "Food Technologies".

Reviewer:

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head of the technology department
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