



**VI МІЖНАРОДНА
НАУКОВО-ПРАКТИЧНА КОНФЕРЕНЦІЯ
VI INTERNATIONAL SCIENTIFIC CONFERENCE**

**ЯКІСТЬ І БЕЗПЕКА
ХАРЧОВИХ ПРОДУКТІВ
FOOD QUALITY
AND SAFETY**

**9-10 листопада
November 9-10**

2023

**ЗБІРНИК ТЕЗ
BOOK OF ABSTRACTS**



**Національний університет харчових технологій – Київ, Україна
National University of Food Technologies – Kyiv, Ukraine**

Якість і безпека харчових продуктів: Збірник тез VI Міжнародної науково-практичної конференції, 9-10 листопада 2023 р., м. К. – К.: НУХТ, 2023. — 292 с.

ISBN 978-966-612-304-9

Подано наукову інформацію у сфері систем менеджменту якості та безпечності харчової продукції, презентовані новаторські ідеї в галузі підвищення якості та безпечності харчових продуктів, які можуть привернути увагу широкого кола фахівців та стати предметом дискусії. Розглянуто аспекти технічного регулювання у Україні, а також актуальні питання у сфері lean-виробництва харчової продукції, підприємництва та торгівлі.

Редакційна колегія:

ректор Національного університету харчових технологій, д-р техн. наук, професор О.Ю. Шевченко,
проректор з наукової роботи НУХТ, канд. техн. наук, доцент С.В. Токарчук,
проректорка з науково-педагогічної та виховної роботи, д-р техн. наук, професор Л.Ю. Арсеньева,
в.о. генерального директора ДП «УкрНДНЦ» С.Л. Павлов
начальник Головного Управління Держпродспоживслужби в м. Києві О.М. Рубан
перший заступник директора УкрНДІ «Ресурс» О.С. Гавриленко
доктор філософії, кафедра технології і якості продукції рослинництва, Словацький університет сільського господарства в м. Нітра (Словаччина) Є. Іванісова,
доктор філософії, кафедра загальних харчових технологій та харчування людини, Інститут харчових технологій та харчування Університету Жешува (Польща) Г. Адамчук
доцентка кафедри експертизи харчових продуктів, канд. техн. наук, доцент С.І. Усатюк,
доцентка кафедри експертизи харчових продуктів, канд. техн. наук, доцент О.О. Петруша.
шеф-редакторка журналу «Управління якістю» видавництва «ТехМедіаГруп», заступник директора М. Бурдейна
тренер-консультантка ТОВ «ІСО БІЗНЕС-СТУДІЯ», аудитор систем менеджменту якості та безпечності харчових продуктів міжнародних органів сертифікації С. Березова
голова правління Асоціації з інтеграції НАССР В. Веремеєнко
доцентка кафедри експертизи харчових продуктів, канд. техн. наук, доцент В.В. Кійко (відповідальний секретар)

*Рекомендовано вченою радою НУХТ
Протокол № 3 від «31» жовтня 2023 р.*

Видано в авторській редакції

ISBN 978-966-612-304-9

© НУХТ, 2023

M. Pawlos¹, Ph.D.,
A. Znamirska-Piotrowska¹, Ph.D., Associate Professor,
O. Petrusha², Ph.D., Associate Professor,
K. Szajnar¹, Ph.D.,
M. Kowalczyk¹, M.Sc.,
K. Szopa¹, M.Sc.

¹University of Rzeszów (UR), Rzeszów, Poland

²National University of Food Technologies (NUFT), Kyiv, Ukraine

3. POSSIBILITY OF USING β -GALACTOSIDASE AND LYOPHILISATE OF DRAGON FRUIT FOR THE MANUFACTURE OF LOW-LACTOSE PROBIOTIC GOAT'S MILK FERMENTED BY *LACTICASEIBACILLUS RHAMNOSUS*

Introduction.

The attraction toward goat's milk stems from its elevated nutritional composition and beneficial impact on several physiological processes within the human body. Goat milk exhibits a higher digestibility than cow's milk, resulting in a reduced presence of undigested residue in the colon, which can otherwise undergo fermentation, potentially leading to discomforting symptoms associated with lactose intolerance. Treatment for lactose intolerance may include adopting a low-lactose diet and enzyme replacement therapy (Deng et al. 2015). All the advantages of goat's milk are retained in fermented beverages, which are further enriched by the effect of the microflora (Nayik et al. 2021). Probiotics are gaining importance as therapeutic agents to help with lactase deficiency, while they can reduce lactose concentration in fermented products and increase lactase activity. In order to induce a favourable probiotic effect, the minimum therapeutic quantity of probiotics should range between 10^6 to 10^9 cfu g⁻¹ of the product (Kowalczyk et al. 2023). *Lacticaseibacillus rhamnosus* may benefit people with lactose intolerance by regulating intestinal peristaltic movements, preventing diarrhoea and strengthening the immune system (Oak and Jha 2018).

An interesting solution related to increasing the health-promoting value of fermented milk could be the addition of dragon fruit (pitaya), which is renowned as a "superfood" because of its abundant nutrients and comparatively low-calorie count. This fruit boasts bioactive elements such as antioxidants, fibre, vitamins, and minerals. Pitaya is also a source of oligosaccharides, demonstrating prebiotic properties and justifying its suitability for application in functional foods and nutraceutical formulations (Wichienchot et al. 2010).

This study aimed to evaluate the effect of the addition of dragon fruit powder on the physicochemical and organoleptic properties, as well as the survival of the microflora in low-lactose goat's milk fermented by *Lacticaseibacillus rhamnosus*.

Materials and methods.

Goat's milk with 0.05% (w/v) of β -galactosidase NOLA[®] Fit (Chr. Hansen, Denmark) was stored at 6 °C for 20 h to reduce lactose content by almost 100%. Four batches of samples were prepared: control goat's milk with conventional lactose content (CG), low-lactose goat's milk (LG), goat's milk with 3% (w/w) addition of dragon fruit powder and conventional lactose content (GP) and low-lactose goat's milk with 3% (w/w) addition of dragon fruit powder (LGP). All groups of milk were pasteurised (85 °C, 10 min). Next, 5% of probiotic monoculture of *Lacticaseibacillus rhamnosus* LGG[®] (Chr. Hansen, Denmark) was added to each batch of cooled milk (37 °C) and fermented at 37 °C in 100 mL plastic cups until reaching a pH=4.6±0.2 (14 h). The fermented milk was analysed on days 1 and 21 of refrigerated storage. The pH, syneresis, colour, texture profile, and viable counts of *L. rhamnosus* were determined. Moreover, the organoleptic evaluation of fermented milk was carried out.

Results and discussion.

Lactose-reduced fermented milk showed a higher pH value than milk with unchanged lactose content. In all samples, there was a significant ($p \leq 0.05$) reduction in milk pH with an increased storage time. The addition of powdered dragon fruit reduced syneresis on day 1 of storage, and, when storage time was extended to 21 days, increased syneresis of fermented milk was observed compared to samples without dragon fruit powder. Significant ($p \leq 0.05$) reductions in syneresis were found in all research groups on day 21 of refrigerated storage. The addition of dragon fruit powder significantly ($p \leq 0.05$) reduced the lightness (L^*) of the fermented milk and increased red saturation in both terms of analysis.

Adding lyophilized dragon fruit to goat's milk with unchanged lactose content most favourably stimulated the growth of the *L. rhamnosus* strain at both terms of the study (10.23 and 9.83 log cfu g⁻¹). The population of the *L. rhamnosus* strain was maintained throughout the storage period at a level that allowed all experimental groups to be considered probiotic.

Low-lactose goat's milk was characterized by decreased hardness, stringiness length, and higher resilience than control milk. The addition of lyophilized pitaya fruit increased the chewiness of the milk gel. Increasing storage time to 21 days reduced hardness in all experimental groups.

Fermented milk with pitaya powder showed a more solid consistency than milk without this additive. The control milk had the least perceptible sweet taste. In contrast, using low-lactose milk and the addition of lyophilized pitaya increased the perceptibility of this taste on both test terms. The experimental groups with pitaya demonstrated a reduction in the perceptibility of milk taste while an increase in the intensity of additive taste, off-taste and off-odour. Extending the storage time intensified the LGP and GP samples' sour taste and sweet taste in all experimental groups. Furthermore, the panellists indicated a decrease in the perceptibility of the goatly taste, off-taste, fermentation odour, sweet odour, additive odour and off-odour.

Conclusions.

Systematic growth of interest in foods with beneficial effects on the organism can be observed among consumers with specific dietary needs. Enzymatic hydrolysis of lactose in goat's milk and application of lyophilized dragon fruit provided the ability to manufacture a functional low-lactose fermented milk with probiotic bacteria.

References

1. Deng, Y., Misselwitz, B., Dai, N., Fox, M. (2015). Lactose Intolerance in Adults: Biological Mechanism and Dietary Management. *Nutrients*. 7: 8020-8035. <https://doi.org/10.3390/nu7095380>
2. Nayik, G.A., Jagdale, Y.D., Gaikwad, S.A., Devkate, A.N., Dar, A.H., Dezmirean, D.S., Bobis, O., Ranjha, M.M.A.N., Ansari, M.J., Hemeg, H.A., Alotaibi, S.S. (2021). Recent Insights Into Processing Approaches and Potential Health Benefits of Goat Milk and Its Products: A Review. *Frontiers in Nutrition*. 8: 789117. <https://doi.org/10.3389/fnut.2021.789117>
3. Kowalczyk, M., Znamirska-Piotrowska, A., Buniowska-Olejniak, M., Pawlos, M. (2022). Sheep Milk Symbiotic Ice Cream: Effect of Inulin and Apple Fiber on the Survival of Five Probiotic Bacterial Strains during Simulated In Vitro Digestion Conditions. *Nutrients*. 14: 4454. <https://doi.org/10.3390/nu14214454>
4. Oak, S. J., Jha, R. (2018). The effects of probiotics in lactose intolerance: A systematic review. *Critical Reviews in Food Science and Nutrition*. 9:1-6. <https://doi.org/10.1080/10408398.2018.1425977>
5. Wichienchot, S., Jatupornpipat, M., Rastall, R.A. (2010). Oligosaccharides of pitaya (dragon fruit) flesh and their prebiotic properties. *Food Chemistry*. 120:850. <https://doi.org/10.1016/j.foodchem.2009.11.026>