

OPINION

on a dissertation for obtaining the scientific degree "Doctor of Sciences" in: field of higher education: 5. Technical sciences, professional field: 5.13. General Engineering, scientific specialty: Milk and milk products technology.

Autor of the dissertation: Dr. Chuluunbat Tsend-Ayush, Mongolia

Topic of the dissertation: "Theoretical and experimental substantiation of the technology of dairy products of functional nutrition in the conditions of Mongolia"

Prepared the opinion: Assoc. Prof. Dr. Svetla Maksimova Dyankova, Institute of Cryobiology and Food Technologies -Sofia, Agricultural Academy, 5.0. "Technical Sciences", 5.12. "Food Technology", scientific specialty "Technology of biologically active substances", appointed a member of the scientific jury by order № RD-16-824/13.07.2022 by the Rector of AU

1. Relevance of the problem.

The dissertation work has a marked and indisputable relevance in scientific and scientific-applied terms. According to the data presented in the dissertation, the national fermented milk products in Mongolia are produced in small farms, using traditional technologies, and there is still no complete information about the composition of the microflora, especially for some of them - aaruul, eezgii, biaslag.

In Mongolia, for the industrial production of fermented milk products, imported standard starter cultures are used, and so far no domestic production of starter cultures for national dairy foods has been organized. In this regard, the isolation, characterization and in-depth investigation of the properties of the microflora in the country's traditional fermented dairy products has significant scientific and applied value.

Another current problem is related to the discovery and study of new probiotic strains of microorganisms. In the modern theory of healthy nutrition, probiotics occupy a significant place. They are the basis of the normal microbiocenosis of the gastrointestinal tract and are directly involved in the digestion process, while at the same time they have a prophylactic and curative effect in a number of socially significant diseases. All these issues are addressed and successfully resolved in the dissertation.

2. Purpose, tasks, hypotheses and research methods.

The aim of the dissertation work is to develop a scientifically based technology for obtaining functional dairy products based on new types of starter cultures prepared from lactic acid bacteria isolated from traditional Mongolian fermented milk foods. The aspiration of the author is to prove that the microorganisms isolated from fermented dairy foods produced in private farms from different regions of the country have the potential to be applied in the creation of new functional probiotic products based on goat, sheep and cow's milk.

The purpose of the scientific research is achieved by solving 11 specific tasks, which are logically supported by the literature analysis. The chosen methodology corresponds to the set tasks. A wide range of classical and modern research methods were used. During the work on the dissertation, a significant number of research and technological experiments were carried out. In the identification of microorganisms, standard biochemical and microbiological methods were applied, as well as genetic studies. To prove the probiotic properties of the strains, "in vitro" and "in vivo" studies were used, and the developed fermented dairy products were also clinically tested.

3. Visualization and presentation of the obtained results.

The dissertation consists of 288 standard pages and is divided into the following parts: introduction, analytical review of the literature, experimental part, including material and methods, obtained results (structured in 5 chapters), technical novelty of the dissertation, conclusions, contributions and references. Seven patents and author's certificates and eight scientific projects related to the dissertation are listed in the appendix. The reference list contains 257 publications, of which 196 are in Latin and 61 in Cyrillic.

The presented abstract corresponds to the content and structure of the text in the dissertation.

4. Discussion of the results and used literature.

The literature review summarizes the current state of knowledge on the problem and concludes that it is necessary to investigate the biochemical and technological properties of new starter cultures isolated from traditional Mongolian fermented milk foods.

The practical application of the obtained results is related to the creation of new functional probiotic dairy products. A significant amount of work has been carried out, all isolated microorganisms have been identified and studied in detail, including for probiotic properties. The obtained results enrich the knowledge of the problem and have great scientific and applied value. In a practical aspect, new starter cultures with selected strains of microorganisms were formulated and the optimal technological conditions for the production of functional products from goat, sheep and cow's milk were established.

5. Contributions to the dissertation.

The author formulates a total of 6 scientific and scientific-applied contributions, which are original and arise from the conducted research. In my opinion, the obtained results for the probiotic properties of some of the identified microorganisms and the complex studies of the biological value of the developed functional dairy products are of particular interest. Through in vitro and in vivo experiments, it was demonstrated that the isolated strain *L. paracasei* spp. *paracasei* (06TSD19b) exhibits significant anti-*Helicobacter pylori* activity.

6. Critical remarks and questions.

I have no critical remarks about the presented work.

7. Published articles and citations.

As a member of the scientific jury, I received a list of publications related to the topic of the dissertation consisting of a total 26 titles, of which 10 are publications, referenced and indexed in world-famous scientific information databases. They are sufficient to cover the minimum national requirements for obtaining the degree of "Doctor of Sciences", defined by the Act on Development of the Academic Staff in the Republic of Bulgaria, the National Regulations for the Application of the Law and the Regulations of AU-Plovdiv its application. The presented list of citations covers the scientometric indicators for the scientific degree "Doctor of Science" and is indicative of the great interest in the research related to the dissertation.


CONCLUSION

Based on the different research methods learned and applied by the candidate, the correctly performed experiments, the summaries and conclusions made, I believe that the presented dissertation meets the requirements of the Law and the Regulations of the Agricultural University for its application, which gives me reason to evaluate it POSITIVE.

I allow myself to suggest to the Honorable Scientific Jury that it also vote positively and award Dr. Chuluunbat Tsend-Ayush scientific degree "Doctor of Sciences" in the scientific specialty "Technology of milk and dairy products".

Date: 28.09.2022

Prepared the opinion:


(Assoc. Prof. Dr. Svetla Dyankova)