ABSTRACT AND REFERENCES

TECHNOLOGY AND EQUIPMENT OF FOOD PRODUCTION

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SUBSTANTIATION OF THE TECHNOLOGY FOR FERMENTED SOUR-MILK DESSERTS WITH BIFIDOGENIC PROPERTIES (p. 6-16)

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The paper reports the newly developed technology of sour-milk desserts that uses the consortia of lactobacilli – Acidophilus, S. Thermophilus, and bifidobacteria – B. Bifidum, B. Longum, B. Adolescentis, resistant to the effects of inhibitors – gastric juice, bile, phenol, sodium chloride, antibiotics, and lactic acid.

To better develop the bifidobacteria, bio-stimulants were applied. The number of viable cells of bifidobacteria during 6 hours of fermentation in the presence of fructose increases from $1 \cdot 10^4$ CFU/cm^3 up to $8.8 \cdot 10^9$ CFU/cm^3, of lactulose – to $9.9 \cdot 10^8$ CFU/cm^3.

To obtain a structure resistant to delamination, with a glossy surface, the modified starch was used. The dynamic viscosity of experimental samples is $25 \cdot 10^{-3}$ PA·s, the number of viable cells of bifidobacteria is $2{,}5 \cdot 10^{10}$ CFU/cm^3.

Pasteurization at a temperature of (90±2) °C at a 2-minute aging warrants the safety of a milk mixture.

The formulation and technology for dessert fermented products with a fruit-berry dressing have been developed. The obtained product clots are dense, their consistency is homogeneous, gentle, gel-like, moderately thick. The taste is pure, pleasant, with a color, flavor, and smell of the fruit-berry filler.

After 10 days of storage, the number of viable cells of bifidobacteria is $1.5 \cdot 10^{10}$ CFU/cm^3, after 15 days –$9.5 \cdot 10^9$ CFU/cm^3, which significantly exceeds the standard required level of bifidobacteria in fermented milk products. The optimal shelf life of dessert products at a temperature of (3±1) °C without a change in the rheological properties is 15 days.

The use of lactic acid bacteria with bifidogenic properties extends the range of products capable to normalize the imbalance of intestinal microflora in humans and to stimulate own intestinal microflora.

Keywords: prebiotics, probiotics, bifidobacteria, lactobacilli, fruit-berry dressing, thickeners, fermented sour-milk desserts.

References

1. Roberfroid, M. B. (2002). Global view on functional foods: European perspectives. British Journal of Nutrition, 88 (S2), S133–S138. doi: https://doi.org/10.1079/bjn2002677
2. Roberfroid, M. B. (2000). Prebiotics and probiotics: are they functional foods? The American Journal of Clinical Nutrition, 71 (6), 1682S–1687S. doi: https://doi.org/10.1093/ajcn/71.6.1682s
3. Rolfe, R. D. (2000). The Role of Probiotic Cultures in the Control of Gastrointestinal Health. The Journal of Nutrition, 130 (2), 369S–402S. doi: https://doi.org/10.1093/jn/130.2.396s
4. Shah, N. P. (2000). Probiotic Bacteria: Selective Enumeration and Survival in Dairy Foods. Journal of Dairy Science, 83 (4), 894–907. doi: https://doi.org/10.3168/jds.s0022-0302(00)74953-8
5. Sanders, M. E. (2000). Considerations for Use of Probiotic Bacteria to Modulate Human Health. The Journal of Nutrition, 130 (2), 384S–390S. doi: https://doi.org/10.1093/jn/130.2.384s
6. Botina, S. G. (2008). Shtammy Streptococcus thermophilus, fermentuyushchie galaktozu. Molochnaya promyshlennost', 4, 54–56.
7. Richardson, D. P. (2002). Functional Food and Health Claims. The world of Functional ingredients, 9, 12–20.
8. Schrezenmeir, J., de Vrese, M. (2001). Probiotics, prebiotics, and synbiotics – approaching a definition. The American Journal of Clinical Nutrition, 73 (2), 361s–364s. doi: https://doi.org/10.1093/ajcn/73.2.361s
9. Smirnov, V. V., Kovalenko, N. K., Podgoriy, V. S., Sorokulova, I. B. (2002). Probiotiki na osnove zhivyh kul'tur. Mikrob. zhurn., 64 (4), 62–80.
10. Kailasapathy, K., Chin, J. (2000). Survival and therapeutic potential of probiotic organisms with reference to Lactobacillus acidophilus and Bifidobacterium spp. Immunology and Cell Biology, 78 (1), 80–88. doi: https://doi.org/10.1046/j.1440-1711.2000.00886.x
11. Tanashchuk, S. V., Savchenko, O. A., Podosinnikov, A. R. (2005). Osnovnye harakteristiki laktulozy, kak funkcional'nogo ingredienta. Molochnoe Delo, 9, 38–39.
12. Yaroshchuk, O. A., Ovcharova, G. P., Donchenko, L. V. (2007). Fruktovye deserty s pektinom na osnove molochnoy syvorotki. Pererabotka moloka, 12, 14–15.
13. Semenihina, V. F., Rozhkova, I. V., Begunova, A. V. (2009). Tekhnologicheskie aspekty ispol'zovaniya bifidobakteriy pri proizvodstve kislomolochnyh produktov. Molochnaya promyshlennost', 12, 9–11.
14. Hramcov, A. G., Sadovoy, V. V., Samylina, V. A. et. al. (2005). Kompleksnaya sistema prebioticheski-sorbcionnoy napravlennosti. Izvestiya vysshih uchebnyh zavedeniy. Pishchevaya tekhnologiya, 4, 40–42.
15. Didukh, N. A., Mohylianska, N. O., Vlasenko, O. V. (2009). Symbiotychnyi kompleks dlia vyrobnytstva atsydofilnykh kyslomolochnykh produktiv z pidvyshchenymy funktsionalnymy vlastyvostiamy. Naukovi pratsi Odesskoi natsionalnoi akademiyi kharchovykh tekhnolohiy, 2 (36), 129–133.
16. Nasledova, L. F. (2009). Eshche raz o laktuloze. Molochnaya promyshlennost', 9, 68–69.
17. Hramcov, A. G., Evdokimov, I. A., Ryabceva, S. A., Kozhevnikova, O. N. (2009). Tekhnologicheskaya platforma otechestvennogo prebiotika laktulozy. Molochnaya promyshlennost', 12, 53–56.
18. Polyanskiy, K. K., Glagoleva, V. E., Ryahovskiy, Yu. V. (2001). Pishchevye volokna v molochnih produktah. Molochnaya promyshlennost', 6, 41.
19. Stankevych, H. M., Didukh, H. V. (2009). Optymizatsiya parametriv homohenizatsiyi molochno-zhyrovykh sumishei dlia herodietychnykh napoiv. Kharchova nauka i tekhnolohiya, 2, 69–71.

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DEVELOPMENT OF THE PLANT FOR LOW-TEMPERATURE TREATMENT OF MEAT PRODUCTS USING IR-RADIATION (p. 17-22)

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The daily increasing demand for meat products with original taste properties causes the need to improve processing of meat raw material. This applies not only to the technology of preparation of raw material, for example its preliminary keeping in various marinades and spices. It is the equipment for manufacturing crust-free meat products that is of great importance.

The proposed innovative solution for the development of the plant for low-temperature treatment of meat products by infrared radiation has some design and technological features. Mobility and portability are ensured thanks to easy movement in space. The use of a flexible film resistive electric heater of the radiative type ensures an even distribution of the heat flow and makes it possible to repeat the internal geometry of the operating chamber of the plant. The designed equipment is capable to operate in a sparing low-temperature treatment mode (63...85 °C) with simplified automation of the technological process. The feature of the plant is the ability to use secondary heat coming from the working space of the plant, by absorbing it by the absorbing screen. Its further transformation by conductive heat exchange between the absorbing screen and Peltier elements provides two structural advantages at the same time. Firstly, there occurs low-voltage of supply, which is used for the operation of exhaust fans. It was established that this voltage is formed when the temperature of a meat product reaches the range of 30...35 °C. Secondly, the internal technical space cools down because the temperature of the outer surface of Peltier elements is 10...15 °C. Thus, there is no need for thermal insulation of the plant.

It was found that for tender pork, the treatment temperature is 53...80 °C with the duration of 5.0...8.0 hours; 55...80 °C with the duration of 5.0...9.5 hours for tough pork; 65 ...80 °C with the duration of 4.5...6.0 hours for poultry; 55...80 °C with the duration of 5.0...8.0 hours for tender beef; respectively, 58...83 °C with the duration of 5.0...10.0 hours for tough beef. Degustation results prove the original organoleptic properties and the effectiveness of using the plant.

Keywords: meat semi-finished products, low temperature, IR-radiation, mobility, portability.

References

1. Prodovol'stvennyy prognoz (2018). Prodovol'stvennaya i sel'skohozyaystvennaya organizaciya Ob'edinennyh Naciy. Available at: http://www.fao.org/3/CA0910RU/ca0910ru.pdf
2. Pankova, N. V. (Ed.) (2012). Innovacionnye tekhnologii v oblasti pishchevyh produktov i produkcii obshchestvennogo pitaniya funkcional'nogo i specializirovannogo naznacheniya. Sankt-Peterburg: Izd-vo «LEMA», 314.
3. Mostenska, T. (2009). Stan ta perspektyvy rozvytku rynku prodovolchykh tovariv v Ukraini. Kharchova i pererobna promyslovist, 1, 8–12.
4. Vlasenko, N. S. (Ed.) (2013). Balansy ta spozhyvannia osnovnykh produktiv kharchuvannia naselenniam Ukrainy. Kyiv: Derzhavna sluzhba statystyky Ukrainy, 56.
5. Kanokruangrong, S., Birch, J., El-Din Ahmed Bekhit, A. (2019). Processing Effects on Meat Flavor. Encyclopedia of Food Chemistry, 302–308. doi: https://doi.org/10.1016/b978-0-08-100596-5.21861-1
6. Dominguez-Hernandez, E., Salaseviciene, A., Ertbjerg, P. (2018). Low-temperature long-time cooking of meat: Eating quality and underlying mechanisms. Meat Science, 143, 104–113. doi: https://doi.org/10.1016/j.meatsci.2018.04.032
7. Savinok, O., Kuzelov, A. (2015). Influence of ways of cooling on functional properties of pork. Scientific Works of University of Food Technologies, LXII, 149–152.
8. Onyshchenko, V. M., Hrynchenko, N. H., Bolshakov, V. A. (2015). Improvement of frozen poultry storage technology. Eastern-European Journal of Enterprise Technologies, 6 (10 (78)), 37–41. doi: https://doi.org/10.15587/1729-4061.2015.54656
9. Yancheva, M., Dromenko, O., Potapov, V., Grinchenko, O., Zhelieva, T. (2018). Development of a physical-mathematical model for the process of crystallization of meat systems. Eastern-European Journal of Enterprise Technologies, 1 (11 (91)), 50–55. doi: https://doi.org/10.15587/1729-4061.2018.120793
10. Roascio-Albistur, A., Gámbaro, A. (2018). Consumer perception of a non-traditional market on sous-vide dishes. International Journal of Gastronomy and Food Science, 11, 20–24. doi: https://doi.org/10.1016/j.ijgfs.2017.10.002
11. Jeong, K., O, H., Shin, S. Y., Kim, Y.-S. (2018). Effects of sous-vide method at different temperatures, times and vacuum degrees on the quality, structural, and microbiological properties of pork ham. Meat Science, 143, 1–7. doi: https://doi.org/10.1016/j.meatsci.2018.04.010
12. Innovacionnye tekhnologii v proizvodstve kulinarnoy produkcii (2014). Sankt-Peterburg, 80.
13. Zonin, V. G. (2006). Sovremennoe proizvodstvo kolbasnyh i solenokopchenyh izdeliy. Sankt-Peterburg: Professiya, 224.
14. Pech' tomleniya, goryachego i holodnogo kopcheniya, hraneniya. Available at: http://www.istoma.com
15. Verboloz, E. I., Romanchikov, S. A. (2017). Features of the low-temperature heat treatment of meat products in a combi steamer with the imposition of ultrasonic vibrations. Proceedings of the Voronezh State University of Engineering Technologies, 79 (3), 35–41. doi: https://doi.org/10.20914/2310-1202-2017-3-35-41
16. Zahorulko, O. Ye., Zahorulko, A. M. (2016). Pat. No. 108041 UA. Hnuchkyi plivkovyi rezystyvnyi elektronahrivach vyprominiuiuchoho typu. No. u201600827; declareted: 02.02.2016; published: 24.06.2016, Bul. No. 12. Available at: http://uapatents.com/5-108041-gnuchkijj-plivkovijj-rezistivnijj-elektronagrivach-viprominyuyuchogo-tipu.html
17. Kiptelaya, L., Zahorulko, A., Zagorulko, A., Liashenko, B. (2017). Improvement of IR emitter to create non-reflector dryer for plant raw materials. Technology Audit and Production Reserves, 2 (3 (34)), 17–22. doi: https://doi.org/10.15587/2312-8372.2017.98068
18. Liao, M., He, Z., Jiang, C., Fan, X., Li, Y., Qi, F. (2018). A three-dimensional model for thermoelectric generator and the influence of Peltier effect on the performance and heat transfer. Applied Thermal Engineering, 133, 493–500. doi: https://doi.org/10.1016/j.applthermaleng.2018.01.080

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DETERMINING THE INFLUENCE OF THE COMPOSITION OF MILK FROM COWS OF DIFFERENT BREEDS ON QUALITY INDICATORS FOR THE DUTCH-TYPE CHEESE (p. 23-33)

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The paper reports a comprehensive study into the impact of feeding rations and breed of cows on the technological properties of milk and quality characteristics of the Dutch type of cheese. Despite the abundance of information on the relationship between domestic animal feeding and technological parameters for the production of cheeses, a possible relationship between particular properties of animal breeds, changes in feed, and a positive influence on the quality of products requires in-depth research. That explains the relevance of studying the influence of an animal breed and the optimization of animal feed on a set of technological parameters and quality indicators for the Dutch type of cheeses. We manufactured the Dutch-type cheese in a series of experiments using milk from cows of different breeds, obtained at different rations of feeding. We compared the chemical composition of milk from three groups of cows – the Ukrainian brown dairy breed, Lebedinskaya breed, and Simmental breed, at different feed. The results obtained demonstrate that the use of alfalfa haylage contributes to an increase in the mass share of a dry fat-free milk residue in milk, improves its suitability for cheese, as compared with milk obtained over a silage-hay period.

We have worked out technological modes for producing the hard Dutch-type cheese from milk of three cow breeds at different feeding rations. It is shown that when applying alfalfa haylage to feed animals the duration of basic technological operations shortens. That helps reduce the share of dry substances (including fat) in whey, and increases the output of finished product. The samples of hard Dutch-type cheese, made from milk of all three groups of animals over a haylage-hay period are characterized by a high content of essential amino acids, as well as free amino acids, and soluble non-protein nitrogen. That predetermined their higher degree of ripeness, and the larger point-based assessment, in terms of organoleptic characteristics (by 7–15 points), compared to the samples of cheese produced from milk received over a silage-hay period. The highest point-based estimate for organoleptic characteristics (99 points) was given to samples of the Dutch-type cheese made from milk of the Ukrainian brown dairy cow, milked over a haylage-hay period.

It was established that an animal breed has a significant impact on the suitability of milk for cheese and yield of the finished product. The most significant influence of the optimized feeding was exerted on the organoleptic and sensorial indicators for a Dutch-type cheese. The proof are the indicators for proteolytic activity. There was an increase in the growth of nitrogen within soluble fractions, an accelerated maturation process, as evidenced by the accumulation of low-molecular nitrogenous fractions. The largest total amount of free amino acids was demonstrated by cheese made from milk of the cows that were fed the improved ration using alfalfa haylage.

The developed feeding rations, as well as the improved technological parameters for making a Dutch-type cheese, could be recommended as the cost and product quality management methods for producing mass-market and craft cheese.

Keywords: Dutch-type cheese, amino acid composition, suitability of milk for making cheese, alfalfa haylage, optimization of feed.

References

1. Bergamaschi, M., Cipolat-Gotet, C., Stocco, G., Valorz, C., Bazzoli, I., Sturaro, E. et. al. (2016). Cheesemaking in highland pastures: Milk technological properties, cream, cheese and ricotta yields, milk nutrients recovery, and products composition. Journal of Dairy Science, 99 (12), 9631–9646. doi: https://doi.org/10.3168/jds.2016-11199
2. Bohdanov, H. O., Kandyba, V. M. (2012). Normy i ratsiony hodivli vysokoproduktyvnoi velykoi rohatoi khudoby. Kyiv: Ahrarna nauka, 296.
3. Hnoievyi, V. I., Holovko, V. O., Trishyn, O. K., Hnoievyi, I. V. (2009). Hodivlia vysokoproduktyvnykh koriv. Kharkiv: Prapor, 368.
4. Eremeev, M. I. (2006). Zavisimost' kachestvennyh pokazateley moloka i molochnyh produktov ot genotipa korov. Hranenie i pererabotka sel'hozsyr'ya, 8, 36–38.
5. Ibatullin, I. I., Melnychuk, D. O., Bohdanov, H. O. et. al. (2007). Hodivlia silskohospodarskykh tvaryn. Vinnytsia: Nova Knyha, 616.
6. Chahorovskyi, O. P., Tkachenko, N. A., Lysohor, T. A. (2013). Khimiya molochnoi syrovyny. Odessa: Simeks-Print, 268.
7. Tacoma, R., Fields, J., Ebenstein, D. B., Lam, Y.-W., Greenwood, S. L. (2016). Characterization of the bovine milk proteome in early-lactation Holstein and Jersey breeds of dairy cows. Journal of Proteomics, 130, 200–210. doi: https://doi.org/10.1016/j.jprot.2015.09.024
8. Visentin, G., De Marchi, M., Berry, D. P., McDermott, A., Fenelon, M. A., Penasa, M., McParland, S. (2017). Factors associated with milk processing characteristics predicted by mid-infrared spectroscopy in a large database of dairy cows. Journal of Dairy Science, 100 (4), 3293–3304. doi: https://doi.org/10.3168/jds.2016-12028
9. De Marchi, M., Bittante, G., Dal Zotto, R., Dalvit, C., Cassandro, M. (2008). Effect of Holstein Friesian and Brown Swiss Breeds on Quality of Milk and Cheese. Journal of Dairy Science, 91 (10), 4092–4102. doi: https://doi.org/10.3168/jds.2007-0788
10. Wedholm, A., Larsen, L. B., Lindmark-Månsson, H., Karlsson, A. H., Andrén, A. (2006). Effect of Protein Composition on the Cheese-Making Properties of Milk from Individual Dairy Cows. Journal of Dairy Science, 89 (9), 3296–3305. doi: https://doi.org/10.3168/jds.s0022-0302(06)72366-9
11. Benedet, A., Manuelian, C. L., Penasa, M., Cassandro, M., Righi, F., Sternieri, M. et. al. (2018). Factors associated with herd bulk milk composition and technological traits in the Italian dairy industry. Journal of Dairy Science, 101 (2), 934–943. doi: https://doi.org/10.3168/jds.2017-12717
12. Abeykoon, C. D., Rathnayake, R. M. C., Johansson, M., Silva, G. L. L. P., Ranadheera, C. S., Lundh, Å., Vidanarachchi, J. K. (2016). Milk Coagulation Properties and Milk Protein Genetic Variants of Three Cattle Breeds/Types in Sri Lanka. Procedia Food Science, 6, 348–351. doi: https://doi.org/10.1016/j.profoo.2016.02.070
13. Malchiodi, F., Cecchinato, A., Penasa, M., Cipolat-Gotet, C., Bittante, G. (2014). Milk quality, coagulation properties, and curd firmness modeling of purebred Holsteins and first- and second-generation crossbred cows from Swedish Red, Montbéliarde, and

Brown Swiss bulls. Journal of Dairy Science, 97 (7), 4530–4541. doi: https://doi.org/10.3168/jds.2013-7868
14. Tsioulpas, A., Lewis, M. J., Grandison, A. S. (2007). Effect of Minerals on Casein Micelle Stability of Cows' Milk. Journal of Dairy Research, 74 (02), 167. doi: https://doi.org/10.1017/s0022029906002330
15. Visentin, G., McParland, S., De Marchi, M., McDermott, A., Fenelon, M. A., Penasa, M., Berry, D. P. (2017). Processing characteristics of dairy cow milk are moderately heritable. Journal of Dairy Science, 100 (8), 6343–6355. doi: https://doi.org/10.3168/jds.2017-12642
16. Prykhodko, M. F. (2009). Otsinka produktyvnosti ta tekhnolohichnykh vlastyvostei moloka novostvorenykh porid i typiv khudoby pivnichno-skhidnoho rehionu Ukrainy. Kherson, 22.
17. Toporova, L. V. (2007). Teoriya i praktika kormleniya vysokoproduktivnyh korov v period laktacii. Kormlenie sel'skohozyaystvennyh zhivotnyh i kormoproizvodstvo, 9, 34–43.
18. Ovcharenko, V. M., Ladyka, V. I. (1999). Syroprydatnist moloka ta yakist syru v zalezhnosti vid henotypu koriv. Visnyk Sumskoho DAU, 3, 70–73.
19. Provatorov, H. V., Ladyka, V. I., Bondarchuk, L. V. (2007). Normy hodivli, ratsiony i pozhyvnist kormiv dlia riznykh vydiv silskohospodarskykh tvaryn. Sumy, TOV «VTD «Universytetska knyha», 488.
20. Kuznecov, A., Kuznecov, S. (2010). Soderzhanie zhira i belka v moloke korov. Kombikorma, 7, 61–64.
21. Yeresko, H. O., Zhukova, Ya. F., Nasyrova, H. F. (2005). Zalezhnist vykhodu tverdykh sychuzhnykh syriv vid yakosti molochnoi syrovyny. Molochna promyslovist, 10 (25), 30–31.
22. Mazzei, P., Piccolo, A. (2012). 1H HRMAS-NMR metabolomic to assess quality and traceability of mozzarella cheese from Campania buffalo milk. Food Chemistry, 132 (3), 1620–1627. doi: https://doi.org/10.1016/j.foodchem.2011.11.142
23. Gaucheron, F. (2005). The minerals of milk. Reproduction Nutrition Development, 45 (4), 473–483. doi: https://doi.org/10.1051/rnd:2005030
24. Gorbatova, K. K. (2010). Biohimiya moloka i molochnyh produktov. Sankt-Peterburg: GIORD, 314.
25. Qi, P. X. (2007). Studies of casein micelle structure: the past and the present. Le Lait, 87 (4-5), 363–383. doi: https://doi.org/10.1051/lait:2007026
26. El'chaninov, V. V. (2008). Nomenklatura i biohimicheskie svoystva kazeinov korov'ego moloka. Syrodelie i maslodelie, 3, 53–55.
27. Gorbatova, K. K. (2003). Syroprigodnost' moloka. Pererabotka moloka, 5, 4–5.
28. Perfil'ev, G. D., Sviridenko, Yu. Ya. (2005). Syroprigodnost' moloka. Nauchnye i prakticheskie aspekty. Molochnoe delo, 1, 9–11.
29. Phadungath, C. (2005). The mechanism and properties of acid-coagulated milk gels. Songklanakarin Journal of Science and Technology, 27 (2), 433–448.
30. Savel'ev, A. A., Sorokin, M. Yu., Shneyder, L. K., Kryshin, A. T. (2002). Nekotorye aspekty povysheniya kachestva i vyhoda syra. Syrodelie i maslodelie, 1, 15–17.
31. Holt, C. (2004). An equilibrium thermodynamic model of the sequestration of calcium phosphate by casein micelles and its application to the calculation of the partition of salts in milk. European Biophysics Journal, 33 (5). doi: https://doi.org/10.1007/s00249-003-0377-9
32. Skott, R., Robinson, R., Uilbi, R. (2005). Proizvodstvo syra. Syr'e, tekhnologii, recepturi: nauchnye osnovy i tekhnologii. Sankt-Peterburg: Professiya, 460.
33. De Kort, E., Minor, M., Snoeren, T., van Hooijdonk, T., van der Linden, E. (2011). Effect of calcium chelators on physical changes in casein micelles in concentrated micellar casein solutions. International Dairy Journal, 21 (12), 907–913. doi: https://doi.org/10.1016/j.idairyj.2011.06.007
34. Tkahcenko, N. A., Nekrasov, P. O., Vikul, S. I. (2016). Optimization of formulation composition of health whey-based beverage. Eastern-European Journal of Enterprise Technologies, 1 (10 (79)), 49–57. doi: https://doi.org/10.15587/1729-4061.2016.59695
35. Didukh, N. A., Chaharovskyi, O. P., Lysohor, T. A. (2008). Zakvashuvalni kompozytsiyi dlia vyrobnytstva molochnykh produktiv funktsionalnoho pryznachennia. Odessa: Polihraf, 236.
36. Cipolat-Gotet, C., Cecchinato, A., Drake, M. A., Marangon, A., Martin, B., Bittante, G. (2018). From cow to cheese: Novel phenotypes related to the sensory profile of model cheeses from individual cows. Journal of Dairy Science, 101 (7), 5865–5877. doi: https://doi.org/10.3168/jds.2017-14342
37. Artamonova, M. V., Samokhvalova, O. V., Hrevtseva, N. V., Stepankova, H. V., Tuz, N. F. (2014). Zahalni tekhnolohiyi kharchovoi promyslovosti. Kharkiv, 190.

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PRESERVATION OF PARSNIP ROOT VEGETABLE DEPENDING ON THE DEGREE OF RIPENESS, VARIETAL FEATURES, AND STORAGE TECHNIQUES (p. 34-41)

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The degree of ripening of vegetables, fruits and berries affects their preservation. It is not possible to detect the degree of ripening of parsnip by the size of a root crop, since growing conditions and agricultural technology play significant role in this case. It is

difficult to distinguish taste and texture of parsnips with a growing season from 120 to 180 days. Therefore, the influence of the degree of ripening on the preservation quality of parsnip root crops is of great practical interest.

We substantiated theoretically and confirmed experimentally the smallest mass loss (5.0–6.7 %) and the highest preservation quality (93.3–90.3 %) in parsnips with a growing season of 150 days. Within the growing season of 140–175 days, growing season duration affects preservation of parsnip root crops by 21.0 % more, characteristics of a variety – only by 1.1 %, the interaction of the studied factors – by 68 %, other factors (weather conditions, growing technology) – by 9.9 %.

We found that diseases affected unwashed root crops stored in open boxes by 0.7 % more than washed ones. Storing of washed root crops in plastic bags increased their proneness to diseases by almost 3.5 times than unwashed ones. Dry substances accumulated from 24.1 % in root crops of parsnip (in the Petrik variety) to 27.7 % (in the Student variety). We noticed the high content of dry substances in the Boris variety – 25.8 %. The Petrik variety contained 1.2 % of monosaccharides, 3.7 % of sucrose, and 5.0 % of total sugars. The total sugar content in the Boris variety of 5.4 % was at the level of control. The largest total amount of sugars was contained in the roots for the Student variety – 5.7 %. We established that the lowest content of vitamin C in root crops was in the Petrik variety – 9.9 mg/100 g, the content of vitamin C was 10.1 and 10.2 mg/100 g in the Boris and Student varieties, respectively. The nitrate content in parsnip roots was low for the Student variety – 60 mg/kg, and it was the highest for the Boris variety – 100 mg/kg.

We established that the mass loss of parsnip root crops depends on storage conditions by 33 %, peculiarities of a variety affects only 1 %, an influence of the interaction of factors (storage conditions, peculiarities of a variety) – by 64 %, other factors – 2 %. The use of a polyethylene film for packaging reduces the mass loss of root crops of the Petrik variety parsnip by 2.1–4.7 times, the Student variety by 1.9–3.7 times, the Boris variety – by 2.3–3.1 times comparing to the storage of root crops in open boxes.

Keywords: parsnip root crops, ripening degree, duration of growing season, storage methods, preservation.

References

1. Koltunov, V. A. (2007). Upravlinnia yakistiu ovochevykh koreneplodiv. Kyiv: KNTEU, 252.
2. Sharma, K., Lee, Y. R. (2015). Effect of different storage temperature on chemical composition of onion (Allium cepa L.) and its enzymes. Journal of Food Science and Technology, 53 (3), 1620–1632. doi: https://doi.org/10.1007/s13197-015-2076-9
3. Sargent, S. A., Moretti, C. L.; Gross, K. C., Wang, C. Y., Saltveit, M. (Eds.) (2007). Tomato. Agricultural handbook number 66: The commercial storage of fruits, vegetables, and florist and nursery stocks. Washington.
4. Passam, H. C., Karapanos, I. C., Bebeli, P. J., Savvas, D. (2007). A review of recent research on tomato nutrition, breeding and post-harvest technology with reference to fruit quality. The European journal of plant science and biotechnology, 1, 1–21.
5. Koltunov, V. A., Puzik, L. M. (2007). Porivnialna otsinka sposobiv zberihannia plodiv kabachka. Ovochivnytstvo i bashtannytstvo, 53, 354.
6. Koltunov, V. A., Puzik, L. M., Vakulenko, L. M. (2006). Vplyv rozmiru ploda na zberezhenist kabachkiv, dyni, ohirkiv. Sbornik nauchnyh rabot Krymskogo gosudarstvennogo agrarnogo universiteta, 93, 56–60.
7. Zhang, J., Wang, X., Yu, O., Tang, J., Gu, X., Wan, X., Fang, C. (2010). Metabolic profiling of strawberry (Fragaria×ananassa Duch.) during fruit development and maturation. Journal of Experimental Botany, 62 (3), 1103–1118. doi: https://doi.org/10.1093/jxb/erq343
8. Voča, S., Dobričević, N., Dragović-Uzelac, V. et. al. (2008). Fruit Quality of New Early Ripening Strawberry Cultivars in Croatia. Food Technology & Biotechnology, 46 (3), 292–298.
9. Moing, A., Renaud, C., Gaudillère, M. et. al. (2001). Biochemical changes during fruit development of four strawberry cultivars. Journal of the American Society for Horticultural Science, 126 (4), 394–403.
10. Barnuud, N. N., Zerihun, A., Gibberd, M., Bates, B. (2013). Berry composition and climate: responses and empirical models. International Journal of Biometeorology, 58 (6), 1207–1223. doi: https://doi.org/10.1007/s00484-013-0715-2
11. Osokina, N. M., Kostetska, K. V. (2009). Vtraty plodovykh ovochiv pry zberihanni. Materialy tez mizhnarodnoi naukovo-praktychnoi konferentsiyi "Innovatsiyni ahrotekhnolohiyi v umovakh hlobalnoho poteplinnia". Melitopol, 177–179.
12. Rahman, M. M., Moniruzzaman, M., Ahmad, M. R., Sarker, B. C., Khurshid Alam, M. (2016). Maturity stages affect the postharvest quality and shelf-life of fruits of strawberry genotypes growing in subtropical regions. Journal of the Saudi Society of Agricultural Sciences, 15 (1), 28–37. doi: https://doi.org/10.1016/j.jssas.2014.05.002
13. Kader, A. A. (1999). Future research needs in postharvest biology and technology of fruits. Acta Horticulturae, 485, 209–214. doi: https://doi.org/10.17660/actahortic.1999.485.28
14. Koltunov, V. A. (2004). Yakist plodoovochevoi produktsiyi ta tekhnolohiya yii zberihannia. Ch. I. Yakist i zberezhenist kartopli ta ovochiv. Kyiv, 583.
15. Koltunov, V., Bielinska, Ye. (2010). Obhruntuvannia efektyvnosti zberezhenosti redysu metodom Kharrinhtona. Tovary i rynky, 2, 62–68. Available at: http://tr.knteu.kiev.ua/files/2010/10/12.pdf
16. Zherdetskyi, I. K. (2010). Osoblyvosti zberihannia matochnykh koreneplodiv. Propozytsiya, 11, 82–84.
17. Zavadska, O. V., Bobos, I. M., Diadenko, T. V. (2013). Prydatnist koreneplodiv morkvy (Daucus carota L.) riznykh sortiv dlia pererobky. Sortovyvchennia ta sortoznavstvo, 1, 51–54. Available at: https://www.researchgate.net
18. Albert, S. Vegetable harvest times. Available at: https://harvesttotable.com/vegetable_harvest_times/
19. Sych, Z. D., Fedosiy, I. O., Podpriatov, H. I. (2010). Pisliazbyralni tekhnolohiyi dorobky ovochiv dlia lohistyky i marketynhu. Kyiv, 440.
20. Ahatov, A. K. (2013). Bolezni i vrediteli ovoshchnyh kul'tur i kartofelya. Moscow, 463.
21. Koltunov, V. A. (2002). Tekhnolohiya zberihannia prodovolchykh tovariv. Kyiv, 340.
22. Castro, A., Bergenståhl, B., Tornberg, E. (2012). Parsnip (Pastinaca sativa L.): Dietary fibre composition and physicochemical characterization of its homogenized suspensions. Food Research International, 48 (2), 598–608. doi: https://doi.org/10.1016/j.foodres.2012.05.023
23. Manosa, N. A. Influence of temperature on Yied and Guality of carrots (Daucus carota var. sativa). Available at: http://scholar.ufs.ac.za:8080/xmlui/bitstream/handle/11660/1299/ManosaNA.pdf;sequence=1
24. Rubatzky, V. E., Quiros, C. F., Simon, P. W. (1999). Carrots and related vegetable umbelliferae. USDA-ARS, University of Wisconsin, USA. CABI, 294.
25. Andryushko, A. et. al. (2006). Sovremennye metody hraneniya i posleuborochnoy dorabotki plodoovoshchnoy produkcii. Kyiv, 90.

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STUDYING THE POSSIBILITY OF USING ENZYMES, LECITHIN, AND ALBUMEN IN THE TECHNOLOGY OF GLUTEN-FREE BREAD (p. 42-51)

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The comprehensive approach to the technology of bread for people suffering from celiac disease by applying amylolytic enzymes, lecithin, and dry egg albumen was scientifically substantiated.

The effect of amylolytic enzymes on sugars accumulation during the hydrolysis of rice flour starch was established. It was proved that the use of enzymes contributes to the formation of mono-and disaccharides in quantity of 5.5–6 %, which are essential for the intensification of microbiological processes in dough. The improvement of gas production in dough during the application of the enzymatic modification of flour starch during fermentation was detected.

With the aim of improving the quality of the dough semi-finished and finished products, the expedience of using surfactants was substantiated. The regularities of the influence of sunflower defatted lecithin on properties of dough and quality characteristics of bread with enzymes were determined. It was established that the introduction of phospholipid into dough using the enzymatic modification of starch flour contributes to the improvement of gas formation in it and causes an increase in specific volume and porosity of finished products.

To ensure the porous structure of the crumb, the additional use of dry egg albumen in the technology of rice bread was proposed. It was established that the preliminary recovery of albumen when making dough with enzymes and lecithin contributes to its better leavening, which provides high quality indicators of the finished products.

It was proved that the use of sunflower defatted lecithin and whipped egg albumens during dough kneading with previously conducted hydrolysis of starch flour by α-amylase and glucoamylase leads to a significant increase in its gas-retaining abilities and contributes to increasing its running. Given the reduction in viscosity of the dough with the addition of selected raw materials, it is recommended to manufacture pan bread.

The influence of application of the enzymatic modification of rice flour starch, lecithin, and egg albumen on the process of gelatinization of water-flour suspensions was studied. The identified regularities make it possible to predict an increase in the shelf life of the finished bread.

Keywords: gluten-free bread, rice flour, α-amylase, glucoamylase, lecithin, egg albumen.

References

1. Elgeti, D., Nordlohne, S. D., Föste, M., Besl, M., Linden, M. H., Heinz, V. et. al. (2014). Volume and texture improvement of gluten-free bread using quinoa white flour. Journal of Cereal Science, 59 (1), 41–47. doi: https://doi.org/10.1016/j.jcs.2013.10.010
2. Laureati, M., Giussani, B., Pagliarini, E. (2012). Sensory and hedonic perception of gluten-free bread: Comparison between celiac and non-celiac subjects. Food Research International, 46 (1), 326–333. doi: https://doi.org/10.1016/j.foodres.2011.12.020
3. Pruska-Kędzior, A., Kędzior, Z., Gorący, M., Pietrowska, K., Przybylska, A., Spychalska, K. (2008). Comparison of rheological, fermentative and baking properties of gluten-free dough formulations. European Food Research and Technology, 227 (5), 1523–1536. doi: https://doi.org/10.1007/s00217-008-0875-1
4. Rémésy, C., Leenhardt, F., Fardet, A. (2015). Donner un nouvel avenir au pain dans le cadre d'une alimentation durable et préventive. Cahiers de Nutrition et de Diététique, 50 (1), 39–46. doi: https://doi.org/10.1016/j.cnd.2014.07.005
5. Perederiy, V. G., Gubskaya, E. Yu. (2013). Celiakiya – samoe chastoe zabolevanie tonkoy kishki. Kak zapodozrit', diagnostirovat' i vylechit'? V voprosah i otvetah gastroenterologa vracham vsekh special'nostey i pacientam. Kyiv: Vistka, 112.
6. Hryshchenko, A. M., Drobot, V. (2014). I. Tekhnolohichni vlastyvosti bezghliutenovykh vydiv syrovyny. Naukovi pratsi Odeskoi natsionalnoi akademiyi kharchovykh tekhnolohiy, 1 (46), 162–166.
7. Renzetti, S., Dal Bello, F., Arendt, E. K. (2008). Microstructure, fundamental rheology and baking characteristics of batters and breads from different gluten-free flours treated with a microbial transglutaminase. Journal of Cereal Science, 48 (1), 33–45. doi: https://doi.org/10.1016/j.jcs.2007.07.011
8. Nunes, M. H. B., Moore, M. M., Ryan, L. A. M., Arendt, E. K. (2008). Impact of emulsifiers on the quality and rheological properties of gluten-free breads and batters. European Food Research and Technology, 228 (4), 633–642. doi: https://doi.org/10.1007/s00217-008-0972-1
9. Kulinich, V. I., Havrysh, A. V., Dotsenko, V. F. (2013). Rysove boroshno – perspektyvna syrovyna dlia bezghliutenovykh produktiv. Naukovi pratsi Odeskoi natsionalnoi akademiyi kharchovykh tekhnolohiy, 1 (44), 175–178.
10. Hatta, E., Matsumoto, K., Honda, Y. (2015). Bacillolysin, papain, and subtilisin improve the quality of gluten-free rice bread. Journal of Cereal Science, 61, 41–47. doi: https://doi.org/10.1016/j.jcs.2014.10.004
11. Hryshchenko, A. M., Udvorheli, L. I., Mykhonik, L. A., Kovalevska, Ye. I. (2010). Doslidzhennia strukturno-mekhanichnykh vlastyvostei bezbilkovoho tista z kamediamy huaru i ksantanu. Kharchova nauka i tekhnolohiya, 1 (10), 63–65.
12. Drobot, V., Mykhonik, L., Gryschenko, A. (2017). The influence of structure forming food additives on the quality of gluten-free bread made from the mixture of rice and corn flour. Scientific Works of National University of Food Technologies, 23 (6), 169–175. doi: https://doi.org/10.24263/2225-2924-2017-23-6-21
13. Mykhonik, L., Gryshchenko, A. (2017). Using rice flour in the production technology of gluten-free bread. Naukovi pratsi Natsionalnoho universytetu kharchovykh tekhnolohiy, 23 (2), 241–247.
14. Kaprel'yanc, L. V. (2009). Ispol'zovanie fermentov v hlebopechenii. Harchova nauka i tekhnologiya, 1 (6), 34–38.
15. Shanina, O. M., Lobachova, N. L., Zvierev, V. O. (2014). Influence of the transglutaminase enzyme on properties of flour proteins. Eastern-European Journal of Enterprise Technologies, 5 (11 (71)), 28–33. doi: https://doi.org/10.15587/1729-4061.2014.27573
16. Kucheruk, Z. I., Tsukanova, O. S. (2014). Vykorystannia polisakharydiv roslynnoho i mikrobnoho pokhodzhennia v tekhnolohiyi bezbilkovoho khliba. Kharkiv: KhDUKhT, 131.

17. Popper, L. (2009). Fermentnaya obrabotka muki. Hleboprodukty, 6, 46–49.
18. Bortnichuk, O. V., Havrysh, A. V., Niemirich, O. V., Dotsenko, V. F. (2015). Innovatsiyni pidkhody v tekhnolohiyi khlibobulochnykh vyrobiv z sukhoiu molochnoiu syrovatkoiu. Journal of Food Science and Technology, 2 (31), 97–102. doi: https://doi.org/10.15673/2073-8684.31/2015.44282
19. Polodiuk, V. S., Arsenieva, L. Yu., Dotsenko, V. F. (2004). Efektyvnist vykorystannia letsytynu v khlibopechenni. Naukovi pratsi Natsionalnoho universytetu kharchovykh tekhnolohiy, 15, 35–38.
20. Mel'nik, E. (2009). Primenenie suhih yaichnyh produktov pri proizvodstve muchnyh izdeliy. Hleboprodukty, 1, 52–53.
21. Medvid, I., Shydlovska, O., Dotsenko, V. (2017). Influence of fermentative modification of rice flour starch on bread quality for patients with celiac disease. Ukrainian Food Journal, 6 (4), 632–647. doi: https://doi.org/10.24263/2304-974x-2017-6-4-5
22. Drobot, V. I. (Ed.) (2015). Tekhnokhimichnyi kontrol syrovyny ta khlibobulochnykh i makaronnykh vyrobiv. Kyiv: NUKhT, 902.
23. Hordienko, L. V., Zhydetska, I. V. (2010). Vplyv spivvidnoshennia retsepturnykh komponentiv na reolohichni vlastyvosti emulsiyi dlia pisochnoho tista. Naukovi pratsi Odeskoi natsionalnoi akademiyi kharchovykh tekhnolohiy, 1 (38), 214–217.
24. Dotsenko, V., Miroshnik, Yu., Shydlovska, O., Medvid, I. (2014). Studying possibility of using fruit powders in technology of sponge-cake semi-finished products. Eastern-European Journal of Enterprise Technologies, 3 (10 (69)), 64–69. doi: https://doi.org/10.15587/1729-4061.2014.24885

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EFFECT OF THE CRYOPOWDER "BEET" ON QUALITY INDICATORS OF NEW CURD DESSERTS (p. 52-59)

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Natural plant bio-additives deserve special attention, because due to their natural properties they provide dairy products with functional properties. The use of such additives makes it possible to fill the shortage of essential nutrients, increase non-specific resistance of an organism to the effect of unfavorable environmental factors. A skillful combination of cryopowders and the dairy base are very promising both in technological and social terms.

The technology of curd desserts with varying fat mass fraction using the cryopowder "Beet" was developed. The expedience of using the cryopowder "Beet" in the technology of new sweet curd mass was substantiated. The optimal dose of the cryopowder "Beet" was proposed. The possibility of using the cryopowder "Beet" as a component of health promoting curd desserts was studied. The amount of the specified cryo-additive varies depending on the fat mass fraction of the dairy base. The organoleptic, physical, and chemical and microbiological characteristics were studied in the experimental samples. An analysis of organoleptic characteristics of curd masses with the cryopowder "Beet" shows that they did not have any substantial changes and fully comply with regulatory requirements. Thus, the color of the sweet curd mass was light-beet, raspberry with separate white inclusions of crushed powder-like cryogenic bio-additive. The curd masses retained the smell of fresh sour milk. When introducing the cryopowder "Beet" into the curd mass, the energy value grew.

The revealed changes in the amino acid composition of curd masses indicate that the use of cryopowder "Beet" makes it possible to enhance nutritional and biological value of the protein component. In particular, we established an increase in the total amount of amino acids by 1.73 %; by 1.16 % in the composition of essential amino acids, and by 2.17 % in the composition of non-essential amino acids.

The proposed product expands the domestic range of dairy products for functional purposes.

Keywords: curd mass, cryopowder, amino acids, organoleptic indicators, titrated acidity, health promoting products.

References

1. Gutyj, B., Hachak, Y., Vavrysevych, J., Nagovska, V. (2017). The influence of cryopowder "Garbuz" on the technology of curds of different fat content. Eastern-European Journal of Enterprise Technologies, 2 (10 (86)), 20–24. doi: https://doi.org/10.15587/1729-4061.2017.98194
2. Mazaraky, A. A., Peresichnyi, M. I., Kravchenko, M. F. (2012). Tekhnolohiya produktiv funktsionalnoho pryznachennia. Kyiv, 116.
3. Bilyk, O., Slyvka, N., Gutyj, B., Dronyk, H., Sukhorska, O. (2017). Substantiation of the method of protein extraction from sheep and cow whey for producing the cheese "Urda." Eastern-European Journal of Enterprise Technologies, 3 (11 (87)), 18–22. doi: https://doi.org/10.15587/1729-4061.2017.103548
4. Hachak, Y., Gutyj, B., Bilyk, O., Nagovska, V., Mykhaylytska, O. (2018). Effect of the cryopowder "Amaranth" on the technology of meolten cheese. Eastern-European Journal of Enterprise Technologies, 1 (11 (91)), 10–15. doi: https://doi.org/10.15587/1729-4061.2018.120879
5. Musul'manova, M. M. (2005). Kombinirovannye molochno-rastitel'nye produkty. Molochnaya promyshlennost', 5, 72–73.

6. Boichak, Ya., Koberniuk, V., Petryk, L. (2018). Novi vydy i formy biodobavok v tekhnolohiyi molochnykh produktiv LPN. Dni studentskoi nauky u LNUVM ta BT imeni S. Z. Hzhytskoho: Materialy studentskoi konferentsiyi. Lviv, 79–80.
7. Ilinska, A., Benytska, A., Prystanskyi, R. (2017). Krioporoshky v yakosti biodobavok u molochnykh produktakh LPN. Aktualni zadachi suchasnykh tekhnolohiy 6 zbirnyk tez dopovidei n. t. konferentsiyi molodykh uchenykh ta studentiv. Ternopil, 174–175.
8. Savchenkova, L. V., Akimova, M. S. (2014). Vyvchennia toksychnosti kriopodribnenoho poroshku aroniyi chornoplidnoi. Aspekty rozvytku farmatsevtychnykh ta medychnykh doslidzhen na suchasnomu etapi: materialy IV Vseukrainskoi naukovo-praktychnoi konferentsiyi z mizhnarodnoiu uchastiu. Luhansk, 105.
9. Savchenkova, L. V. Nemiatykh, O. D., Ternynko, I. I., Rokotianska, V. V., Akimova, M. S., Burtseva, O. M., Kuldyrkaieva, Ye. V. (2012). Likarski roslyny yak dzherelo stvorennia novykh likarskykh zasobiv. Luhansk: SPD Rieznik V. S., 64.
10. Nagovska, V., Hachak, Y., Gutyj, B., Bilyk, O., Slyvka, N. (2018). Influence of wheat bran on quality indicators of a sour milk beverage. Eastern-European Journal of Enterprise Technologies, 4 (11 (94)), 28–35. doi: https://doi.org/10.15587/1729-4061.2018.140093
11. Ukrainec, A. I., Rashevskaya, T. A., Vasheka, O. N. (2008). Morfologiya kristallicheskih elementov nanostruktury slivochnogo masla s krioporoshkami rastitel'nymi pishchevymi. Kinetika i mekhanizm kristallizacii. Kristallizaciya dlya nanotekhnologiy, tekhniki i mediciny: V mezhdunar. nauch. konf. Ivanovo, 190.
12. Hoiko, I., Pryshepa, M. (2014). Zastosuvannia kropu, cheremshi, bazyliku u vyrobnytstvi kyslomolochnoho syru. Zbirnyk mizhnarodnoi naukovo-praktychnoi konferentsiyi «Ozdorovchi kharchovi produkty ta dietychni dobavky, tekhnolohiyi, yakist ta bezpeka». Kyiv: NUKhT, 15–16.
13. Syrokhman, I. V., Zahorodnia, V. M. (2009). Tovaroznavstvo produktiv funktsionalnoho pryznachennia. Kyiv, 544.
14. Horyuk, Y. V., Kukhtyn, M. D., Perkiy, Y. B., Horyuk, V. V., Semenyuk, V. I. (2016). Identification of Enterococcus isolated from raw milk and cottage cheese «home» production and study of their sensitivity to antibiotics. Scientific Messenger of LNU of Veterinary Medicine and Biotechnology, 18 (3 (70)), 44–48. doi: https://doi.org/10.15421/nvlvet7011
15. Samilyk, M. (2017). Improving the technology of soft sour milk cheese by increasing biological value. Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies, 19 (80), 33–37. doi: https://doi.org/10.15421/nvlvet8007
16. Turchyn, I., Zalensky, M., Voychishin, A. (2018). Development of technology of cereal past with combined composition. Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies, 20 (85), 24–28. doi: https://doi.org/10.15421/nvlvet8505
17. Hrek, O. V., Skorchenko, T. A. (2012). Tekhnolohiya kombinovanykh produktiv na molochniy osnovi. Kyiv, 362.
18. Yatsenko, I. V., Bohatko, N. M., Bukalova, N. V. et. al. (2016). Hihiena moloka i molochnykh produktiv. Chastyna 2. Hihiena molochnykh produktiv. Kharkiv, 424.
19. Pukivskyy, P., Turchin, V., Slivka, N., Myhaylytska, A. (2015). Use in plant materials technology cheese curd. Naukovyi visnyk Lvivskoho natsionalnoho universytetu veterynarnoi medytsyny ta biotekhnolohiy imeni S. Z. Gzhytskoho, 17 (4), 105–109.
20. Pavliuk, R. Yu., Poharska, V. V., Khomenko, A. V., Kostrova, K. V. (2013). Biotechnology of fermented milk drinks using buttermilk and additives of spicy vegetables. Eastern-European Journal of Enterprise Technologies, 4 (10 (64)), 53–57. Available at: http://journals.uran.ua/eejet/article/view/16315/13838
21. Hachak, Yu. R. (2011). Molochni produkty likuvalno-profilaktychnoho pryznachennia. Lviv, 136.
22. Nahovska, V., Hachak, Y., Myhaylytska, O., Slyvka, N. (2017). Application of wheat brans as a functional ingredient in the technology of kefir. Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies, 19 (80), 52–56. doi: https://doi.org/10.15421/nvlvet8011
23. Goiko, I. Yu. (2016). Creation of fito compositions for production of functional sour-milk cheeses. Problemy stareniya i dolgoletiya, 25 (2), 273–279.
24. Bazhay-Zhezherun, S. A. (2016). Ice cream with stevia extract as gerodietetic product. Problemy stareniya i dolgoletiya, 25 (2), 287–297.
25. Borys, O. M., Tsisaryk, O. Y. (2016). Tekhnolohiya kyslomolochnoho napoiu z synbiotychnymy vlastyvostiamy. Materialy Mizhnarodnoi konferentsiya «Dni studentskoi nauky» u Lvivskomu natsionalnomu universyteti veterynarnoi medytsyny ta biotekhnolohiy imeni S. Z. Hzhytskoho. Lviv, 92–93.
26. Koberniuk, V., Ilinska, A., Hrabarchuk, O. (2018). Novi vydy krioporoshkiv v tekhnolohiyi molochnykh produktiv LPN. Dni studentskoi nauky u LNUVM ta BT imeni S. Z. Hzhytskoho: Materialy studentskoi konferentsiyi. Lviv, 103–104.
27. Lisovska, Yu., Puneiko, O. (2018). Rozrobka retseptur molochnykh produktiv LPN iz krioporoshkom iz moreproduktiv. Dni studentskoi nauky u LNUVM ta BT imeni S. Z. Hzhytskoho: Materialy studentskoi konferentsiyi. Lviv, 110–111.
28. Hachak, Y., Slyvka, N., Gutyj, B., Vavrysevych, J., Sobolev, A., Bushueva, I. et. al. (2019). Investigation of the influence of cryopowders "broccoli" and "laminaria" on quality parameters of cheese masses of different fat. EUREKA: Life Sciences, 1, 28–35. doi: https://doi.org/10.21303/2504-5695.2019.00839
29. Simahina, G. (2011). Biological value and functional activity of sugar beet cryopowders. Tsukor Ukrainy, 6-7.
30. Nagovska, V. O., Hachak, Y. R., Bilyk, O. Y., Gutyj, B. V., Slyvka, N. B., Mikhailytska, O. R. (2018). Influence of thistle grist on organoleptic, physico-chemical and microbiological parameters of kefir. Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies, 20 (85), 166–170. doi: https://doi.org/10.15421/nvlvet8530
31. Kaminarides, S., Nestoratos, K., Massouras, T. (2013). Effect of added milk and cream on the physicochemical, rheological and volatile compounds of Greek whey cheeses. Small Ruminant Research, 113 (2-3), 446–453. doi: https://doi.org/10.1016/j.smallrumres.2013.04.009

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DEVELOPMENT OF FORMULATIONS FOR SPONGE CAKES MADE FROM ORGANIC RAW MATERIALS USING THE PRINCIPLES OF A FOOD PRODUCTS SAFETY MANAGEMENT SYSTEM (p. 60-70)

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To control the safety of sponge cakes made from organic raw materials in line with the HACCP principles, we have developed two sample sponge cakes "Winter delight" and "Exotic". To make the semi-finished sponge cake "Winter delight", we used organic buckwheat flour, organic powdered ginger, organic maple sugar, organic eggs, organic peppermint essence. To make the semi-finished sponge cake "Exotic", we used organic spelt flour, organic hemp flour, organic powdered rosehip, organic coconut sugar, organic eggs, organic lemon-based essence. It was established that the products developed have high organoleptic properties. Among the physical-chemical indicators, we identified moisture content in both products, which was 25±2 % for the semi-finished sponge cake "Winter delight" and 24±2 % for the semi-finished sponge cake "Exotic". The nutrient and caloric value of products was determined. The amount of proteins for the sponge cake "Winter delight" was 14.4 g/100 g, for "Exotic" – 15 g/100 g, the amount of fat – 3.80 and 4.40 g/100 g, the amount of carbohydrates – 50.41 and 55.40 g/100 g, caloric value – 298.84 and 315.80 kcal/100 g, respectively.

The HACCP-based plan for the production of sponge cakes makes it possible to manufacture a safe product: we analyzed dangerous factors at each stage of the production process, it was found that the highest degree of risk is inherent to biological factors that might affect the safety of the finished product. We established 4 critical control points, as well as critical boundaries, and designed a HACCP-based plan. We defined the microbiological and toxicological safety indicators for finished products; they do not exceed permissible limits.

These results indicate that the use of alternative formulations for semi-finished sponge cakes based on organic raw materials taking into consideration the HACCP approaches makes it possible to create safe products with elevated nutritional value. The results obtained could be applied at enterprises in confectionery industry in order to extend the range of organic products. In addition, given the requirement to implement the HACCP system by all operators in the market of foods, the results of developing the HACCP plan could also be utilized by manufacturers.

Keywords: safety management system, organoleptic indicators, physical-chemical, nutritional value, caloric value.

References

1. Kafetzopoulos, D. P., Psomas, E. L., Kafetzopoulos, P. D. (2013). Measuring the effectiveness of the HACCP Food Safety Management System. Food Control, 33 (2), 505–513. doi: https://doi.org/10.1016/j.foodcont.2013.03.044
2. HACCP-based food safety management systems: great in theory but can we really make them work in practice? (2014). Perspectives in Public Health, 134 (4), 188–190. doi: https://doi.org/10.1177/1757913914538735
3. Voica, D. (2009). Bakery yeast Saccharomyces cerevisiae manufacturing based on Good Manufac-turing Practice and Food Safety Principles. Annals. Food Sciens and Technology, 10 (1), 400–403.
4. Belinska, S. E., Orlova, N., Motuzka, Yu. (2011). Kontseptualni zasady harantiy bezpechnosti kharchovykh produktiv. Tovary i rynky, 1, 176–182.
5. Shyrobokova, A. (2010). Food safety management: systemic approach. Standartyzatsiya. Sertyfikatsiya. Yakist, 2, 68–70.
6. Organic confectionery market continues to grow. Available at: https://www.hartman-group.com/files/news/Organic-confectionery-market-continues-to-grow-Candy-Industry.pdf
7. Živělová, I., Crhová, M. (2013). Organic food market in the Czech Republic. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 61 (2), 539–546. doi: https://doi.org/10.11118/actaun201361020539
8. Bryła, P. (2016). Organic food consumption in Poland: Motives and barriers. Appetite, 105, 737–746. doi: https://doi.org/10.1016/j.appet.2016.07.012
9. Tkachenko, A., Birta, G., Burgu, Y., Floka, L., Kalashnik, O. (2018). Substantiation of the development of formulations for organic cupcakes with an elevated protein content. Eastern-European Journal of Enterprise Technologies, 3 (11 (93)), 51–58. doi: https://doi.org/10.15587/1729-4061.2018.133705
10. Bourn, D., Prescott, J. (2002). A Comparison of the Nutritional Value, Sensory Qualities, and Food Safety of Organically and Conventionally Produced Foods. Critical Reviews in Food Science and Nutrition, 42 (1), 1–34. doi: https://doi.org/10.1080/10408690290825439
11. Worthington, V. (2001). Nutritional Quality of Organic Versus Conventional Fruits, Vegetables, and Grains. The Journal of Alternative and Complementary Medicine, 7 (2), 161–173. doi: https://doi.org/10.1089/107555301750164244
12. Johannessen, G. S., Froseth, R. B., Solemdal, L., Jarp, J., Wasteson, Y., Rorvik, M. L. (2004). Influence of bovine manure as fertilizer on the bacteriological quality of organic Iceberg lettuce. Journal of Applied Microbiology, 96 (4), 787–794. doi: https://doi.org/10.1111/j.1365-2672.2004.02208.x
13. Halagarda, M. (2008). New Food Product Development. Polish Journal of Commodity Science, 4 (17), 32–41.
14. Ackah, N. B., Baidoo, E. A., Appiah, A. H. K. (2018). Validating a HACCP System for the Production of Vegetable Shito. Journal of Food Quality, 2018, 1–7. doi: https://doi.org/10.1155/2018/7146040
15. Easdani, M., Khaliduzzaman, Bhuiyan, M. (2013). The Design of HACCP Plan for Potato Chips Plant in Bangladesh. Journal of Environmental Science and Natural Resources, 5(2), 329–338. doi: https://doi.org/10.3329/jesnr.v5i2.14839
16. Lu, J., Pua, X.-H., Liu, C.-T., Chang, C.-L., Cheng, K.-C. (2014). The implementation of HACCP management system in a chocolate ice cream plant. Journal of Food and Drug Analysis, 22 (3), 391–398. doi: https://doi.org/10.1016/j.jfda.2013.09.049
17. Mykyjchuk, M. M., Ostapyuk, S. D. (2017). The development stages of HACCP system in the dairy processing enterprise. Enerhetyka i avtomatyka, 1, 123–131.
18. Oleksienko, N., Obolkina, V., Dudko, S., Baldyniuk, O. (2015) Some aspects of food safety formation in confectionery industry. Prodovolcha industriya APK, 3, 37–40.
19. Tkachenko, A., Syrokhman, I., Lozova, T., Ofilenko, N., Goryachova, E., Hmelnitska, Y., Shurduk, I. (2019). Research of consumer properties of developed biscuits based on organic raw materials. EUREKA: Life Sciences, 1, 59–64. doi: http://dx.doi.org/10.21303/2504-5695.2019.00849
20. Vasilenko, G., Dorofeeva, A., Golub, B., Mironyuk, G. (2010). A guide for small and medium-sized enterprises of the dairy industry

for the preparation and implementation of food safety management based on HACCP concepts. Kyiv, 194.

21. Burykina, I. M., Vereschagina, N. V., Orlov, Yu. A., Strahov, S. A., Hitrova, G. V. (2003). Sistema NASSR: predposylki vnedreniya i principy razrabotki. Molochnaya promyshlennost', 8, 16–19.
22. Rozrobka NASSR-planu: zastosuvannia piaty pryntsypiv. Propozytsiya. Available at: https://propozitsiya.com/ua/rozrobka-nassr-planu-zastosuvannya-pyaty-pryncypiv
23. Khadieieva, S. O. (2010). Vyznachennia potentsiynykh ryzykiv tekhnolohiyi biskvitnoho vypechenoho napivfabrykatu z dodavanniam dietychnykh dobavok. Visnyk "KhPI", 46, 275–282.
24. Codex Alimentarius Commission. Procedural Mannual (2015). Rome. Available at: http://www.fao.org/3/a-i5079e.pdf
25. Mardar, M., Ustymenko, I., Kruchek, O., Makar, A. (2018). Vykorystannia pryntsypiv NASSR dlia zabezpechennia yakosti ta bezpechnosti produktiv na pidpryiemstvakh rozdribnoi torhivli. Naukovi pratsi ONAKhT, 48, 171–182. doi: https://doi.org/10.15673/swonaft.v0i48.811
26. Ozturkoglu-Budak, S. (2017). A model for implementation of HACCP system for prevention and control of mycotoxins during the production of red dried chili pepper. Food Science and Technology, 37, 24–29. doi: https://doi.org/10.1590/1678-457x.30316
27. Srikaeo, K., Thongta, R. (2015). Effects of sugarcane, palm sugar, coconut sugar and sorbitol on starch digestibility and physicochemical properties of wheat based foods. International Food Research Journal, 22 (3), 923–929.
28. Drobot, V. I., Mykhonik, L. A., Semenova, A. B. (2014). Tekhnolohichni aspekty vykorystannia boroshna spelty u khlibopechenni. Prodovolchi resursy, 2, 15–17.
29. Bojňanská, T., Frančáková, H. (2011). The use of spelt wheat (Triticum spelta L.) for baking applications. Plant, Soil and Environment, 48 (4), 141–147. doi: https://doi.org/10.17221/4212-pse
30. Nazar, M. I., Kocherha, V. I. (2012). Vyznachennia vitaminno-mineralnoho skladu vyrobiv vyrobiv z biskvitnoho tista na osnovi boroshnianykh sumishei i fitokompozytsiyi. Kharchova nauka i tekhnolohiya, 3 (20), 59–62.
31. Svidlo, K. V., Lypova, Yu. O. (2013). Vyznachennia potentsiynykh ryzykiv tekhnolohiyi khlibtsiv tomatnykh herodietychnoho pryznachennia. Visnyk Natsionalnoho tekhnichnoho universytetu KhPI. Ser.: Novi rishennia v suchasnykh tekhnolohiyakh, 11, 124–129.
32. Vodyanka, L. D., Kutarenko, N. Ya. (2013). Prospects for the Implementation of the HACCP System in the Production of Food Products. Rehionalna ekonomika, 1, 185–194.