

FEEDBACK

from the official opponent

for dissertation work of DENG CHUNLI

«TECHNOLOGY OF PHYSICALLY MODIFICATION OF POTATO STARCH AND THEIR APPLICATIONS IN FOOD PRODUCTS»,

submitted for obtaining the scientific degree of Doctor of Philosophy
for Specialty 181– Food Technology

Structure and scope of work

Dissertation work presented for obtaining the scientific degree of Doctor of Philosophy is submitted for consideration. It consists of an introduction, 5 sections, conclusions, a list of references of 236 names, appendices. Main content dissertation is laid out 186 pages of printed text, contains 48 tables and 48 figures.

Relevance of the dissertation topic

There is no doubt about the relevance of the research topic. Undoubtedly, the quality of food significantly affects the health of the population. An unbalanced diet disrupts the body's metabolism, leads to a decrease in immunity, premature aging, and contributes to the rapid spread of many non-infectious diseases. This, in turn, leads to the search for new product technologies aimed at supporting the health and improvement of the population and ingredients that have a health-improving effect.

The search for new non-traditional raw materials and the development of innovative food technologies is timelier and relevant than ever.

Deng Chunli developed the technology of physical modification of potato starch, researched and established the regularities of the influence of heat-moisture treatment in combination with microwave treatment on its quality, substantiated the use of physically modified starch in the technology of wheat flour products, which can be recommended for diabetics and elderly people age.

Connection of work with scientific programs, plans, themes

Scientific research of the dissertation thesis was carried out within the framework of the thematic plan of research works according to topic 0119U103484 «Scientific grounding and development of technologies of food and culinary products using innovative types of raw materials», Technology of Nutrition Department, Sumy National Agrarian University, Ukraine, and the College of Food and Biological Engineering, Hezhou University, China.

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

The purpose and tasks of the work, aimed at its achievement, correspond to the general plan of theoretical and experimental research. The scientific propositions formulated by the graduate student and the conclusions given in the dissertation thesis are based on the results of an analytical analysis of the literature and experimental studies performed using instrumental methods - sensory, physicochemical, chemical, computational and statistical. The logic of the presentation of the material corresponds to the set purpose and tasks of research.

The validity and novelty of research results. The scientific novelty of research is inherent in all sections of the dissertation thesis.

The scientific novelty of the obtained results is:

- for the first time, the author investigated the influence of heat-moisture treatment in combination with microwave treatment of potato starch on its quality;
- the influence of temperature, moisture and duration of processing of potato starch on its rheological parameters, gel textural properties and in vitro digestion characteristics of the HMT modified starch and HMT and MW bidirectional modified starch were systematically analyzed to provide reliable evidence for their application in food industry;
- the regularities of the effects of wheat flour substitution with modified potato starch on properties of mixed dough and quality of cookies, steamed bread and noodles are substantiated.
- experiments on cookies, steamed bread and noodles products confirmed that adding a suitable dose of modified potato starch can improve the quality of the products, making the products have good texture properties and sensory acceptability, which is of positive significance for promoting the process of potato staple food;
- the technology of obtaining physically modified starch is substantiated;
- the technology of food products from wheat flour using the developed modified starch was developed;

It has been proven that the use of the developed modified starch in the technology of food products will reduce the glucose content in the human body.

The practical significance of the obtained results

The practical significance of the obtained results is that the author comprehensively investigated the effect of physical modification of potato starch (HMT, HMT and MW) on the functionality and digestibility of starch, developed

optimal parameters of its modification, which will provide a useful theoretical basis for further research on improving the use of hydrothermal or microwave technologies in starch modification.

The modified starch obtained in the study has a high content of RS and SDS, which is suitable for the development of low GI foods and is also suitable for use in the production of wheat flour products. The author developed recipes for cookies, steamed buns and noodles with the addition of the obtained modified starch.

The materials of the dissertation thesis were used in the educational process for preparing students, as well as during the conduct of fundamental and applied research in the direction of the development of technologies for flour products or the processing of starch raw materials.

The implementation of the results of scientific research into practice will improve the health of the population, reduce the risks of a number of diseases, which will be of great socio-economic importance.

Complete presentation of the main results of the dissertation

The main results of the dissertation thesis are presented in 14 scientific papers, including 9 articles in scientific journals, 2 of which are published in a category B scientific professional publication approved in Ukraine and 2 in a scientific professional publication approved in Ukraine indexed by Scopus, 1 publication in a Polish scientific journal indexed by Scopus, 1 publication in Slovakia scientific journals indexed by Scopus, 2 in Hungarian scientific journals, 1 publication in a Brazil scientific journal indexed by Scopus; 5 abstracts of scientific conference reports.

The published works sufficiently reflect and confirm the conducted research.

Evaluation of the language and style of the dissertation

Dissertation thesis by Deng Chunli is written in English, has meaningful integrity, consistency and completeness. The text presentation of the material corresponds to the style of research literature.

Remarks and wishes to the dissertation work:

1. In the scientific novelty, which is given by the author in the work, it was desirable to give specific numerical values established by the author during the conduct of scientific research.

2. In my opinion, the replacement of wheat flour with modified starch in the preparation of cookies, noodles and steamed bread requires a more detailed justification.

3. In chapter 2, in the description of the raw materials used for the preparation of cookies, bread and noodles, the suppliers of raw materials are indicated, however, it would be appropriate to indicate the regulatory documentation for the raw materials, which is a confirmation of their quality.

4. The explanation of the change in the textural properties of starch in point 3.4.6 is not quite correct, since it is not clear how in this case protein and fat participate in the structure of starch formation.

5. How does the tendency to retrogradation of modified starch affect the quality of noodles?

6. What explains the increased hardness of potato starch gels after modification? What research supports this?

7. The results of Table 5.16 show an increase in the indicators of hardness and chewiness of the dough for steamed bread when modified starch is added in the amount of 30.0%. Why is there such a trend, since the gluten content of flour decreases with an increase in the starch content of the mixture?

8. When studying the replacement of wheat flour with modified starch in the preparation of cookies, it is not clear what is the justification for adding modified starch in the amount of 15%. In my opinion, it was necessary to show the purpose of such a replacement and how it would affect the glycemic index (GI).

9. It would be appropriate to show how the cost of cookies, bread and noodles using modified starch will change and how the process of physical processing of starch developed by the author will affect its cost.

10. It was desirable to provide data on how digestibility (in vitro) of wheat flour products with the addition of modified starch changes.

The above comments and wishes on the dissertation thesis are not fundamental and do not reduce the overall positive assessment of the work.

Conclusion on compliance of the dissertation work with the requirements of the procedure for obtaining a scientific degree

The dissertation thesis of Deng Chunli is an independent, completed qualifying scientific work, relevant, aimed at solving the important problem of developing the technology of physical modification of potato starch, researching and establishing the regularities of the influence of heat-moisture processing in combination with microwave processing on its quality, and substantiating the use of physically modified starch in the technology of products with wheat flour.

The work contains new scientifically based results and corresponds to specialty 181 – «Food technologies».

In terms of content, scope of research, scientific novelty, practical significance and design, the dissertation work «Technology of physically modification of potato starch and their applications in food products» meets the requirements of Resolution of the CMU № 44 dated January 12, 2022 «On approval of the procedure for obtaining the scientific degree of Doctor of Philosophy and cancellation of the decision of the one - time specialized general council of the institution of higher education, scientific institution on obtaining the scientific degree of Doctor of Philosophy», and the author, Deng Chunli, deserves to be awarded the scientific degree of Doctor of Philosophy in specialty 181 «Food Technologies».

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