

Ministry of Education and Science of Ukraine

National University of Food Technologies

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**91<sup>th</sup>**  
**International scientific conference**  
**of young scientist and students**

**"Youth scientific achievements**  
**to the 21st century nutrition**  
**problem solution"**

**April, 7–11 2025**

**Part 1**

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**Kyiv, NUFT, 2025**

Міністерство освіти і науки України

Національний університет харчових технологій

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**91-а**  
**Міжнародна наукова**  
**конференція молодих учених,**  
**аспірантів і студентів**

**"Наукові здобутки молоді –**  
**вирішенню проблем**  
**харчування людства у ХХІ**  
**столітті"**

**7–11 квітня 2025 р.**

**Частина 1**

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**Київ НУХТ 2025**

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The publication contains materials of 91<sup>th</sup> International scientific conference of young scientists and students "Youth scientific achievements to the 21st century Nutrition problem solution".

It was considered the problems of improving existing and creating new energy and resource saving technologies for food production based on modern physical and chemical methods, the use of unconventional raw materials, modern technological and energy saving equipment, improve of efficiency of the enterprises, and also the students research work results for improve quality training of future professionals of the food industry.

The publication is intended for young scientists and researchers who are engaged in definite problems in the food science and industry.

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**Матеріали** 91-ї Міжнародної наукової конференції молодих учених, аспірантів і студентів "Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті", 7–11 квітня 2025 р. – Київ: НУХТ, 2025. – Ч. 1. – 347 с.

Видання містить матеріали 91-ї Міжнародної наукової конференції молодих учених, аспірантів і студентів "Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті".

Розглянуто проблеми удосконалення існуючих та створення нових енерго- та ресурсоощадних технологій для виробництва харчових продуктів на основі сучасних фізико-хімічних методів, використання нетрадиційної сировини, новітнього технологічного та енергозберігаючого обладнання, підвищення ефективності діяльності підприємств, а також результати науково-дослідних робіт студентів з метою підвищення якості підготовки майбутніх фахівців харчової промисловості.

Розраховано на молодих науковців і дослідників, які займаються означеними проблемами у харчовій науці та промисловості.

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## 12. Innovative approaches to use transglutaminase in meat-containing products

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**Introduction.** This study focuses on utilizing the properties of the enzyme transglutaminase in the preparation of a meat-containing product.

**Materials and Methods.** Transglutaminase is an enzyme widely employed in the food industry, particularly in the production of meat-containing products, due to its ability to catalyze the formation of covalent bonds between protein molecules. This process enhances the texture, structure, and functional properties of meat raw materials.

**Results.** The product is a meat-containing item, first grade, encased in a cellulose casing. Composition: Meat raw materials – 40% (manually deboned poultry meat, semi-fat trimmed pork, lard), drinking water, mechanically deboned poultry meat, pork skin emulsion, raw beef fat, multicomponent dry mixes, wheat flour, semolina, dry cow's milk, table salt, color stabilizer E250. Storage Conditions: At a temperature of 0°C to 6°C and relative air humidity of 75% to 78%. Shelf Life: 2 days. Packaging Type: Gas, vacuum; pH 5.8; microbial transglutaminase obtained from *Streptomyces mobaraensis*. Transglutaminase is naturally present in mammalian tissues, particularly in blood. Historically, it was extracted from the plasma of pigs or cattle. The enzyme is obtained through centrifugation and protein precipitation.

The strong binding of components in meat products is maintained even during slicing, freezing, or heat treatment. Microbial transglutaminase, derived from *Streptoverticillium mobaraense*, is independent of Ca<sup>2+</sup> ions. This characteristic makes it highly valuable for modifying the functional properties of proteins in food production, as many proteins—such as milk caseins, soy globulins, or myosins—are sensitive to the presence of Ca<sup>2+</sup>. In such conditions, they lose stability and become less responsive to microbial transglutaminase. Its application is relevant in meat-containing products: it acts as a binding agent, connecting particles and proteins, which enables the product to achieve a texture similar to that of traditional dry-fermented sausages.

The yield of the first-grade meat-containing product (sausage in a cellulose casing) increased with higher levels of microbial transglutaminase (MTG). Products with the addition of 0.5% and 1.2% MTG demonstrated significantly higher yields compared to the control group without the enzyme ( $P < 0.05$ ), indicating improved emulsion stability and the ability to retain moisture within the product's structure. These findings are attributed to the ability of MTG, sourced from *Streptomyces mobaraensis*, to catalyze the formation of strong covalent bonds between the proteins of poultry meat, pork, and pork skin emulsion present in the composition at temperatures of 0–6 °C. Thus, the use of transglutaminase not only optimizes the technological properties of the meat-containing product but also reduces the need for salt and phosphates while maintaining high product quality.

**Conclusion.** The addition of transglutaminase contributed to increased elasticity and uniformity of texture, reducing mass losses during cooking and storage at temperatures of 0–6 °C.

### References.

Samuel Verdú, Ignacio García, Carlos Roda, José M. Barat, Raúl Grau, Alberto Ferrer, J.M. Prats-Montalbán, Multivariate image analysis for assessment of textural attributes in transglutaminase-reconstituted meat, *Chemometrics and Intelligent Laboratory Systems*, Volume 256, 2025, <https://doi.org/10.1016/j.chemolab.2024.105280>.